Strategic Development and Positioning of Petroleum Companies

Master Thesis

by

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I declare in lieu of oath that I composed the diploma thesis in hand by myself using only literature cited at the end of this volume.

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Leoben, September 2007

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List of abbreviations

BBL: Barrel of oil

Bcf: Billion cubic feet of gas

Boe: Barrel of oil equivalent (oil and gas)

Boe/d: Production of barrel of oil equivalent per day

Cf.: lat. confer

EBIT: Earnings before Interest and Tax

EBITDA: Earnings before Interest and Tax, Depreciation, Amortisation

EOR: Enhanced Oil Recovery

E&P: Exploration and Production

HR: Human Resources

LNG: Liquefied Natural Gas

LPG: Liquefied Petroleum Gas

M: Thousand

MM: Million

MMCF/d: Million Cubic Feet per day (gas)

MMTOE: Million Tons of Oil Equivalent

NOC: National Oil Company

p.: page

ROACE: Return on Average Capital Employed

ROI: Return on Investment

SWOT: Strengths, Weaknesses, Opportunities and Threats

VRIO: Value Rareness Imitability Organization

Glossary

Appraisal well: A well drilled to determine the size or to extend an identified oil or gas field.

Barrel (BBL): The standard volume of measure oil products, equal to 159 litres.

Barrels per day (BBL/d): The amount of barrels produced daily by a well.

Barrel of Oil Equivalent (BOE): A measure of hydrocarbon content that converts different oil and gas units into the equivalent unit of barrels of oil.

Billion cubic feet (Bcf): The standard volume measure of gas products, equal to 6,0 million barrels of oil equivalent.

Biomass: Any organic material such as wood, plants and organic wastes that can be turned into fuel.

Cash flow: The amount of cash earned after paying all expenses and taxes. It is a measure of cash inflow and outflow from the business. Positive cash flow means more money is coming into the business than is leaving it. Negative cash flow is converse.

CO_2 injection: A secondary recovery technique in which carbon dioxide (CO_2) is injected into wells as part of a miscible recovery program.

Deepwater: Offshore operations in water depths greater than 300 meters.

Development well: A well drilled in a proven field to complete a pattern or production.

Discounted cash flow: It is the value of an investment (measured in terms of the cash you will put into and receive from it) adjusted for the time value of money. The future cash flows must be discounted in order to express their present values in order to determine the value of a company under considerations as a whole.

Downstream: The term refers to refining, distribution and marketing of refined products.

Dry hole: A well that either produces no oil or gas.

Earnings before Interest and Tax (EBIT): This is the ratio of profit before interest and taxation.

Earning before Interest, Taxes and Amortization (EBITDA): This level of earnings is utilized to communicate the earnings of a company prior to the current corporate tax planning or capitalization considerations. It is used to compare the profitability of a company with other companies of the same size in the same industry which may have different tax situations.

Enhanced Oil Recovery (EOR): Injection of water, steam, gases or chemicals into the underground reservoirs to cause the oil to flow toward the producing wells. It permits more recovery than would have been possible from natural pressure or pumping alone.

Exploration well: A well drilled in order to search an undiscovered reservoir or to extend the limits of a known reservoir.

Farm in: When one company drills wells or performs other activity on another company's lease in order to earn an interest in or acquire that lease.

Farm out agreement: An arrangement in which the responsibility of exploration and development is shifted (by assignment) from the working interest owner to another party.

Gas lift: A recovery method that brings oil from the bottom of the well to the surface by using compressed gas. The gas which is pumped to the bottom of the reservoir mixes with fluid, expands it and lifts it to the surface.

Heavy oil: A type of crude petroleum which can be characterized by high viscosity and a high carbon to hydrogen ratio. It is usually difficult and costly to produce by conventional techniques.

Horizontal drilling: Part of the directional drilling in which the angle of deviation of the wellbore reaches at least 80 degrees from vertical. It maximizes the length of the wellbore exposed to the formation.

Independent: An independent E&P company does not have marketing or refining operations. The company performs upstream operations.

Infill well: Wells placed between known producing wells to further exploit the reservoir.

Integrated: An integrated oil company performs upstream and downstream operations.

Joint venture: A project in which two or more parties (usually oil companies) cooperate. One supplies funds and the other actually carries out the project. Each participant retains control over his share including liability and right to sell.

Lifting costs: Production costs related to the maintenance and operation of company's wells and related equipment and facilities.

Liquefied Natural Gas (LNG): Natural gas which has to be cooled in order to transport it in liquid state by ship.

Liquefied Petroleum Gases (LPG): Hydrocarbon fractions lighter than gasoline such as ethane, propane and butane which are kept in liquid state through compression.

The Majors: The term describes the world's largest non state oil companies. The super majors are ExxonMobil, BP, Royal Dutch Shell, Chevron Texaco, ConocoPhillips, ENI and Total Fina Elf.

Million Cubic Feet (MMCF): The cubic foot is a standard unit of measure for quantities of gas at atmospheric pressure.

Natural Gas Liquids (NGL): Portions of natural gas that are liquefied at surface in lease separators, field facilities or gas processing plants. They include ethane, propane, butane, natural gasoline and condensate.

Net Asset Value (NAV): The value of a single share in a mutual fund, which is determined by dividing the total assets of the fund, minus its liabilities, by the total number of shares outstanding.

Net Present Value (NPV): The present value of a series of future net cash flows that will result from an investment, minus the amount of the original investment.

Offshore: Offshore operations in water depths lower than 300 meters.

Operator: The company or organization that drills the wells to extract hydrocarbons from a particular field.

Permeability: A measure of the ease with which a fluid can pass through the pore spaces of a formation.

Pipeline: A tube or system of tubes used for the transportation of oil or gas.

Proved reserves: Proved reserves of crude oil, natural gas and natural gas liquids are estimated quantities which are according to geological and engineering data with reasonable certainty, at a specific data recoverable in the future from known reservoirs under existing economic and operational conditions. The reasonable certainty can be defined with 90 to 100%.

Refining: It can be described as the manufacturing of petroleum products by a series of processes that separate crude oil into its major components.

Reserves/Production Ratio (years): The R/P ratio is the ratio of proved reserves to production and measures a company's reserve life at existing production levels.

Reservoir: A porous, permeable sedimentary rock formation which contains quantities of oil and/or gas enclosed or surrounded by layers of less permeable rock.

Return on Average Capital Employed (ROACE): Net operating profit after taxes divided by average capital employed.

Return on Investment (ROI): Overall loss or profit on an investment expressed as a percentage of the total investment.

3 D seismic: It is an exploration technique which is used to search for oil and gas in underground structures. The sound from a shot hole is recorded from geophones and interpreted to give a picture of the underlying structures within the earth.

4 D seismic: The newest method of seismic technology makes the monitoring of the movement and the mobility of oil as it is extracted in the production process possible.

Tight gas: Gas contained in rocks with low permeability. Therefore high costly production techniques like fracturing are required.

Upstream: Parts of the petroleum business that relate to the exploration, development and production of oil or gas.

Viscosity: A fluid's resistance to flowing.

Waterflooding: A secondary recovery method in which water is injected into the reservoir to force oil into wells.

Workover: Maintenance procedures performed for a completed well to stimulate production or increase the life of the well.

1 Introduction to the study

The initial situation of the diploma thesis is the state that an uncertain and dynamic environment as well as the shortage of resources result in emerging strategic risks for international petroleum companies. A changing political and economical environment (e.g. oil price) leads to different strategic behavior patterns for Exploration & Production companies which are active worldwide. Especially the exploration and production business is risky and capital intensive. Large sums of money are invested with the risk of a complete loss in case of a dry hole.

The diploma thesis was advertised at the department of economics at the University of Leoben from OMV Exploration & Production GmbH. The task of the diploma thesis is the analysis of the strategic development and positioning of selected petroleum companies in order to identify possible strategic behavior patterns.

The first part of the diploma thesis covers theoretical fundamentals about the strategic management process. It provides a general overview of the single phases of the strategic management process from the development of a vision to the implementation and realization of the strategy. Further on, different concepts and instruments of the strategic management as well as their possible applicabilities are explained. Especially the external strategic analysis which has to consider the global environment, the structure of the branch and the competition can be used to identify environmental influences. It is a major task in the strategic management process and a main part of the diploma thesis. Creativity techniques like brainstorming, brainwriting as well as the decision tree and the morphological box can be used to identify relevant environmental impacts.

The second part of the diploma thesis deals with the practical utilization of the theoretical fundamentals of the strategic analysis and methods. The idea of the work at the OMV Exploration and Production GmbH was that a group of pre- defined E&P companies which are interesting for the OMV AG have to be analyzed out of a strategic background during a time frame from 2000 to 2005.

The identification of possible strategic concepts for petroleum companies by using the brainstorming creativity technique is the basis for the development of the so called E&P focused morphological box which is the heart of the diploma thesis. The morphological box can be used as a tool of the external analysis in order to illustrate different kind of strategic behavior patterns for specific companies.

By applying the theoretical fundamentals of the value chain introduced by Porter, the main activities which are part of the morphological box are defined with exploration & appraisal and development & production. In addition, the morphological box is extended with the segments acquisition, cooperation, human resources and energy portfolio.
Finally, strategic views as well as indicators and possible behavior patterns have to be defined for each segment by using creativity techniques in order to complete the morphological box.

Several petroleum internet data bases as well as annual reports from 2000 to 2005 related to every selected E&P company served as a quantitative and qualitative information source in order to work with the developed morphological box.

A general strategic conclusion of all E&P companies has been performed by separating the defined companies into two different performance groups. The comparison of E&P companies according to defined economic and technical indicators allowed a ranking as well as a differentiation into "weak" and "good" performers. In that way, possible strategic patterns concerning these two groups can be identified by using the morphological box.

Last but not least, the overall strategic analysis allowed drawing conclusions for OMV Exploration and Production GmbH.

2 Strategic management

The term "strategy" has its origin in the Greek word "strategos" which means commander. Strategies are measures to secure the success of an enterprise for a longer time.[1] Strategic management can be defined as a process which is concentrated on the formulation and realization of strategies within an enterprise.[2] It is focused on the structuring of an enterprise as well as on its relationships to the environment. Based on this basic task, the single steps which should be identified are focused on the modification of strategies, the development of the organization as well as on the culture of the enterprise.[3] The process of strategic management is described in figure 2.1.

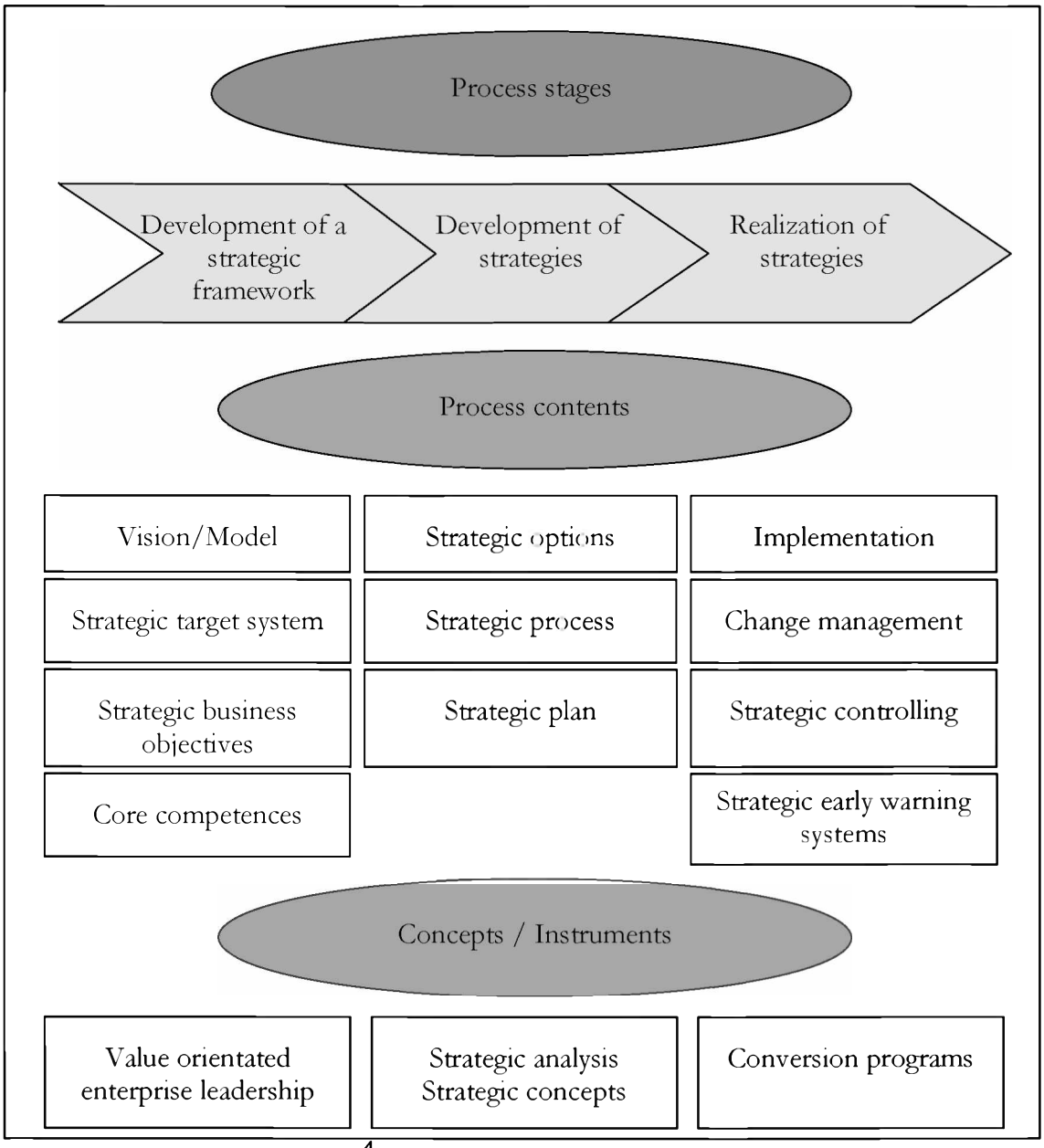

Fig. 2.1 Process of strategic management[4]

[1] Cf. Bea/Haas (1995),p.46
[2] Cf. Laham/Welge (2003),p.19
[3] Cf. Bea/Haas (1995),p.7
[4] Source: Cf. Kohlöffel (2000),p.17

2.1 Development of a strategic framework

Strategies can only be developed by identifying the strategic action framework which covers the vision and mission, the strategic target system, strategic business units and the core competences.

2.1.1 Vision and mission

The vision should be the starting point for every target orientated process. It contains a general imagination about the future role of the enterprise. As a consequence the vision stands on top of the target hierarchy as part of the strategic management.[5] The vision can become a strategic intention if all business units try to reach the desired target. Topics of a vision can be the development of new technologies, materials, products, solutions, value chains, market positions, business units or new regional structures.[6]

The enterprise politics defines the principles of the company in a mission in order to determine the "personality" of the company. The vision as well as the enterprise politics and the mission are strongly connected as shown in Fig. 2.2 provided by Hinterhuber.

Missions are used to put the vision in concrete terms. They deliver the principles to realize the vision. In that way, missions are also defined as guidelines in terms of the right behavior (policies). They should be used as a framework for the behavior of employees with other partners.[7]

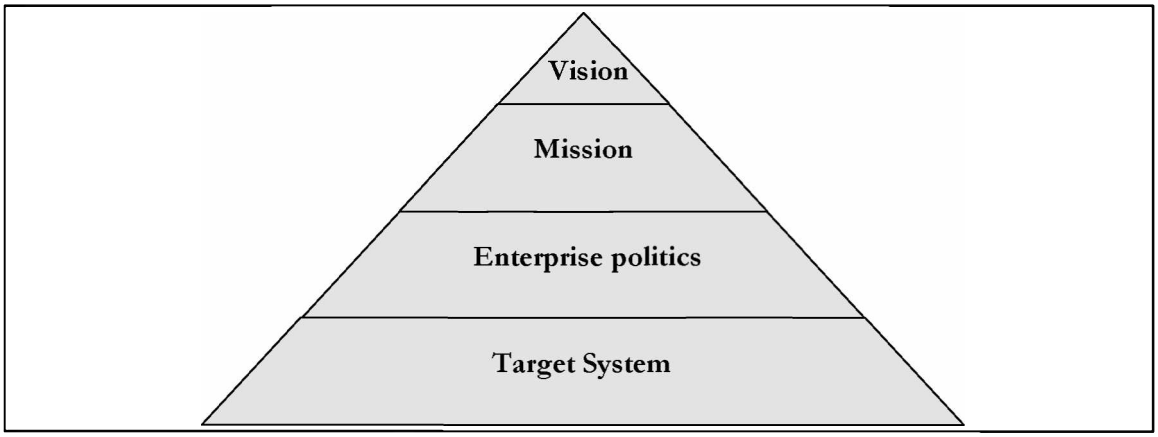

Fig. 2.2 Vision, enterprise politics, mission[8]

2.1.2 Development of a strategic target system

Visions and missions are described abstractly and need to be defined in detail with so called enterprise targets. The targets have to be defined exactly in order to measure the attainment of the target as well as to perform as success control. The following characteristic details have to be taken into account:[9]

- Target content (What is the target?)
- Target size (What is the dimension of the target?)
- Time point (When should it be reached?)
- Responsibilities (Who is responsible?)
- Location (Where is the place of the target attainment?)

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5 Cf. Bea/Haas (1995),p.64
6 Cf. Kohlöffel (2000),p.19
7 Cf. Bea/Haas (1995),p.65
8 Source: Cf. Hinterhuber (1996),p.102
9 Cf. Laham/Welge (2003),p.117

A catalogue of possible enterprise target categories is shown in table 2.1 provided by Al Laham and Welge.

Market performance	Market position	Profitability	Financial	Power	Social in relation to employees
Product quality Product innovation Customer service	Revenue Market share New markets	Profit Revenue	Liquidity Capital structure Creditworthiness	Independence Image Political influence Society influence	Social-integration Personal development Social security

Tab. 2.1 Possible enterprise targets[10]

The formulation of these targets has to contain general features: [11]

- Targets have to be demanding but realistic
- Targets have to be measurable because that's the only way to check the objective, -"if you can't measure it, you can't manage it"
- Massive targets have to be brought down to specific targets
- Targets should be understandable for every one

The formulation of strategic targets is a significant part of the strategic management. The definition of targets is strategically important by looking at the following functions: [12]

Decision function: Targets deliver criteria for the evaluation of alternatives.
Motivation function: Targets are guidelines which should motivate the employees in order to reach the target. A massive motivation can be expected if the employees identify with the company's vision.
Information function: Targets inform employees as well the environment about future activities. A commitment with targets is the consequence of this information.
Controlling function: By setting targets it is possible to check the status of the process. Targets are the basis for drawing a comparison.

2.1.3 Strategic business objectives

A business unit is an independent part of an enterprise which delivers a separated market. It is possible to perform strategic planning for a business unit because it defines own targets. The targets for single business units can be deduced from enterprise targets by going into detail. In that way targets should become more measurable and separated in time. The functional objectives can be achieved out of the business objectives through further target derivations.

The target hierarchy is described in figure 2.3.

[10] Source: Cf. Al Laham/Welge (2003),p.114
[11] Cf. Kohlöffel (2000),p.27
[12] Cf. Bea/Haas (1995),p.67

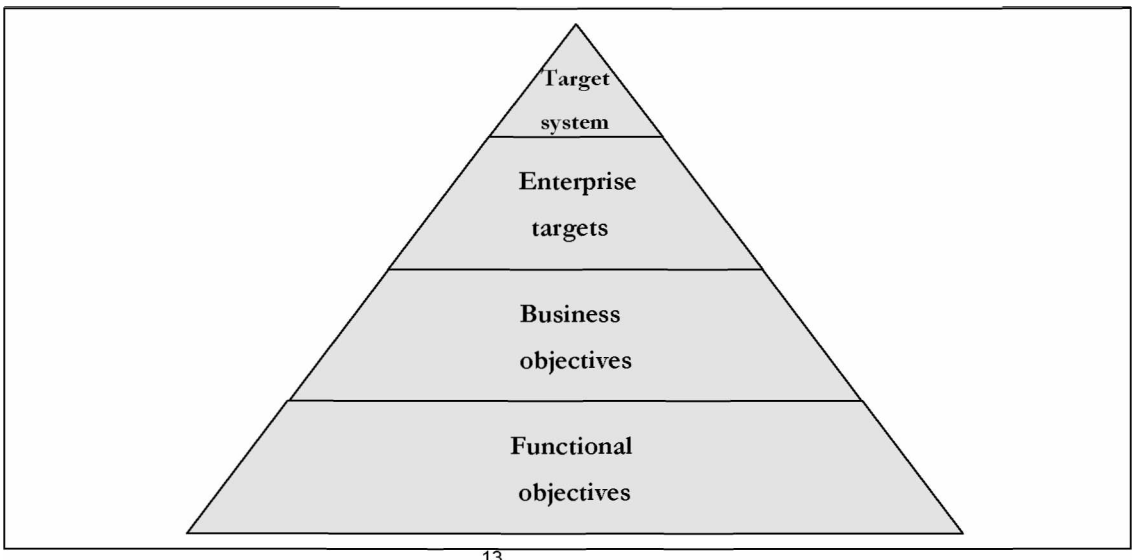

Fig. 2.3 Target hierarchy in strategic management [13]

Indicator systems like the Du Pont system can be used in order to support the target derivation process. The sub targets are derived through target dissolving. The revenue profitability and the capital overturn are sub targets of the Return on Investment (ROI) which is the main target.

This kind of target system can be used to define revenue or market share targets for business units. By going into detail, functional targets can be the determination of cost targets in the production. The single business areas can be controlled by financial target values.[14] The indicator system of Du Pont is described in figure 2.4.

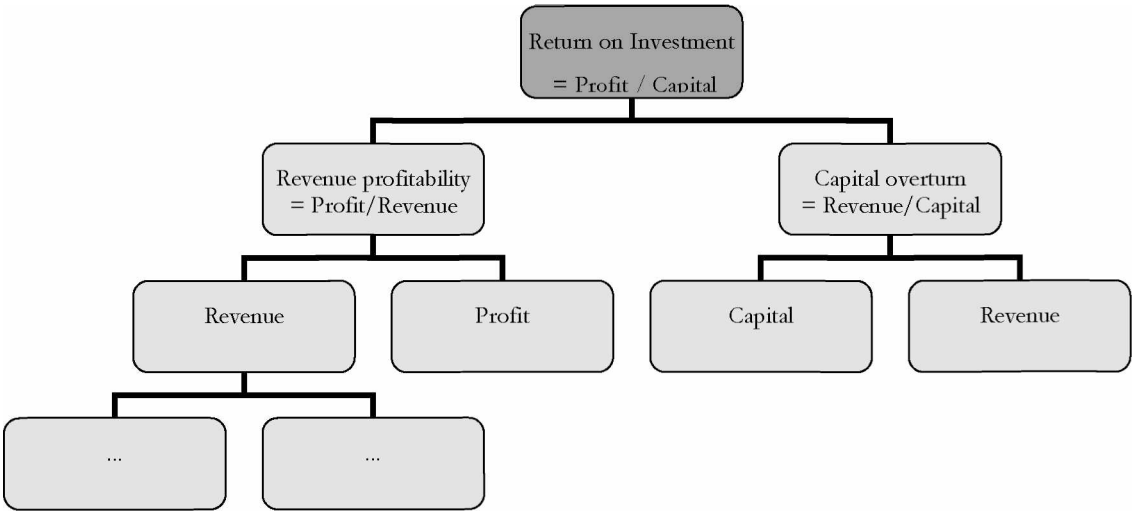

Fig. 2.4 Du Pont indicator system[15]

2.1.4 Core competences

The source of competition advantages of a company is based on the ability of the management to integrate technologies, know how and production into core competences. The most important aspect is the unique combination and coordination of resources with internal learning processes. The costumer should value this combination as an additional profit which influences the strategic success significantly.[16]

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[13] Source: Cf. Bea/Haas (1995),p.64
[14] Cf. Bea/Haas (1995),p.66
[15] Source: Cf. Bea/Haas (1995),p.67
[16] Cf. Hinterhuber (1996),p.122

Barney developed a system in order to identify core competences. The VRIO scheme (Value Rareness Imitability Organization) which consists of four questions can be used to identify strategic core competences.[17]

1. The Question of **Value**: Do a firm's resources and capabilities enable the firm to respond to environmental threats and opportunities?
2. The Question of **Rareness**: How many competing firms already possess particular valuable resources and capabilities?
3. The Question of **Imitability**: Do firms without a resource or capability face a cost disadvantage in obtaining it compared to firms that already possess it?
4. The Question of **Organization**: Is a firm organized to exploit the full competitive potential of its resources and capabilities?

Core competences should have a strategic value. As a consequence they have to improve the competition position as well as the efficiency of the enterprise. Resources become core competences if they use the strengths of the enterprise and reduce environmental risks.[18] The second question covers the rareness and uniqueness of core competences. Experiences and abilities which are the same for all enterprises of a branch do not create differentiation advantages but they allow a competition comparison.[19] The third part of Barney's VRIO scheme defines resources as core competences if they can not be imitated by competitors. Routines and abilities which can not be imitated are a major source of efficient competition positions.[20] The last aspect tries to find out if organization structures, processes and management systems are available which can use the potentials of core competences. In that way, core competences can only be formed through the interplay of abilities and routines with supporting structures, processes and systems of the enterprise. Finally resources can be classified as core competences if Barney's questions can be answered with "yes".[21]

Core competences have to be transformed into core products. Core products are components which play an important role in developing the final product. The main characteristic of core products is the ability to transfer them into different final products.[22]

2.1.5 Value orientated enterprise leadership

2.1.5.1 Stakeholder value principle

An intensive consideration of the environment around the enterprise is based on the stakeholder principle. Stakeholders can be attachment, interest or demand groups which are affected by the enterprise. As a consequence, they follow certain interests in an enterprise.[23] Entrepreneurial operations lead to different relationships with stakeholders like costumers, suppliers, investors, employees, societies and states. All these kind of stakeholders contribute to the value increase in the enterprise. On the other side, the enterprise has to create an adequate value increase for all of these stakeholders. If this is not the case, customers could choose other competitors, suppliers could serve other customers, investors could finance other enterprises and employees could change their workplaces.[24] In that way, the leadership of the enterprise should be concentrated on the extension of business values.

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[17] Cf. Barney (2002),p.145
[18] Cf. Al Laham/Welge (2003),p.267
[19] Cf. Barney (2002),p.149
[20] Cf. Barney (2002),p.150
[21] Cf. Al Laham/Welge (2003),p.268
[22] Cf. Kohlöffel (2000),p.32
[23] Cf. Bea/Haas (1995),p.90
[24] Cf. Donovan/Tully/Wortman (1998),p.19

Different kind of stakeholder relationships are introduced in figure 2.5 by Kohlöffel.

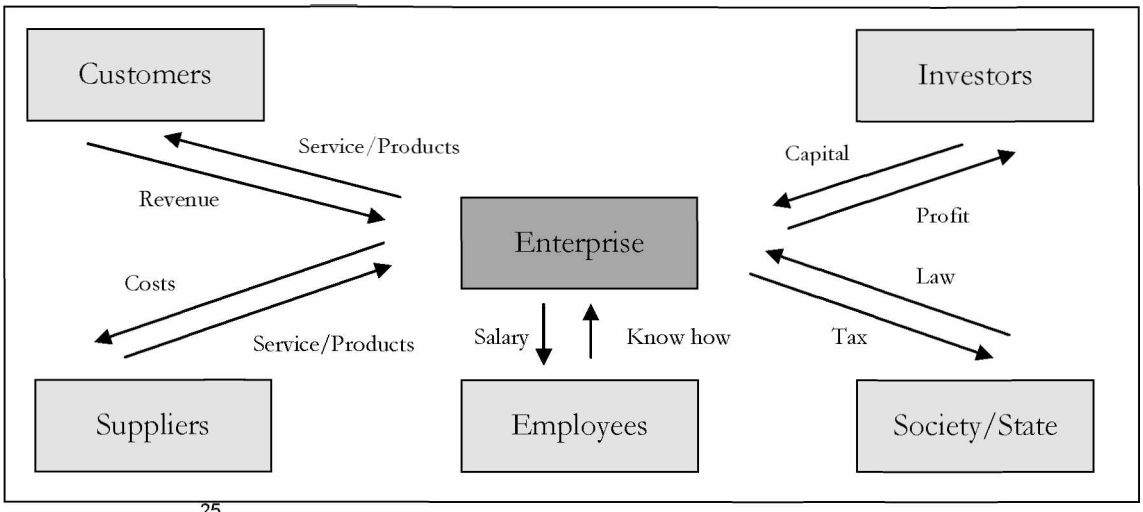

Fig. 2.5 Stakeholder [25]

Customers: A customer value can be created if the customers get a special profit in comparison to a cheaper price in the competition or if the prices are identical but the profit for the offer is larger in comparison to other alternatives. A company can extend its market position if it fulfils these demands. The offered performance and the price play an important role for the customer profit.
Suppliers: The suppliers try the reach a good price for their products and services. They are interested in stable supply relationships to secure their businesses.
Society/State: The society as well as the state represent the framework for entrepreneurial operations. On the other side, the company supports the gross national product and the prosperity of the society.
Investors: Investors are very sensitive concerning the profit expectations. A good indicator is the development of the exchange rate in the stock exchange. The exchange rates of some companies showed a downwards trend even with high revenue growths because the investors expected a bigger increase.
Employees: During the last years, the role of the employees in a company has changed. The classification was shifted from high cost production factors to the most important resource of a company. It is impossible to increase the business value without the working performance of motivated and creative employees.[26]

2.1.5.2 Shareholder value principle

Since the beginning of the eighties the shareholder value became an important strategic target. The general principle is the evaluation of an enterprise by the investor or shareholder. A company has success if the value which is created by the investor increases. A value can only be created for an investor if all the stakeholders are considered too. As a consequence there is an intensive connection between the stakeholder- and shareholder concept.

Every strategy should be focused on the creation of a shareholder value. A single general target is defined by the enterprise as a long term success indicator. Examples can be indicators of the value orientated management like the EVA and variants of the discounted cash flow. The EVA can be calculated as the difference between the profit in the sense of net operating profit after taxes (NOPAT) and capital costs. An enterprise generates shareholder value if it makes profit above its capital costs. On the other side, shareholder value is destroyed if the profit of the enterprise is below the capital costs.[27]

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[25] Source: Cf. Kohlöffel (2000),p.40
[26] Cf. Kohlöffel (2000),p.41
[27] Cf. Kaplan/Norton (2001),p.76

The shareholder value can be calculated if borrowed capital is subtracted from the enterprise value. The enterprise value can be found if the future operating cash flow paid interest at the decision time point. This procedure is also defined as discounted cash flow method. The cash flow in this case is the difference between yields and costs.

Cash flow = Cash inflow – Cash outflow

The long term capital costs of the company are taken as the calculation interest rate. The shareholder value is equal to the market value of the company if the capital market is perfect. In general the shareholder value can be used as a criterion to evaluate strategies. A strategy is successful if the property value of an enterprise increases by following a new strategy in comparison to the value which was achieved by the former strategy. In addition, the shareholder value is used as a controlling instrument. It is possible to judge if the leaders of the company could expand the shareholder value in the sense of the investors.[28]

The shareholder value concept expects strategies which increase the enterprise value systematically. The following questions have to be considered:

1. How do you plan strategies which follow the target of creating values for shareholders?
2. Which kind of influences have alternative strategic plans on the shareholder value?
3. Which business units favour or damage the shareholder value?

The general direction of strategic management can follow the described principles:

Expected profit	Basic direction of the strategic management
Smaller than capital costs	No growth Restructuring Reducing costs or divestitures
Equal as capital costs	Substitute investment to maintain the business Improvement of profitability is more important than growth
Larger than capital costs	Growth investment to expand the business Maintaining profitability

Tab. 2.2 Business politics under shareholder value aspects[29]

2.2 Development of strategies

The vision as well as the target system are the basis for the development of a general direction or a strategy for the enterprise. Strategies are used to achieve sustainable competition advantages. These advantages can be reached if the own operations deliver a bigger profit for the customer as the operations of the competitors.[30]

[28] Cf. Bea / Haas (1995),p.70
[29] Source: Cf. Kohlöffel (2000),p.46
[30] Cf. Kohlöffel (2000),p.68

2.2.1 Strategic base concepts

Porter defined three types of strategic concepts to be successful in the competition within in the same line of business. These three strategies are introduced in table 2.3.

- Overall cost leadership
- Differentiation
- Focus on main points

		Strategic advantage	
		Singularity from the customer's view	Cost leadership
Strategic target object	Over all business segments	**Differentiation**	**Overall cost leadership**
	Focus on one segment	**Focus on main points**	

Tab. 2.3 Three strategies[31]

A company which can not develop a strategy in one of these three directions has a bad strategic position. In that way the enterprise should make a strategic fundamental decision as described in the two chairs hypothesis introduced by Porter. The enterprise has to set significant steps in order to reach cost leadership, it has to concentrate on a target object or it has to create a kind of uniqueness through differentiation. The U-Curve model provided by Porter describes different kind of relationships between the market share and the profitability. A consequence of the two chairs strategy in same branches can be that small enterprises which have chosen the differentiation or focus strategy and bigger enterprises with a cost leadership strategy are more profitable than enterprises of medium size.[32] This leads to a U-Curve relationship between market share and profitability as described in figure 2.6.

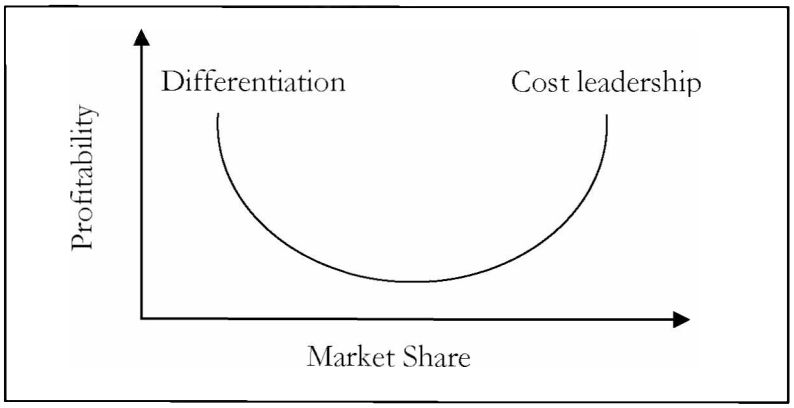

Fig.2.6 U-Curve[33]

2.2.1.1 Overall cost leadership

The principle behind this strategy is the achievement of an overall cost leadership over a line of business. Basis of a cost leadership are a massive construction of efficient production plants, strong control of variable costs as well as avoidance of cost reductions in the areas of development, research, service and advertising. The analysis of the cost behavior is a main part of this kind of strategy. Porter defined ten major cost drivers which are responsible for the amount of costs.[34]

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[31] Source: Cf. Porter (1999),p.75
[32] Cf. Porter (1999),p.79
[33] Source: Cf. Porter (1999),p.81
[34] Cf. Porter (1999),p.71

Economies of scale: Scale effect means the reduction of unit costs through the extension of business.
Learning effects: Economies of learning are possible especially in repeating operations in the production area. They should reduce the costs. The learning curve is described in chapter 2.2.6.2.
Structure of capacity: Fix costs degression effects are possible if an activity shows a large fix costs intensity.
Synergies: The cost analysis has to cover all activities which are connected. Connections are present if the costs of an activity are influenced by the realization of other activities.
Economies of scope: Synergy effects between business units of an enterprise which are present by performing activities or transferring know how can lead to cost reductions.
Integration: The level of vertical integration of an activity influences the costs.
Time point: The time decision of a market entry can influence the costs in different ways. An early market entry may lead to a favourable position on the learning curve but on the other side uncompleted production technology is available.
Enterprise decisions: Corporate decisions which influence costs directly cover decisions about the product differentiation, product offer as well as quality- and service level.
Location: Parameters like infrastructure, regional salary level, rate of taxes or energy access influence the costs.
Surrounding factors: These factors cover the influences of state or society.[35]

2.2.1.2 Differentiation

The principle behind the differentiation strategy is to achieve a customer commitment by offering a unique product or service. The differentiation can cover the design, technology, service or a special brand name.[36]

The so called value chain can be used to identify the sources of the differentiation. Every activity in the value chain can contribute to a differentiation. A successful differentiation strategy leads to high profits because of competition advantages. It isolates the competition because it achieves a customer commitment and a reduction in price sensitivity. The created customer loyalty as well as the uniqueness of the product forms entry barriers. In addition, higher profits and rare alternatives reduce the power of suppliers and customers. [37]

2.2.1.3 Focus on main points (niche strategy)

The niche strategy is focused on a special customer segment, on a part of the product program or on a special geographic market. This type of strategy works on a special target and every instrument is used to achieve the target.[38]

A company which concentrates its activities on a special market segment can solve the task more efficiently as other competitors which are operating in a larger business area. Afterwards, a niche strategy can focus on a differentiation or on a cost leadership way.[39]

Wright analysed the niche strategy and observed several conditions as well as risks for this kind of strategy. An important point is the ability to segment the market. Markets which offer products with a high differentiation level provide more possibilities for a niche strategy as markets with standard products. As a consequence of small sales volumes, the niche strategy should be used in small and medium business units. The major risk of successful niche strategies is the imitation of the offered products or services by market leaders which operate in the whole market.[40]

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[35] Cf. Al Laham/Welge (2003),p.385, cited after Porter
[36] Cf. Porter (1999),p.73
[37] Cf. Al Laham/Welge (2003),p.391
[38] Cf. Porter (1999),p.75
[39] Cf. Al Laham/Welge (2003),p.392
[40] Cf. Wright (1987),p.96

2.2.2 Strategic options

The strategic option describes the development direction for a business unit. The main development directions are defined with the growth and withdrawal strategy.[41]

2.2.2.1 Growth strategy

The strategy of growth is focused on changes. The growth of an enterprise can be encouraged by a market penetration, a product development, a market development and a diversification. Table 2.4 describes the product/market matrix.

Product / Market	Existing	New
Existing	**Market penetration**	**Product development**
New	**Market development**	**Diversification**

Tab. 2.4 Product/market matrix[42]

Market penetration: The basic idea of this strategy is the increase of sales with existing products on present markets. The main target is the extension of the market share. It can be achieved through an aggressive price politics, training of sales staff as well as through an increase of the advertisement budget.
Product development: The strategy of product development is given if existing markets are delivered with new products. The main targets behind this strategy are a sustainable growth in combination with increasing market shares. In addition, these strategies try to substitute a product. The old products should be substituted by new ones on the existing markets. Product innovations require investitures in research and development to avoid the break down in the market.
Market development: By performing this strategy, an enterprise is searching for new markets for already developed products. As a consequence, new customer relationships as well as distribution channels have to be reached and developed.
Diversification strategy: The enterprise tries to develop new markets with new products.[43]

These types of growth strategies which are based on own operations and resources are called endogenous. Exogenous growth has its origin in strategic alliances. The following types of strategic alliances can be distinguished: [44]

- Long time contracts (supply or sale contracts)
- Licenses (production, technology, service rights)
- Cooperations in research & development, production or distribution
- Joint ventures (starting a third party company)
- Merger of companies

2.2.2.2 Withdrawal strategy

Withdrawal strategies are often used if the company wants to focus the operations on its core competences. Some activities are outsourced because other companies offer better or cheaper solutions.[45] Harrigan introduced the following withdrawal strategies in case of a stagnated and degenerated branch. [46]

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41 Cf. Kohlöffel (2000),p.74
42 Source: Cf. Ansoff (1988),p.109
43 Cf. Bea/Haas (1995),p.157
44 Cf. Kohlöffel (2000),p.74
45 Cf. Kohlöffel (2000),p.75
46 Cf. Harrigan (1980),p.15

Increase the investment: This kind of strategy is used in order to maintain or achieve a dominant role in the market. The intention of this strategy is based on a possible takeover of market shares from liquidated competitors.
Hold the present investment level: This defensive strategy should be used to hold the competition ability of the company.
Shrink selectively: The basis for this kind of strategy is the combination of a divestment and an investment strategy. High profit segments have to be encouraged and non profit segments should be divested.
Milk the investment: This kind of strategy is performed to reduce the investment slowly in order to cut the costs.
Divest now: This strategy is used by leaving the market. The capacities of the company are shut down.

2.2.2.3 McKinsey matrix

The McKinsey matrix can be characterized in comparison to the BCG matrix which is described in chapter 2.2.6.3 as a multi factors concept. The success of strategies is determined by different strategic factors. The environmental dimension which is described with "Market attractiveness" can be defined by the market growth, market size, market risk, market entry costs, competition situation, price elasticity as well as by the investment attractiveness. The enterprise dimension which is defined with "Competitive strength" covers for example the relative market share, product quality, distribution politics as well as location, price and sale advantages. These two dimensions can be described quantitative as well as qualitative. The single indicators have to be transferred into point values which are summarized into an overall value. In that way, the calculation of the numerical shape of a strategic business unit in relation to its success potential is possible. The two key dimensions are characterized through the categories "low", "medium" and "high". The consequence is a nine fields matrix which leads to three main areas. These areas are the zones of means attachment and release as well as the so called selective area. This main scheme makes the derivation of three norm strategies possible. [47]

Investment and growth strategies: The strategies are suitable for success objects which show a high market attractiveness and competitive strength. This kind of product market combinations contribute to the growth and the future profits of the enterprise. The relative competitive strength has to be secured with further investments to extend the capacities and the market position. The sustainable improvement of the profit as well as the creation of a strong market position are the main intentions of these kind of strategies.
Skim off and divestment strategies: These kind of strategies are related to success objects which have a small success potential. The strategic direction of the business unit is focused on the skim off of profits, on the short term achievement of profits as well as on the maximization of the cash flow.
Selective strategies: Strategic recommendations for success objects which are positioned in the middle field of the matrix are difficult to define. An offensive investment strategy is suitable for success objects which can be characterized by high market attractiveness in order to increase the minor competition strength. On the other side, considerations about a withdrawal have to be made if the competition intensity is too high.

[47] Cf. Al Laham/Welge (2003),p.349

The main scheme of the market attractiveness and competition strength matrix is introduced in figure 2.7.

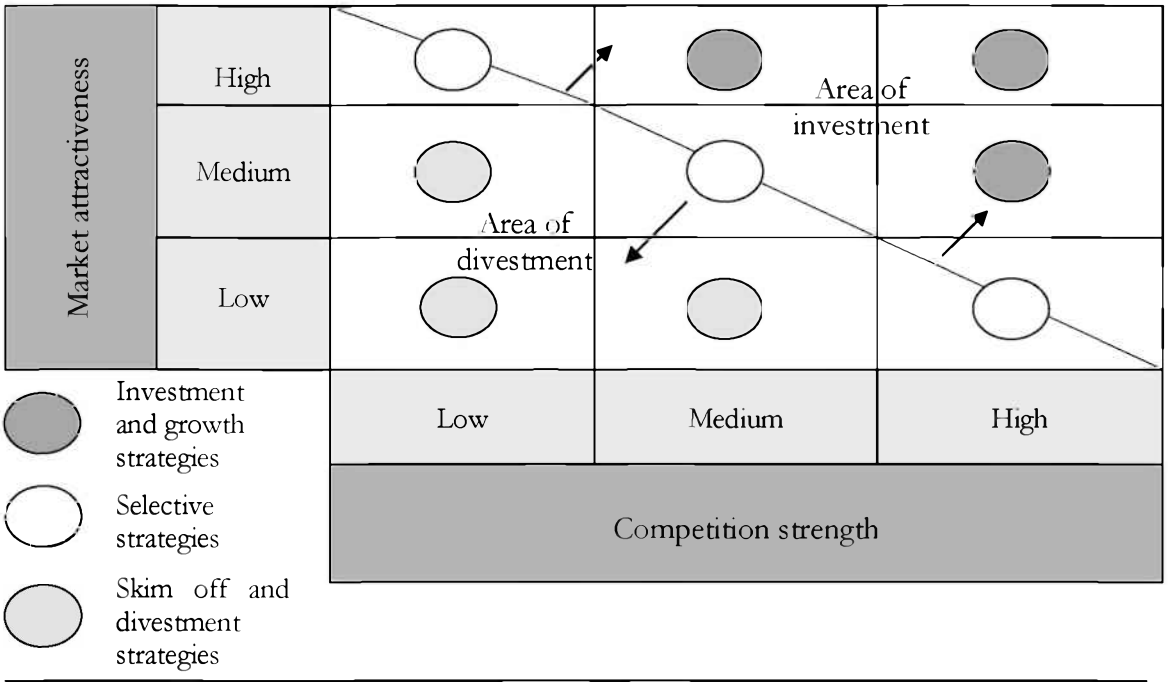

Fig. 2.7 Basic scheme of market attractiveness and competitive strength matrix[48]

2.2.3 Strategic process

The general strategic process is described exemplary by Kohlöffel in order to get an idea about the practical realization. The strategic development process is organized as a project if a strategic plan is initiated for the first time. The project organization covers a project team, a professional support and a committee.

The project team consists of experienced employees who think strategically. The team is responsible for the project management, for the development of strategic ideas as well as for the preparation of workshops and presentations.

Professional support can be provided by internal employees as well as through external strategic advisers. They have to perform workshops in order to define the strategic target system. In addition, this team has to prepare data and analysis.

The committee consists of the management of the strategic business unit as well as of representatives in higher enterprise levels. The group defines the members of the project team, sets time points of workshops and encourages the realization of results.

In general, three management workshops can be performed in the development process of a strategy. The first workshop is used to define a general strategic framework. Targets of the first phase should be the vision and mission as well as the formulation of the strategic target system.

The results of environmental analysis are needed in the second workshop. The conclusions are used to work out the strategic initial situation of the business unit or the enterprise.

Part of the third workshop is the development of a strategic plan which consists of the prepared targets and strategies. Finally, the responsibilities as well as the time points for the realization of the concept have to be defined.

The strategic development process should be worked out once a year if a strategic plan already exists. It is useful to check and redefine the validity of the target system every year.

Dealing with topics of strategic planning is an important task for every business unit management. A successful strategic plan is given if environmental changes can be observed early.[49]

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[48] Source: Cf. Al Laham/Welge (2003),p.351

[49] Cf. Kohlöffel (2000),p.113

2.2.4 Strategic plan

The base strategy of a business unit can be written in a so called strategic plan. This plan consists of the description of the strategic environment and the business unit.
The description of the environment with the help of market, competition, and customer data shows chances and risks which can be used to define conclusions for the own operations. The environmental analysis is used to check if the planned business development can be realized under the existing environment situation.
The business part contains data concerning the targets and development of the business unit. Especially, the revenue, market share and EBIT development are main topics of this part.
Measures have to be worked out for the major parts of the strategic plan. They describe the way to reach the target. The conversation as well as the control of the strategic plan is possible by setting time points and defining responsibilities.
The internal communication of the strategic target as well as of the plan itself play a significant role to reach the desired target. Strategic plans are defined by responsibilities of the business unit but lots of employees participate in the conversation. Employees have to know the main topics of the strategic plan to focus the whole organization on the common targets and strategies.[50] The structure of a strategic plan is provided by Kohlöffel in table 2.5.

Environmental analysis		Business unit plan
• Market data • Competition situation • Distribution channels • Purchase criteria of customers	Consistency check	• Revenue • Market share • EBIT • Employee • Measures/Milestones

Tab. 2.5 Structure of a strategic plan[51]

2.2.5 Strategic analysis

The environmental as well as the enterprise analysis can be used to define enterprise strategies with the so called SWOT concept which is described in chapter 2.2.6.1. The enterprise analysis is performed to identify the strengths and weaknesses of the company. The opportunities and threats can be analyzed with the so called environmental analysis.[52] The connection between the environmental and enterprise analysis is shown in figure 2.8 provided by Bea and Haas.

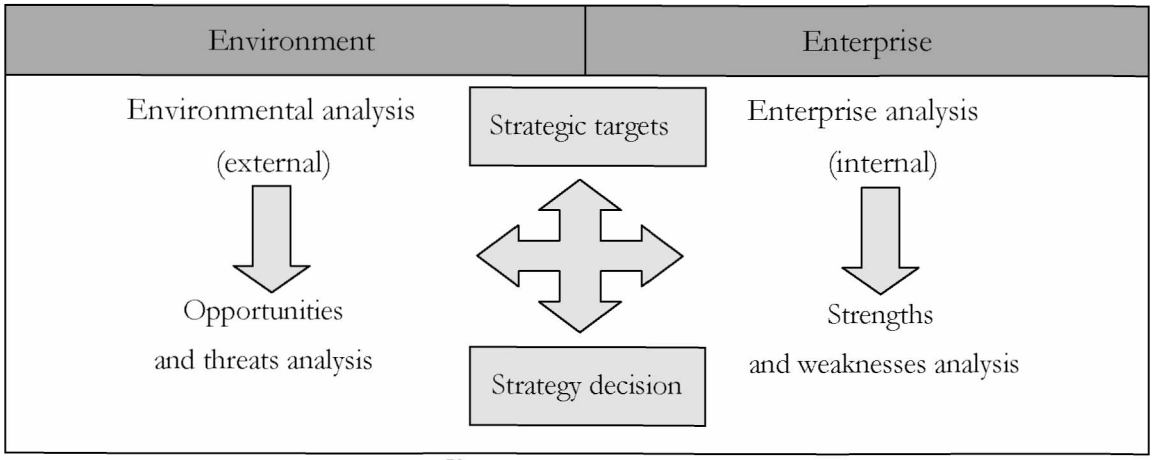

Fig. 2.8 Environmental and enterprise analysis[53]

[50] Cf. Kohlöffel (2000),p.119
[51] Source: Cf. Kohlöffel (2000),p.119
[52] Cf. Al Laham/Welge (2003),p.187
[53] Source: Cf. Bea/Haas (1995),p.94

2.2.5.1 Environmental analysis (external)

The external or environmental analysis has to consider the global environment, the structure of the branch and the competition. Identifying of environmental influences is a major task in the strategic management process.[54] The different steps of the environmental analysis can be described by the following way.[55]

1. **Scanning:** This part tries to identify all kind of stakeholder groups. The result can be a so called stakeholder map.
2. **Monitoring:** The second step covers the identification of relevant trends which are important for the enterprise. The main task is the detection of targets, arguments and instruments in order to realize targets of identified stakeholder groups.
3. **Forecasting:** The third part finds out the direction, extension and intensity of environmental changes. Threat potentials can be studied by using techniques like trend or scenario analysis.
4. **Assessment:** The last step evaluates the results of scanning, monitoring and forecasting in order to identify threats or opportunities for the enterprise. Afterwards, the searching of strategies can be initiated.

2.2.5.1.1 Global environment

The global environment of companies can not be controlled or influenced in comparison to the competition environment. It acts as a data framework to which the enterprise has to adapt itself. The task of the analysis of the global environment is the identification of changes in the relevant environment segments. The resulting consequences for the companies have to be defined. Al Laham and Welge defined four relevant segments of the global environment which have to be analyzed.[56]

Economic factors:

- Interest rate
- Exchange rate
- Inflation rare
- Credit worthiness

Socio cultural factors:

- Population mix
- Demography of population
- Values and attitude of society
- Educational level

Technological factors:

- Technological development in the industry
- Technological development in alternative branches of industry
- Product and process innovations
- Environmental technology

Political factors:

- Political ideology of government
- Political stability
- Legislation of the government, states or rural communities
- Competition laws

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[54] Cf. Al Laham/Welge (2003),p.187
[55] Cf. Bea/Haas (1995),p.91
[56] Cf. Al Laham/Welge (2003),p.190

2.2.5.1.2 Structure of branch

The structural characteristics of a branch can be described by the five forces concept which was introduced by Porter. The intensity and dynamic of the competition determine the structural characteristics of the branch.[57]

The five major competition forces are shown in figure 2.9 provided by Porter.

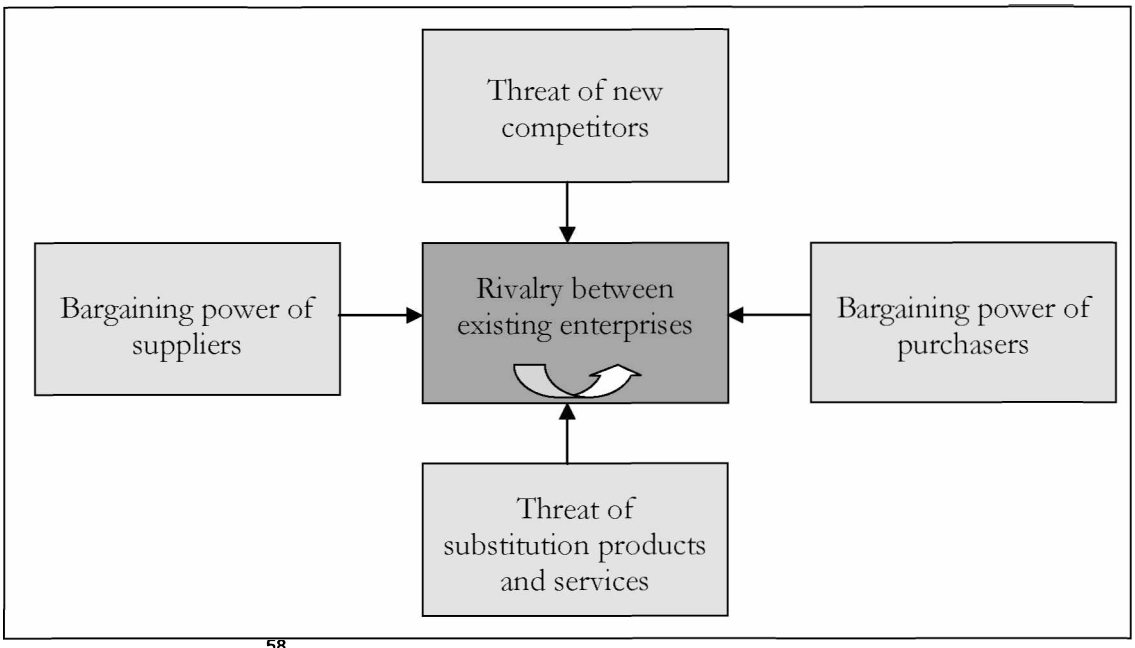

Fig. 2.9 Five forces concept[58]

1.) Threat of new competitors

The threat of new competitors depends on the market entry barriers for newcomers. The height of theses barriers is influenced by the following factors: [59]

Product differentiation: Products of known enterprises are already on the market. Differentiation creates new entry barriers because the competitors have to pass existing customer loyalties.
Economies of scale: New competitors have to enter the market with lower number of pieces to achieve the so called fix costs degression effect.
Capital requirement: Passing market entry barriers often needs a massive investment in research and development.
Market identity: Established brands or products are characterized by a strong customer preference.
Access to distribution: Established enterprises use or own existing distribution channels through signed contracts. Building up new distribution systems demands high initial investments of competitors.
Regulations by the state: The state can encourage the market entry through the aid for existence foundations or by providing subsidies. On the other side, monopolies by the state can be significant market barriers for newcomers.
Absolute costs advantages: Present competitors have costs advantages if the average costs (independent of the production) are smaller than the costs for the newcomers. Reasons for this case can be know how, experience and technology of the established enterprises.

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[57] Cf. Porter (1999),p.33
[58] Source: Cf. Porter (1999),p.34
[59] Cf. Al Laham/Welge (2003),p.198

2.) Bargaining power of suppliers

Suppliers can use their bargaining power by calling for higher prices, reducing quality or cutting down the supply. The power of suppliers is considerable if the concentration level in the supply segment is high and if the substitution possibility of input products is low. A massive supply power can be expected if lots of purchasers depend on a small group of suppliers which delivers significant input products.[60]

3.) Threat of substitution products and services

Substitution products cover the same functions as original products of the branch. These products define the highest price level which can be determined by an enterprise. Substitution products have to be considered if they can improve the price/performance relationship against a product of the branch and if the producers achieve high profits. The position against substitution products can be strengthened by common strategies of established competitors like publicity campaigns or formation of unit production standards (collective operations).[61]

4.) Bargaining power of purchasers

The five forces concept defines purchasers as a competition force which can influence the profit of the branch by calling for lower prices, higher qualities and services. The bargaining power of purchasers is given by looking at the following conditions: [62]

Concentration level of purchasers: A purchasers group which is small but powerful can influence the offer structure massively.
Value of products: The purchasers will react with a price sensitive and selective purchase behavior if the products cover the main part of the purchase budget.
Standardization level of products: Products which are not differentiated increase the bargaining power of purchasers because they can always find alternative products.
Threat of backwards integration: Purchasers can bargain concessions through the threat of backwards integration. In addition, purchasers which are partial integrated produce single products and buy the rest from external suppliers. As a consequence, the knowledge of production costs can be used in the bargaining process.
Market transparency: The bargaining power of purchasers is tremendous if they have information about the demand, the market prices and the costs for suppliers.

5.) Rivalry between competitors

The rivalry between competitors within the branch is expressed in price competitions, advertising, free service and guarantee performances as well as in the introduction of product innovations.

The rivalry level of competitors in the branch depends on the following structural factors: [63]

Level of product differentiation: The consequence of a missing product differentiation is an intensive price competition. Product differentiation can protect against a massive competition.
Rearrangement costs: The competition intensity will be higher if the customers could not be bind to the own product.
Market exit barriers: The competition of established competitors is intensive if the market exit barriers are high. Competitors are forced to stay in the market. Examples of these kind of barriers are staff costs, value reduction of plants as well as emotional relationships with present operations of the enterprise.
Culture of the branch: There are traditional branches which are strong competitive like the trade and branches with a moderate competition level like the insurance or banking sector.

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[60] Cf. Bea/Haas (1995),p.84
[61] Cf. Porter (1999),p.56
[62] Cf. Al Laham/Welge (2003),p.202
[63] Cf. Bea/Haas (1995),p.87

2.2.5.1.3 Competition analysis

The analysis of competitors plays a major role in the strategic concept of an enterprise. The strongest competitors as well as smaller ones have to be considered. Porter introduced four steps which should be part of a competition analysis.

1.)Future targets of competitors: The knowledge about these targets allows to analyze if a competitor is satisfied with the present situation as well as with its financial results. Further on, a prediction of a possible strategy change can be made.

2.)Identification of assumptions: Assumptions of competitors must be divided into two groups.

- Assumptions of the competitor about the own situation (for example about the own strengths)
- Assumptions of the competitor about the branch and the other enterprises (for example assumptions about the branch trend)

Chances for the own enterprise are given if the assumptions of the competitor are not realistic. Reasons for these wrong assumptions can be historical connections with a special behavior.

3.)Development of statements concerning the present strategy of competitors.

4.)Assessment of competitor's abilities: The strengths and weaknesses of a competitor determine the ability to perform strategic reactions.

The combination of these elements can be used to create a reaction profile of the competitor. It contains a prediction about the aggressive operations as well as of weaknesses of the competitor.[64]
Competitors can be arranged in so called strategic groups to simplify the analysis process. The analysis of strategic groups covers the whole branch as well as the single competitor.
This kind of analysis delivers information about the intensity of the competition as well as about the profit potential of a branch. The profit potential is influenced by the rivalry level between strategic groups. In general, the competition within a group (intra group competition) is expected to be larger than the competition between different groups (inter group competition). The inter group competition increases if the number of groups within a branch increases and if the size differences between groups decrease.
The strategic group analysis identifies marginal groups. Unimportant groups contain competitors which have the intention to leave the branch. These candidates can be possible competitors if they enter a new group.
In addition, strategic trends can be identified which can be used for further prediction of the branch development as well as of the future competition intensity in the market.
Enterprises within a group are influenced by competition measures in the same way. Similar reaction behaviors can be observed which can be predicted by knowing the groups.[65]

2.2.5.2 Enterprise analysis (internal)

The target of the strategic planning is the coordination of potentials of the enterprise with the demands of the environment. As a consequence, the external analysis has to be combined with the internal analysis to reach a system of strategic success factors. These factors are used to identify strengths and weaknesses of an enterprise.[66]

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[64] Cf. Porter (1999),p.86
[65] Cf. Al Laham/Welge (2003),p.228
[66] Cf. Bea/Haas (1995),p.94

2.2.5.2.1 Value orientated analysis

In general, the value added can be defined as the difference between the performance which was delivered by the enterprise and the performance which was taken over by the enterprise (pre-performance).[67]

Value added = Overall performance – Pre- performance

The value added which is described in figure 2.10 can be seen as a balance of value streams between customers and enterprises on one hand side and between suppliers and enterprises on the other hand side. The value added is the amount which is left for the distribution among employees, equity capital investors as well as borrowed capital investors. In addition, the value added can be used to maintain and develop the enterprise.[68]

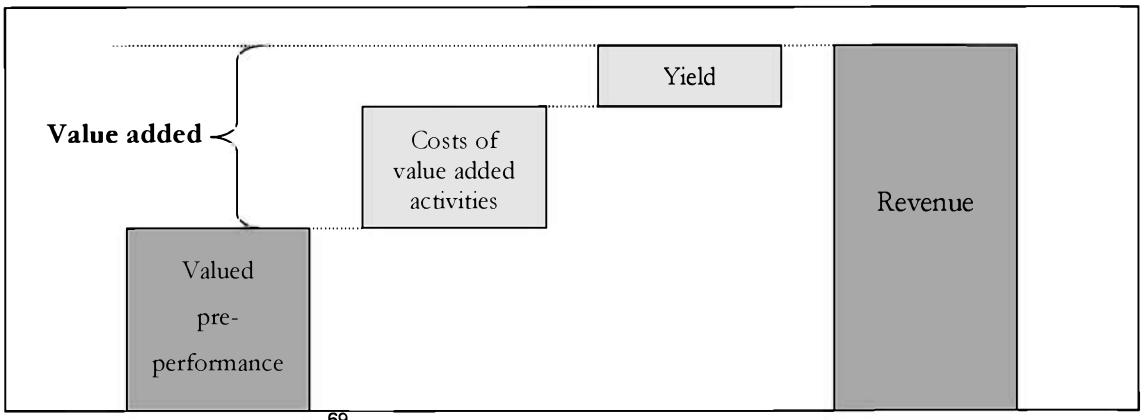

Fig. 2.10 Definition of value added[69]

The enterprise analysis introduced by Porter is based on value chains. The value chain defines the overall value and consists of the profit range as well as of value activities. These activities which are physical and technological distinguishable create a value for customers. The profit range is the difference between the sales and the sum of costs which appeared by performing value activities. Porter divided the value chain into primary and supporting activities. The structure of the value chain is shown in figure 2.11.

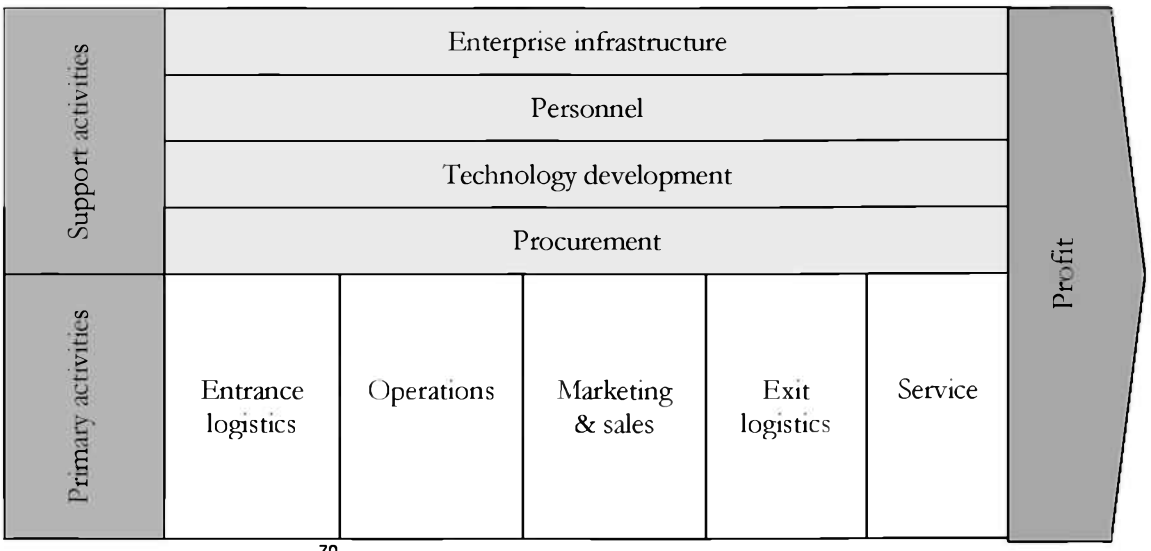

Fig. 2.11 Structure of value chain[70]

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[67] Cf. Kohlöffel (2000),p.164

[68] Cf. Kirsch (1991),p.521

[69] Source: Cf. Kohlöffel (2000),p.164

[70] Source: Cf. Al Laham/Welge (2003),p.245

Primary activities cover the entrance logistics, operations, marketing & sales, exit logistics as well as service.

- **Entrance logistics:** Arrival, storage and distribution of resources and raw materials.
- **Operations:** Activities which are related to the transformation of inputs into outputs.
- **Marketing & sales:** Advertising activities or field services to market the product.
- **Exit logistics:** Operations which cover the storage and distribution of the final product.
- **Service:** Service activities which are performed to maintain the value of the product.

The supporting activities cover all operations which are used to perform the primary ones.

Procurement: This category covers the purchase of inputs which are used in the value chain. Procurement has a strategic relevance because it influences the costs and qualities of the inputs.
Technology development: This element contains all activities which are related to the improvement of products or processes. Examples of these technologies can be found in the communication, electronics, mechanics or in the metallurgy sector. A technological configuration of the whole value chain can lead to competition advantages.
Personnel: The human resource management covers the recruitment, payment, assessment, employment and further training. Competition advantages can be achieved through a highly trained and motivated staff.
Enterprise infrastructure: The firm infrastructure covers financial management, accountancy, business leadership and information systems.[71]

2.2.5.2.2 Customer orientated analysis

The separation of technological and market orientated philosophies in enterprises leads to different behavior patterns. The technological point of view starts with the initial idea which is followed by the development of the product. After passing successful tests, the product is offered to the customer.
The market orientated philosophy sets the customer desire in the centre of the development and planning process. The product or service should meet the customer desire. In addition, a special value has to be created for the customer which leads to a competition advantage. Markets in highly developed industry nations are saturated. Products and services are global available and similar in performance and technology. The customers expect integrated system solutions provided as a whole. These are the main reasons for the significance of customer analysis as part of the environment.
The following elements have to be considered by performing a customer analysis:

Customer segment

Questions like "Which customers determine the market?", "What are the demands and problems of customers?" or "Which kind of customer segments can be differentiated?" can be used to define customers segments. Criteria for the formation of customer segments can be the location, type of organization, price sensitivity, service intensity or the product image.

Purchase process

The analysis of the purchase process requires information about the structure of the purchase process and about significant purchase factors. The most important questions which can be used to analyze the purchase process are "How is the purchase process organized?", "Who determines the purchase decision?" and "Which are the significant purchase factors?".
The question "Who determines the purchase decision?" tries to define if the user of the final product/service or a central sale determines the purchase decision.
The service organizations of strategic business units have to know the desires and expectations of the customers to offer the best purchase process.[72]

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[71] Cf. Al Laham/Welge (2003),p.246
[72] Cf. Kohlöffel (2000),p.141

Porter divided the purchase criteria into utilization and signal factors. Utilization factors influence the real value for the customer. Examples of utilization factors are the price, delivery period or product quality.
Signal factors show the value of the offered performance. They can be the advertising, designing of the sale room or the image of the enterprise.
First, the enterprise has to find out which kind of utilization or signal factors are important. Afterwards, the enterprise should evaluate if the products and services fulfil these criteria. In addition, the enterprise has to define if the competitors meet the significant purchase factors. The results of these evaluations have to be compared with the own position. The outcome has to be part of the business strategy.[73] Instruments like the customer portfolio or the ABC analysis which are used to define customer related strategies are described in the chapter 2.2.6.4.

2.2.6 Concepts of strategic development

Concepts of strategic development are used to combine the elements of the environmental and enterprise analysis. They allow the evaluation of the business situation as well the development of ideas for future strategies.

2.2.6.1 SWOT- analysis

The SWOT- analysis (Strengths, Weaknesses, Opportunities, Threats) is a flexible method which can be performed to combine the opportunities and threats of the environment with the own strengths and weaknesses. The idea of this analysis is that an effective strategy should be focused on the reduction of weaknesses and on the utilization of strengths in order to use opportunities as well as to defend threats. This kind of analysis makes the development of strategies easier because it shows the strategic call for action.[74] Lombriser and Abplanalp introduced the SWOT- analysis with examples in a matrix structure as shown in figure 2.12.

Environment factors / **Enterprise factors**	**Opportunities** Liberalization of markets New business structures Increasing environmental awareness	**Threats** New competitors Market saturation Dramatic drop in prices
Strengths Cash position Research & Development Market – Know How	**SO Strategies**	**ST Strategies**
Weaknesses Costs position Product complexity Market penetration	**WO Strategies**	**WT Strategies**

Fig. 2.12 SWOT matrix[75]

[73] Cf. Porter (1989),p.191
[74] Cf. Kohlöffel (2000),p.155
[75] Source: Cf. Lombriser/Abplanalp (1997),p.188

Four strategy types can be derived from the SWOT matrix: [76]

SO Strategies: These kind of strategies are based on present strengths of the enterprise. The target of these strategies is to use the opportunities of the environment. This ideal case is given if yields from present business units can be used to support the building up of growth businesses.
WO Strategies: The target of these strategies is the removal of internal weaknesses in order to use the opportunities of the environment. Mid term, weaknesses should be transformed to strengths in order to reach the SO position.
ST Strategies: These strategies are focused on the utilization of strengths of the enterprise in order to minimize the risks and threats of the environment.
WT Strategies: The targets of these kind of strategies are the minimization of weaknesses to defend environmental threats.

2.2.6.2 Experience curve

The concept of the experience curve which was developed by the Boston Consulting Group is based on empirical investigations. For example, the unit costs are reduced by 20% to 30% if the cumulative number of produced products is doubled. A linear decrease is the consequence of a logarithmic scale. The principle is described in figure 2.13.

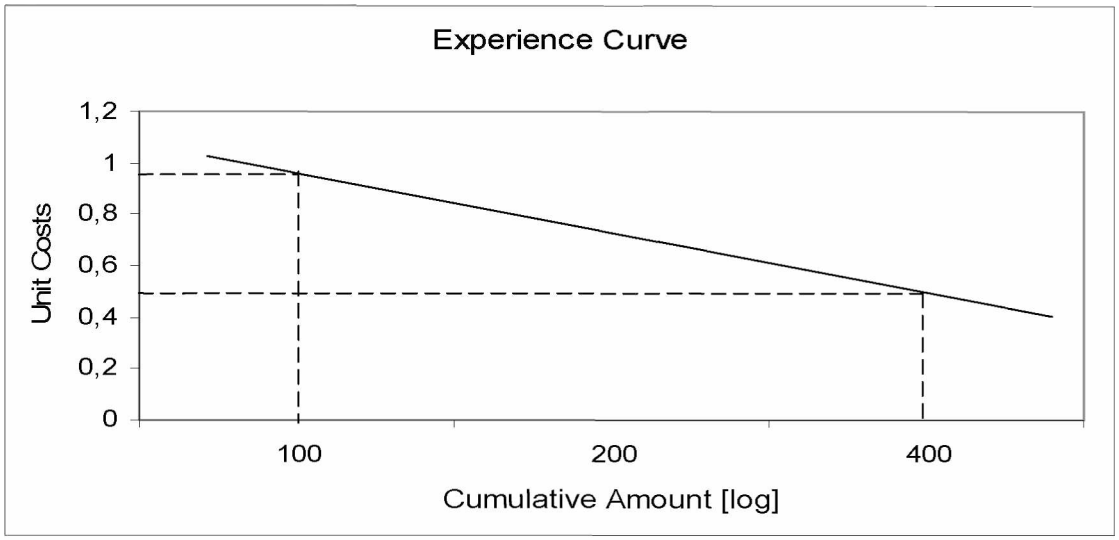

Fig. 2.13: Experience curve[77]

Repeating activities leads to learning effects for a single person as well during teamwork. A reduction of the production time reduces the production costs. The improvement of production plants as well as the disposal of interruptions during the process reduce the unit costs. Especially, capital intensive branches like the oil industry profit because of better production technologies. The standardization of products makes the simplification of production processes possible. The experience of the producer leads to a better understanding for the product characteristics which makes the modification of the product possible. As a consequence, expensive raw materials can be replaced by cheaper ones like plastics.

The following advantages can be observed by increasing the production to mass production:

- Using the fix costs degression effect (related to just one period)
- Development of cheaper production processes (from single production to assembly line production)

The statements of the experience curve show a potential which can be used. The reduction of costs is not strictly connected with an increase of the production volume. In that way, the chances which can be a possible consequence of the volume increase have to be observed.

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[76] Cf. Al Laham/Welge (2003),p.318
[77] Source: Cf. Kohlöffel (2000),p.161

In addition, the experience curve effect gives advice for the strategy choice. Obviously, the increase of the market share leads the costs advantages. In early potential for the experience curve effect can be reached in case of a first to market strategy.
Experience curve effects are also possible if an enterprise starts the production earlier than the competitor does. The lead in the cumulative production amount makes the creation of costs advantages possible. This advantage is given, if the own cumulative amount is higher than the cumulative amount of the competitors.[78]

2.2.6.3 Portfolio analysis

The portfolio analysis serves as a support for the enterprise as well as for the environmental analysis. The idea of this kind of analysis is that every decision has to be seen in connection with other decisions. The portfolio analysis can be characterized as a description model. In that way, the strategic situation of an enterprise can be defined and analyzed. Further on, this kind of analysis can also be interpreted as an explanation model. It contains statements with an empirical content. For example, the Boston Consulting Group matrix states that an extension of the market share of a product increases the cash flow. In addition, the portfolio analysis can be seen as a decision model. The comparison of the present portfolio with the target portfolio allows the detection of problems. These kind of gaps can be removed by initiating norm strategies.[79]
One example of the portfolio analysis introduced by the Boston Consulting Group is the market growth and market share matrix. The structure is shown in table 2.6.

		Market growth	
		High	Low
Relative market share	High	**Stars**	**Cash cows**
	Low	**Question mark**	**Poor dogs**

Tab. 2.6 BCG matrix[80]

The environment is characterized by the market growth and the internal situation of the enterprise is defined by the relative market share. Four segments are part of the matrix.[81]

Question mark: Upcoming products are described by a relative low market share and a high growth rate potential. Strategies which induce an expansion of the market share have to be initiated. These kind of strategies require a further investment to achieve competition advantages. A selection of upcoming products has to be performed in case lots of products are present and resources are limited.
Stars: Strategic business units which achieved a market leadership position in the growth phase can be arranged into the star category. The relative market share can be extended through investment activities. In that way, growth strategies are performed. As a consequence of the investment, the proceeds are nearly similar like the expenditures. In this case, the cash flow is balanced and the success product can finance the growth by itself.

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78 Cf. Bea/Haas (1995),p.115
79 Cf. Bea/Haas (1995),p.122
80 Source: Cf. Al Laham/Welge (2003),p.318
81 Cf. Al Laham/Welge (2003),p.344

Cash cows: The cash cows are characterized by a high relative market share and low growth rates. The market does not grow anymore and further capacity investments are not needed. Substitution and rationalisation investments lead to a financial surplus for the business units. Positive cash flows can be used for other portfolio segments or projects.
Poor dogs: These kind of success objects do not show a market growth and have a weak market position. A negative cash flow is the consequence of increasing competition intensity and a bad costs position. Divestment strategies have to be considered if the business units just consume cash.

2.2.6.4 Methods to segment customers

The customer portfolio as well as the ABC analysis are instruments which can be used to segment customers. The segmentation allows the formulation of strategies which are focused on customers.

2.2.6.4.1 Customer portfolio

In this kind of portfolio, the customers are characterized concerning the dimensions "Customer attractiveness" and "Relative supplier position". The portfolio consists of four quadrants and each quadrant can be described with a specific norm strategy which defines the behavior relating to customers. The general framework is described in table 2.7.

		Relative supplier position	
		High	Low
Customer attractiveness	High	**Stars** → Holding/Extending	**Question mark** → Key decision (big step or out)
	Low	**Cash cows** → Holding position	**Poor dogs** → Selective withdrawal

Tab. 2.7 Customer portfolio[82]

Question mark customers: The business has to focus its strategy on the extension of its supplier position or it has to leave the customer segment gradually if further investment is not successful.
Star customers: A Key Account Management can be initiated in this case in order to extend or hold the customer position.
Cash cow customers: These kind of customers are reliable and have to be connected intensively with the business by regular service performances.
Poor dogs customers: Customers in this segment should be served with less efforts. A special focus on these kind of customers is not essential.[83]

[82] Source: Cf. Kohlöffel (2000),p.172
[83] Cf. Kohlöffel (2000),p.171

Hinterhuber introduced the so called customer orientated competence portfolio. The idea of this concept is that the demands on the enterprise should be defined from the customer (customer value orientated concept). The key factors of the Hinterhuber matrix are the customer value for the environment dimension and the relative competition strength for the enterprise dimension.
The evaluation of the relative competition strength is based on the difficulty level of imitation of the competences. Competition advantages can be created through competences which can not be imitated. A benchmarking process can be initiated in order to compare the own competence strength with competitors, suppliers or so called best practice companies.
The evaluation of the customer value requires several analysis steps. Customer expectations for the product or service can be derived through performing a customer analysis or questioning. These are the critical success factors of the business. The costumer expectations lead to demands on the offered products and performances. (e.g. a low price as a customer expectation calls for cheap product technologies). The next step contains the transformation of product related demands to competence related demands. The results give information about the rating of individual competences concerning the achievement of critical success factors.[84]
The customer value orientated competence portfolio which consists of four quadrants is described in table 2.8.

		Relative competence strength	
		Low	High
Customer value	High	**Competence gaps**	**Core competences**
	Low	**Competence standards**	**Competence potential**

Tab. 2.8 Customer value orientated competence portfolio[85]

Competence gaps: The competences in this quadrant are high valued by customers. The reason of the gap is that competitors have a better ability to handle the main success factors. Development strategies should be initiated by the enterprise because the competences in this quadrant are strategic relevant.
Competence standards: Competences which are characterized by a low customer value added and a low competition differentiation potential can be defined as base competences. These competences are not significant for the customers and other competitors can deal with these single competences better. Defensive strategies are a possible consequence because competition advantages can not be achieved in this quadrant. These strategies serve for the maintenance of base competences.
Core competences: Strategic core competences can be described with a high customer value added and a high differentiation level. These competences are the centre of the competence orientated strategic management. The differentiation contribution has to be secured long term through suitable activities. In addition, the base of these competences should be flexible in order to react on customer preference changes. As a consequence, build up and development strategies have to be planned and integrated.

[84] Cf. Al Laham/Welge (2003),p.367
[85] Source: Cf. Al Laham/Welge (2003),p.371

Competence potential: An enterprise in this quadrant has competences which are not noticed by the customers. Over engineering can lead to products provided with additional functions which are too perfect. These supplement functions are not desired by the customers. The competence base can be used as a potential for competition advantages by adapting the competence base to market requirements. In addition, new market applications can be build up for existing competences.[86]

2.2.6.4.2 ABC analysis

The ABC Analysis defines the main customers who contribute to the revenue. This kind of analysis identifies the "Core or A Customers" who are responsible for 80% of the total revenue. The "B Customers" contribute to the future main revenue. The segment of "C Customers" identifies the amount of customers who will not play a major role in the future.
The ABC Analysis delivers information about the future customer focus. In that way, marketing or services can be concentrated on the main clients.[87]

2.2.6.5 Benchmarking

Benchmarking is defined by Camp as the searching for the best industrial methods which lead to top performances.[88] The own company is compared with other reference enterprises in order to identify weaknesses. The strengths of other companies have to be adapted to become a leader in the branch. The reference companies can be part of the same branch or best practice enterprises.
One of the steps is the comparison of the own performance with other reference companies. The performance gap has to be measured. Competitive and possible targets have to be defined based on this analysis. The major step is the evaluation of the reasons for the higher efficiency or performance capability of the other reference companies. In that way, the learning process can help to realize improvements.[89] Four steps can be identified as part of the benchmarking process. The processes and phases of benchmarking are described in figure 2.14 and table 2.9.

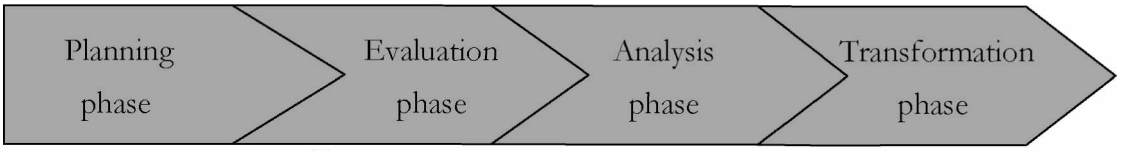

Fig. 2.14 Benchmarking process[90]

Planning phase	Survey phase	Analysis phase	Transformation phase
1. Defining benchmarking targets and project team 2. Setting time points 3. Selection of benchmarking objects 4. Defining of reference enterprises	1. Internal analysis 2. Data gathering of reference enterprises	1. Structuring and checking the data 2. Identifying gaps 3. Finding out reasons for gaps	1. Achieving acceptance 2. Defining targets 3. Generation of measures 4. Implementation

Tab. 2.9 Benchmarking phases[91]

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[86] Cf. Al Laham/Welge (2003),p.368
[87] Cf. Rommel (1993),p.31
[88] Cf. Camp (1994),p.16
[89] Cf. Karlöf/Östblom (1994),p.193
[90] Source: Cf. Al Laham/Welge (2003),p.283
[91] Source: Cf. Al Laham/Welge (2003),p.283

The planning phase defines the framework of the benchmarking project. The main task of this phase is the selection of the benchmarking objects and partners. Objects can be functions, products or processes of the enterprise. Criteria for the selection of benchmarking partners can be the performance ability and the comparability of partners as well as the accessibility to data.[92] Partners should be comparable concerning the main parameters like size as well as the organizational and legal structure.[93]
The survey phase starts with an internal analysis. Part of this analysis is the separation of benchmarking objects, the measurement of the own performance and the arrangement of reference criteria. Possible survey methods can be personal interviews, observation of processes (e.g. tour of a factory) as well as the evaluations of technical plans or process diagrams.
The analysis phase covers the comparable confrontation of the performance ability of the own enterprise and the reference enterprises. In that way, gaps have to be identified. The characterization of the reasons for these gaps allows further activities to improve the performance.
Finally, the transformation phase starts with the creation of acceptance within the enterprise. The results of the analysis phase are used to define targets. In addition, activity programs can be realized. The implementation can be described as a changing process. Continuous improvements are possible if benchmarking is performed as a permanent process.[94]

2.3 Realization of strategies

The strategy implementation covers all activities which are used to realize the strategy. The balanced scorecard which is described in the following chapter can be used to transfer the mission and strategy of a business unit into targets and indicators.[95] The implementation has to fulfil the following tasks:[96]
Objective task: The strategy has to be separated into single measures. In case of a costs leadership strategy, the parts of the enterprise have to be defined in which the costs reduction potentials can be used.
Organizational task: The process organization has to be defined (e.g. responsibilities, competences...).
Personnel task: Part of the strategy implementation can be conflicts between participants in the same hierarchy level (horizontal conflicts) or in different hierarchy levels (vertical conflicts). These kind of conflicts may be followed by barriers which can bring the strategy to fail. Conflicts can be solved by performing conflict management or installing an external adviser.

2.3.1 Balanced scorecard

The origin of the balanced scorecard is based in a science project performed by Kaplan and Norton.[97] The target of the project was the development of an instrument which can be used to quantify, image and communicate all relevant targets of an enterprise. Indicators out of four perspectives are significant for a successful implementation of a strategy. Quantitative as well as qualitative parameters which are focused on customers, internal processes and present resources should be balanced in the system. In that way, the balanced scorecard is a leadership instrument which contains a combination out of financial and non financial indicators. The different perspectives are illustrated in figure 2.15.

Financial perspective: This perspective serves as a target value for the other indicators. It shows the economic consequences of the company's activities (e.g. Cash flow, ROACE...).
Customer perspective: It represents the view of the customers who evaluate the company. The indicators which are part of this perspective are for example the customer satisfaction, image, commitment or market share.

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[92] Cf. Kleinfeld (1994),p.21
[93] Cf. Karlöf/Östblom (1994),p.131
[94] Cf. Al Laham/Welge (2003),p.285
[95] Cf. Al Laham/Welge (2003),p.562
[96] Cf. Bea/Haas (1995),p.175
[97] see Kaplan/Norton, „Führen mit der Balanced Scorecard" (2001)

Internal processes: This perspective contains indicators of processes which are most important for the company in the market. These indicators are focused on activities which have the biggest impact on customer satisfaction and on enterprise targets.
Learning and development perspective: The indicators of this perspective measure the conditions to develop and maintain the knowledge concerning customer satisfaction and efficient process management. It shows which kind of abilities have to be build up to reach the targets of the customer and process perspective.[98]

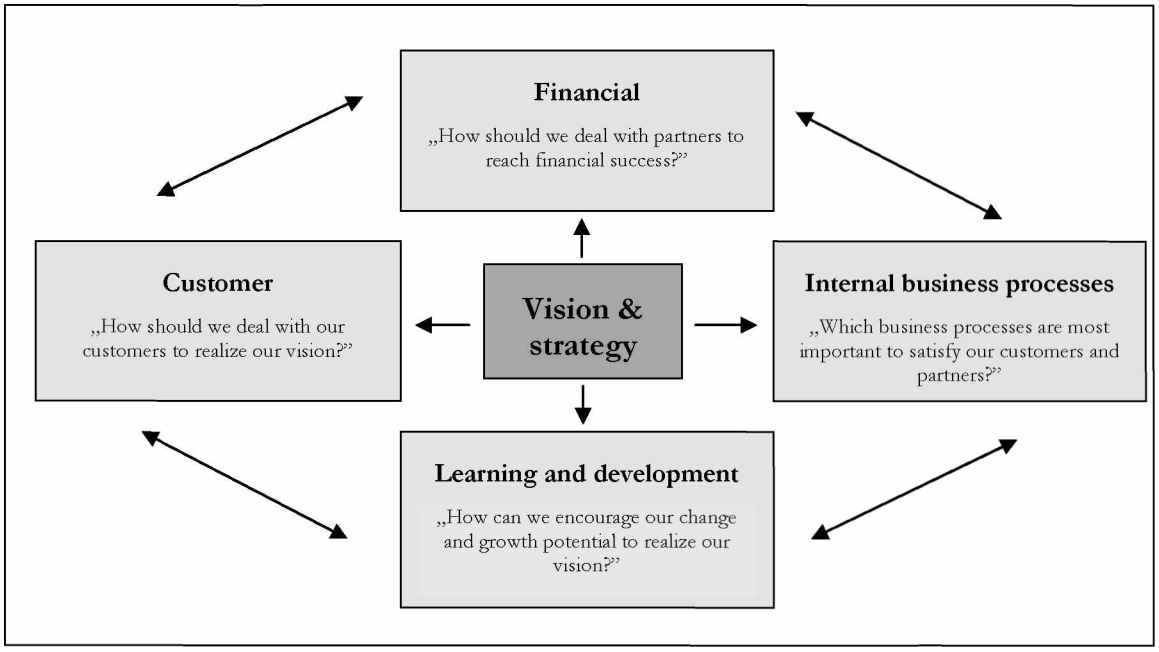

Fig. 2.15 Four perspectives of balanced scorecard [99]

Parts of every perspective are targets, criteria, objectives and measures.

Targets	Criteria	Objectives	Measures

Tab. 2.10 Defining perspectives[100]

The balanced scorecard can be used as an instrument to realize a strategic plan through the determination of targets, criteria, objectives and measures. A clear strategic direction of the enterprise or a business unit is essential for the success of such a project. The vision, the strategic target system as well as the way to reach the target have to be defined exactly. Afterwards, the balanced scorecard encourages the transformation process with suitable indicators and activities. The concretization of the strategic direction is done top down from the enterprise level to the business units and further on to the team and employee level. The strategic direction should be communicated over all leadership levels. The formulation of individual targets creates understanding in the specific levels and focuses individual activities on the desired enterprise targets.[101]

98 Cf. Grünig/Kühn (2002),p.358
99 Source: Cf. Grünig/Kühn (2002),p.359
100 Source: Cf. Grünig/Kühn (2002),p.359
101 Cf. Michel (1997),p.278

2.3.2 Change management

The implementation of strategies is often connected with a change process. Possible conflicts can have its origin in the culture of the enterprise as well as in the implementation style. The enterprise culture covers all norms, ways of thinking and attitudes within a company. It characterizes the present situation of the organization.[102] The implementation style can have different shapes:

Commander model: This model is based on a leader or a leading group which defines strategies. The implementation consists of a short announcement of the strategic topics. The leadership must have a high information base as well as power to order the implementation of strategies.[103]
Change model: In this kind of model, the leadership notices the importance of a realization plan. The organizational structure as well as plan, control and information systems have to align on the strategy formulated by the top management. The leadership takes a central role in this model. As a consequence the conditions like a high power and information base as well as the disadvantages like a low acceptance are the same as in the commander model.
Collaborative model: This model integrates the lower levels in the enterprise during the strategy formulation as well as during implementation. The implementation process can be supported by the creative potential of employees.
Cultural model: At first, the management formulates a strategy. Afterwards, the management acts as a coach during the transformation process. In that way, the strategy implementation can be supported by the definition of a vision which should influence the behavior of employees. It can serve as a guideline for the derivation of activities.
Convergence model: The idea of this model is that the management just defines the strategic framework. It carries out a controlling function. The lower levels can formulate and implement the strategy.[104]

The entrepreneurial change can be described by looking at the changing intensity and the chronological positioning of the change. The changing intensity can range from a stepwise incremental change to fundamental change of the organization. The chronological positioning of the change ranges from anticipative to reactive changing processes. Reactive changing processes are part of the crisis management and anticipative changing processes try to work against environmental discontinuities. Fopp and Schiessel defined different types of changes like the adaptation and fine tuning with a evolutionary character and the reorientation and post structuring with a revolutionary character.[105] The matrix is described in table 2.11.

		Chronological position		
		Reactive	Anticipative	
Changing intensity	Fundamental	**Post structuring**	**Reorientation**	Revolutionary
	Incremental	**Adaptation**	**Fine tuning**	Evolutionary

Tab. 2.11 Types of changes[106]

[102] Cf. Kohlöffel (2000),p.180
[103] Cf. Bourgeois/Brodwin (1984),p.244
[104] Cf. Kohlöffel (2000),p.184
[105] Cf. Fopp/Schiessl (1999),p.47
[106] Source: Cf. Fopp/Schiessl (1999),p.47

2.3.2.1 Stepwise changing process

The development of a vision is not enough for a successful changing process. The different phases of the change processes have to be passed in a structured way. The seven steps plan which was introduced by Kotter can be a good way to perform the changing process.

1. **Creating consciousness for the importance of a changing process**

The need for a change has to be detected before a crisis develops. Date, facts and moods are analyzed in order to define present potentials which can create a problem consciousness for the significance of a changing process. The market and competition situation has to be considered and evaluated. Chances and risk have to be observed in order to anticipate a possible crisis. Finally, consequences can be derived and defined.

2. **Leading visionary and developing measurable strategies**

It is difficult to realize a far reaching change. In that way, a group of personalities has to be arranged which has competence and power of persuasion in order to force the changing process. A vision has to be created which serves as a guideline for the endeavour of the change. The development of a strategy can support the realization of the vision. An effective vision and strategy make the importance of a change transparently for employees. The derivation of indicators, targets and activity programs support this process. The balanced scorecard can be used by the group in order to develop a vision, strategy and activities.

3. **Communicating the vision and strategy**

Every employee has to become confidential with the vision and strategy. As a consequence, they have to be communicated. The executive personnel have to act as a model. In that way, they decide about the success of the changing process. A basis for the success can be formed if the leadership can win the trust of employees by acting as a leading force in the willingness of the change.

4. **Planning short term visible successes**

There are lots of possibilities which can make a success visible. The most effective method can be described as project management. Complex problems can be disassembled into small working packages which are worked off. In that way, successes can be planned more easily. They have to be communicated and employees should be rewarded.

5. **Process orientated control**

The structures should be focused on the changed framework conditions. The employees have to be integrated in the restructuring process and barriers should be removed. Employees know the possible potentials of their processes best. In that way, they should be encouraged to analyze and improve their own processes. A consequence process management can support the changing process.

6. **Consolidation of successes and institutionalization of changes**

The increasing confidence can be used to change all structures and processes which do not contribute to the realization of the vision. Employees who have the willingness to be part of the changing process should be promoted and rewarded. The continuous changing process can be encouraged with new projects, topics and impulses.

7. **Cultivation of new behavior patterns**

A successful change management process is given if the new behavior patterns are integrated in the enterprise culture, social norms and values. The self esteem of each employee has to be extended and improved. Finally, activities should be developed which secures the leadership development and succession.[107]

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[107] Cf. Kostka/Mönch (2002),p.18

2.3.3 Strategic controlling

The process of strategic controlling can be defined by the following characteristics:

- Strategic controlling is a systematic and continuous process which works with information.
- It runs parallel to the strategic planning.
- The target of strategic controlling is the evaluation of deviations between plan values and present values in order to check the correctness of the strategic planning.[108]

Schreyögg and Steinmann defined with the premise and realization control as well as with the strategic monitoring process, three major parts of the strategic controlling. The strategic controlling concept is described in figure 2.16.

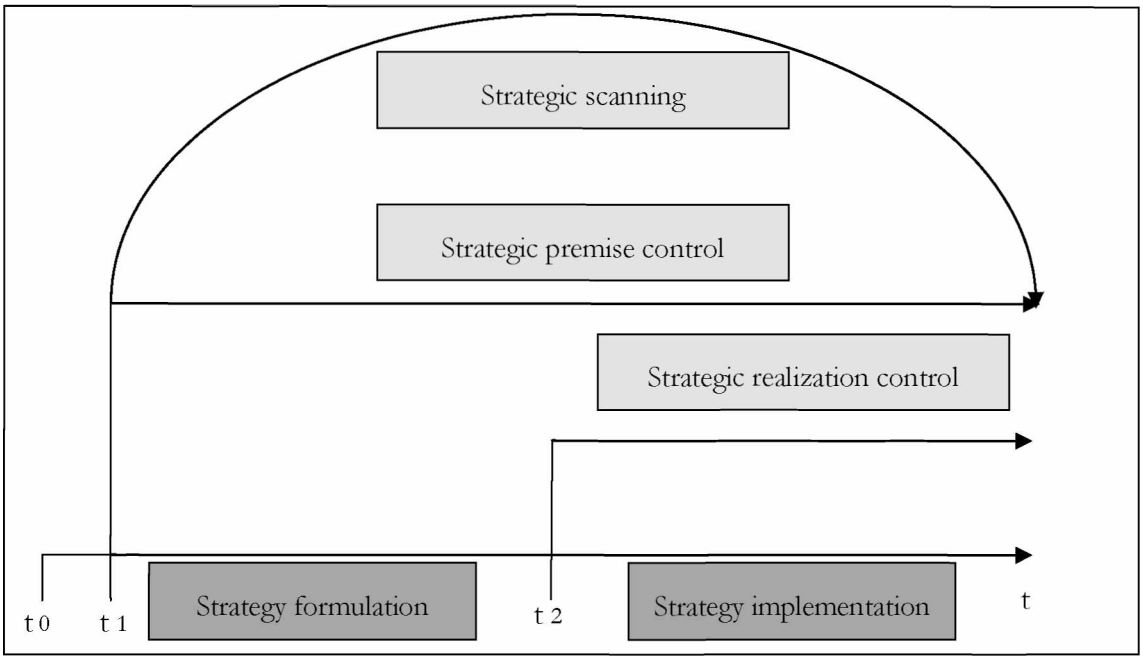

Fig. 2.16 Strategic controlling concept[109]

Strategic premise control: Setting premises is useful in order to convert a complex environment into a clear decision situation. In that way, strategies can be formulated. These kind of premises are focused for example on exchange rates, technological developments or on inflation rates. The premise control has to check regularly the validity of the explicitly formulated premises. The process begins with the acquisition of premises and the identification of critical ones. In that way, indicators can be defined which are able to detect deviations. The premise control can be applied based on these indicators. It is part of the strategic planning process from the initial strategy formulation to the strategy implementation.[110]

Strategic realization control: It starts with the implementation of the strategy. The strategic realization control checks disturbances during the strategy implementation as well as deviations of planned milestones. In addition, it checks regularly the validity of the strategic direction.[111]

The strategic realization control tries to set milestones in order to make the way to the target more transparent and checkable. The difficulty level of defining milestones depends on the strategy type. Milestones for quantitative targets like the increase of the market share can be easily formulated. Interim targets for qualitative strategic targets like the technology leadership are much more difficult to define.

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[108] Cf. Bea/Haas (1995),p.206

[109] Source: Cf. Bea/Hass (1995),p.210

[110] Cf. Bea/Hass (1995),p.210

[111] Cf. Schreyögg/Steinmann (1986),p.403

Most of the practical problems occur during the realization of these different controlling concepts. The premise control leads to fewer problems because the initial premises are well known and can be compared with reality.[112]

Strategic scanning: The premise as well as the realization control are based on defined assumptions. Both control types can be characterized as a directed and selected control.[113]

The task of strategic scanning is a non directed continuous scan of the environment for unpredictable events which can influence the strategic orientation of the enterprise. It acts as strategic radar which scans the environment for information which can endanger the strategy.[114]

The main strategic decisions are based on the fact that some alternatives have to be neglected. These possibilities can become relevant in case of changing situations. As a consequence, the strategic scanning is the main part of the controlling concept introduced by Schreyögg and Steinmann.[115]

Most of the implementation troubles occur during strategic scanning. The idea behind this controlling concept is the reduction of complexity in order to widen the view. It should be opened for new environmental developments. Potentials in the environment can only be detected by qualified staff and through the creation of an open enterprise culture.[116]

2.3.4 Strategic early warning systems

An early warning system can be described as an information system which has to define, analyze and pass on relevant knowledge for leadership tasks.[117] The target of such an information system is the early transmission of information concerning chances and risks of the environment to the user.

The base of strategic warning systems is the strategic issue analysis concept which was introduced by Ansoff. The starting point of this concept is the unexpected appearance of chances and threats which are defined as discontinuities. These discontinuities can be observed early as weak signals.

Enterprises have to react on these weak signals with the early development of strategies and activities in order to encourage a sustainable business process.

Two different types of observation models can be distinguished in order to detect so called weak signals. The environmental scanning which is the first step of gaining information can be used to identify weak signals in the environment. It is described in chapter 2.3.3. If something conspicuous can be observed, environmental monitoring allows a far reaching and long term information gathering and consolidation.[118]

A warning system can be developed in the following phases:

1.) Determination of monitoring areas

The first phase in the development of an early warning system covers the determination of areas which can deliver relevant information about chances and risks.

Possible monitoring areas can be the change of the economical, ecological and political environment as well as discontinuities in the competition or customer behavior.

2.) Determination of early warning indicators

Indicators for relevant monitoring areas have to be defined in order to describe the so called reason and reaction relationship. Indicators for the change of the economical environment can be the interest or inflation rate as well as the behavior of foreign investors. Country risk indicators can be used to evaluate political or economical risks as well as chances. The development of strategies requires the definition of plan values and the determination of specific ranges for indicators.

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[112] Cf. Bea/Hass (1995),p.221
[113] Cf. Bea/Hass (1995),p.211
[114] Cf. Hasselberg (1989),p.97
[115] Cf. Bea/Hass (1995),p.212
[116] Cf. Bea/Haas (1995),p.222
[117] Cf. Bea/Haas (1995),p.269
[118] Cf. Al Laham/Welge (2003),p.302

3.) Development of activities and strategies

Strategies can only be formulated by responsible persons of the business who have information about the reason and reaction relationship in order to estimate possible consequences of strategies and activities.[119]

4.) Implementation of the early warning system

A successful implementation of the discontinuity management requires the development of an information culture and the creation of organizational conditions. An information culture is the basis to overcome psychological barriers. The main characteristics can be described in the following way:

- Thinking in alternatives (creativity)
- Ability to change
- Communication willingness
- Recognition of the importance of environment (thinking global and connected)
- High information consciousness

The intention and the ability are the basics to analyze and process weak signals. Discontinuity management has to involve all the organizational members of the enterprise. An active support of the discontinuity management can be encouraged by the way how the own initiatives are processed in the enterprise. The delegation of authorized decisions can be a suitable method in this case.

In general, the development of an information culture as well as the creation of organizational conditions have to be concretized by the enterprise itself in order to achieve successful implementation results.[120] The principle of the warning system is described in figure 2.17.

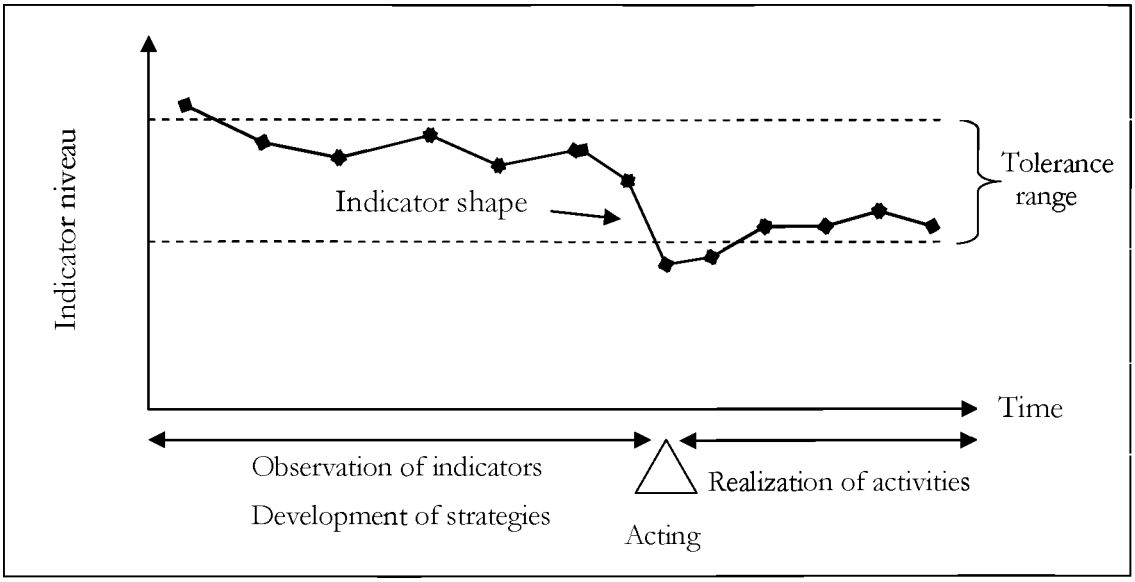

Fig. 2.17: Early warning[121]

[119] Cf. Kohlöffel (2000),p.192
[120] Cf. Bea/Haas (1995),p.290
[121] Source: Cf. Kohlöffel (2000),p.194

2.3.5 Conversion programs

All conversion programs are based on a target system which focuses on components like costs, time, complexity, quality or innovation capability in different ways. Costs leadership strategies are concentrated on the reduction of time and complexity. An increase of the quality or an improvement of the innovation capability can lead to differentiation strategies. The target system of programs which is needed to realize strategies is shown in figure 2.18.

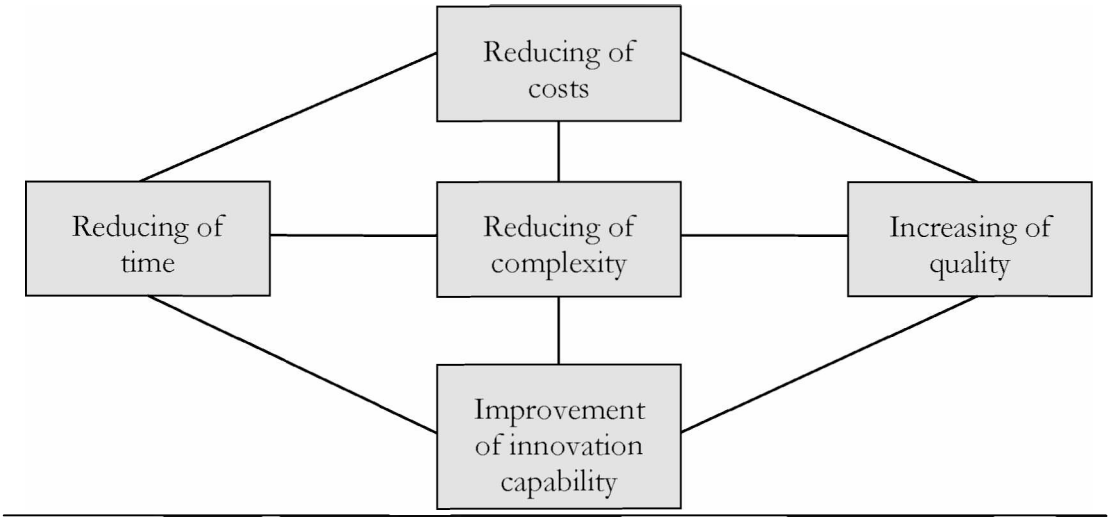

Fig. 2.18: Target system of programs[122]

2.3.5.1 Kaizen

The principle of Kaizen describes the continuous improvement of processes concerning quality, costs and time in small steps which involves all employees. The basic idea of Kaizen is the determination of weak spots during processes. In that way, improvement measures are defined, performed and evaluated.

The main effects are focused on the changes in the employee's attitude and morals. Employees are obliged to encourage the permanent improvement. The knowledge, experiences and observations are collected and transformed into improvements. A culture of reward and understanding is the basis for living the Kaizen principle.[123]

[122] Source: Cf. Kohlöffel (2000),p.197
[123] Cf. Kohlöffel (2000),p.198

3 Methods of external analysis (creativity techniques)

The identification of environmental influences is an important task in the strategic management process which is described in the external analysis of chapter 2.2.5.1. Creativity techniques can be used to identify relevant environmental impacts. The well known methods of brainstorming, brainwriting as well as the decision tree and the morphological box are selected for a detailed description.

3.1 Brainstorming

The brainstorming method can be used to search for ideas in all kind of areas. The target of this method is the integration of all team members and the achievement of a large spectrum of ideas. Different kind of approaches and ways of thinking can be discussed. The process of brainstorming covers the following steps:

1. At first, the problem has to be defined.
2. Secondly, the brainstorming rules need to be explained.
    - Ideas should not be criticized. Destructive comments have to be avoided.
    - The target of brainstorming is the production of lots of ideas. In that way quantity is more important than quality.
    - Ideas of other team members should be handled with tolerance.
3. The participants have to write every single idea on own separate cards.
4. Afterwards, the individual cards have to be mixed up to guarantee anonymity.
5. Finally, a moderator reads the cards in order to arrange similar ideas in groups which can be pinned up on a wall. After ordering groups, the usability of ideas can be checked.

The concept of the brainstorming process is based on a clear separation between the search and evaluation of ideas. As a consequence of an anonymous polling, every team member can be part of the discussion without thinking about staff hierarchy. Problems of fewer acceptances can be possible in case of an untrained team.[124]

3.2 Brainwriting

In comparison to brainstorming, the communication in brainwriting is based on a written way. As a consequence, more time is needed but the spectrum of ideas which can be achieved during brainwriting is larger than during brainstorming. The process of brainwriting can be described by looking at the following parts:

1. The definition of the task covers the first step.
2. Every participant has to write down two to four solution suggestions on appropriate forms which are put in the centre of the table.
3. Afterwards, every team member can take a processed form from the middle of the table in order to add new ideas.
4. This step has to be repeated till every participant has read and extended all forms.
5. Finally, ideas will be collected and checked for applicability.

The biggest advantages of this kind of searching method are that ideas on the form can lead to new suggestions and every participant has the same chance of being part of the process because of the written discussion. The presence of all team members in the same room is not significant.

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[124] Cf. Malorny/Langer (2002),p.73

Working on forms is also possible during working hours privately which can be advantageous because participants have more time to think about ideas of predecessors. A disadvantage can be the break of ideas in case of long time distances.[125]

3.3 Decision tree

The decision tree can be used in order to define the most probable strategy. The definition of a target and a restricted number of processing alternatives are the basics for handling this instrument. The result is a list of all alternatives with their relative appearance probability. A prognosis for the strategy with the highest expected value makes the selection of the most successful processing alternatives possible. The decision tree can be handled by performing the following steps:

1. At first, targets have to be defined.
2. Possible strategies which provide a solution have to be formulated.
3. Events which can appear have to be defined for every strategy alternative.
4. Event criteria have to be formulated for single events. "What is the condition for the appearance of an event?"
5. Event probabilities for single events have to be estimated.
6. Afterwards, the appearance probabilities for the single strategy alternatives are determined.
7. Based on calculations, the most appropriate strategy has to be selected.
8. Additional analysis can be performed in order to put the single process steps on higher probability levels. A modification can lead to a new strategy. [126]

3.4 Morphological box

The word "Morphology" has its origin in the Greek language and means "Theory of structuring and forming". A morphological box can be used in order to solve a problem through the separation into single aspects. The variation of these areas creates new potential solution ways which can help to reach the optimal solution. This kind of instrument classifies a problem two dimensional.
By using the morphological box an early recognition of deficits in solutions is possible. In addition, results can be seen on the morphological box automatically. The instrument can be performed by a single person or a team. The level of difficulty is high and a moderator of a group should have experience.

The following steps have to be considered by using the morphological box:

1. The problem has to be analyzed and defined.
2. Characteristics which are part of all solutions in different shapes are arranged into higher parameter levels. They are written in the first column. The development of parameters is the most critical step. Appropriate parameters can be identified by using the 6W question technique: What? When? Where? Why? Who? How?
3. The parameters have to fulfil the following conditions:
    - General validity: Parameters should be appropriate for all kind of solutions.
    - Logical independence: The different shapes can not be combined to alternative solutions if parameters are mutually conditional.
    - Relevance: Details which are not significant lead to an unclear morphological box.

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[125] Cf. Malorny/Langner (1997),p.82

[126] Cf. Malorny/Langer (2002),p.78

- Number of parameters: The number of parameters used should not be greater than seven.

4. The possible shapes of parameters are put in the fields on the right hand side of the parameters.
5. Every combination of single shapes is connected through a line which represents a possible solution. As a consequence different kind of solutions can be the result.
6. Finally, the different solution alternatives can be restricted through economical and technological considerations.[127]

An example of a morphological box is described in table 3.1. The task is the improvement of the refectory organization.

Parameter	Shape of parameter			
Opening	7 h – 16 h	7 h – 11 h	11 h – 14 h	14 h – 17 h
Service	Self service	On table	Machine	Ordering service
Type of meal	Mixed	Exotic	Vegetarian	Fast food
Additional offer	Salad	Snacks	Dessert	Cakes
Price	5 USD	8 USD	12 USD	15 USD

Tab. 3.1 Principle of morphological box[128]

3.4.1 Morphological box in strategic analysis

The morphological box can be used as part of the strategic analysis in order to show different kind of strategic behavior patterns. Possible strategic behaviors from different views are described in the following part.

Product/market matrix

Market breakthrough strategy

- Imitation: This strategy is focused on the imitation of products from competitors.
- Costs and price reduction: Value analysis and process development are the main parts of this strategy in order to decrease costs and prices.
- Intensifying of the market focus: The idea of this strategy is to increase existing market performances.

Market development

- Market extension: This kind of strategy is focused on the development of new markets.
- New customers: The target is the expansion of regular customers.
- New distribution channels: The main idea is the development of new sale possibilities.[129]

[127] Cf. Malorny/Langner (1997),p.88
[128] Source: Cf. Malorny/Langner (1997),p.90
[129] Cf. Pümpin (1980),p.74

Product development

- New products: Investments in research and development should lead to new solutions for customer requirements.
- New product lines: The basic idea of this strategy is the extension of the present product range through new product lines.
- New services: This kind of strategy is focused on the development of new services.

Diversification

- New products are offered to new markets.

Using of synergies

Market orientated strategy

- This kind of strategy tries to satisfy the demands of a specific customer segment.

Technology orientated strategy

- The main idea is to offer products which are processed in the same plant. The target is the development of core competences in this kind of process technology.

Material orientated strategy

- The concept of this strategy is to offer all products out of the same material to different kind of customers. The achievement of development competences for this specific raw material is the main intension of the strategy.

Portfolio standard strategies

Skim off (milk) strategy

- The successive controlled decline of the business is the major target of this kind of strategy.

Investment strategy

- The main idea is to invest consequently in the business.

Divestment strategy

- This strategy is focused on the disposal of the business.

Segmentation strategy

- This kind of strategy concentrates the business on market niches. Part of this strategy is the achievement of a differentiation from other competitors.

Growth strategies

Maintaining strategy

- The major target is to keep the present status.

Expansion strategy

- The basic idea of this strategy is a strong expansive growth.

Contraction strategy

- A conscious shrinkage is the main focus of this strategy.

Integration strategies

Forward integration

- The basic idea is the integration of post process steps.

Backward integration

- This kind of strategy involves the integration of backward process steps.

Cooperation strategies

Independence

- The strategy is focused on the maintaining of the present independence of the enterprise.

Cooperation

- The basic element of this kind of strategy is the cooperation with other enterprises.

Acquisition

- The main idea is the guarantee of the enterprise development by acquiring companies or reserves for example.

Participation

- This kind of strategy involves the participation in other enterprises.

Behavior against competitors

Defensive strategy

- A defensive strategy avoids confrontations.

Aggressive strategy

- An aggressive behavior in the market leads to confrontations with other competitors. [130]

The combinations of different shapes of parameters are possible and sensible. A morphological box can illustrate these different types of strategies. A market breakthrough strategy can be technology orientated. Further on, it can be an expansive investment strategy which is focused on neutral integration and on independence. This overall strategy makes an aggressive behavior against other competitors possible.[131] The morphological box with the combination of possible strategic behavior patterns is shown in table 3.2.

Criteria	Shape of criteria			
Product/market matrix	Market breakthrough	Market development	Product development	Diversification
Synergy	Market orientated	Technology orientated	Material orientated	
Portfolio	Skim off	Investment	Divestment	Segmentation
Growth	Maintaining	Expansion	Contraction	
Integration	Forward	Neutral	Backwards	
Cooperation	Independence	Cooperation	Acquisition	Participation
Behavior against competitors	Defensive	Aggressive		

Tab. 3.2 Combination of strategies with morphological box[132]

[130] Cf. Pümpin (1980),p.76
[131] Cf. Pümpin (1980),p.77
[132] Source: Cf. Pümpin (1980),p.77

4 External analysis in petroleum industry

This chapter provides a general introduction in the petroleum business and deals with the derivation of possible strategies for E&P companies. The identification of strategic concepts for petroleum companies through the method of brainstorming is the basis for the development of the E&P focused morphological box which is the main part of the diploma thesis.

4.1 General overview of petroleum business

The oil and gas chain begins with the exploration and discovery of hydrocarbons and ends with the distribution to the end markets. Two parts of this chain have to be distinguished, which can be described as the supply of crude oil (upstream) and the supply of refined crude products (downstream). The upstream is the largest business in the oil and gas chain concerning net profits and returns performances. The business involves the finding, developing and producing of oil and gas. It covers the integrated, independent exploration and production as well as oil field service industries. The downstream sector consists of integrated companies, which are part of all activities in the supply chain and independent refiners which are involved just in refining and marketing. Integrated companies as well as independent exploration and production companies explore and produce hydrocarbons.

The oil market can be described as a global market because oil is produced on nearly every continent and transported by pipelines, tankers and trucks to refineries for conversion into end products (diesel, heating oil, gasoline). Integrated oil companies and independent refiners process the crude oil into products and sell them to wholesale and retail markets.

The gas business is regional because of the limitations in transportation. The global gas market is not comparable with the oil market but technologies which convert natural gas into liquefied natural gas (LNG) or natural gas to liquids (GTL) improved its position in the worldwide market.[133]

The distributions of the proved oil and gas reserves as well as production worldwide after continents and regions at the end of 2005 provided by BP are described in figures 4.1 and 4.2.

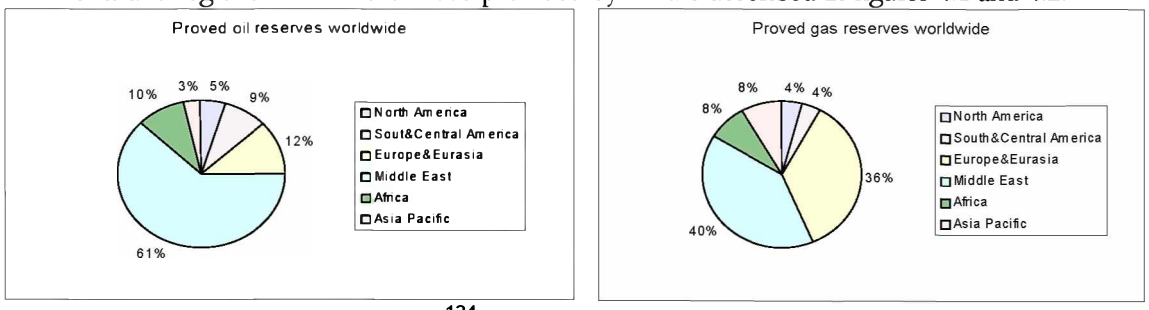

Fig. 4.1 Proved oil and gas reserves worldwide[134]

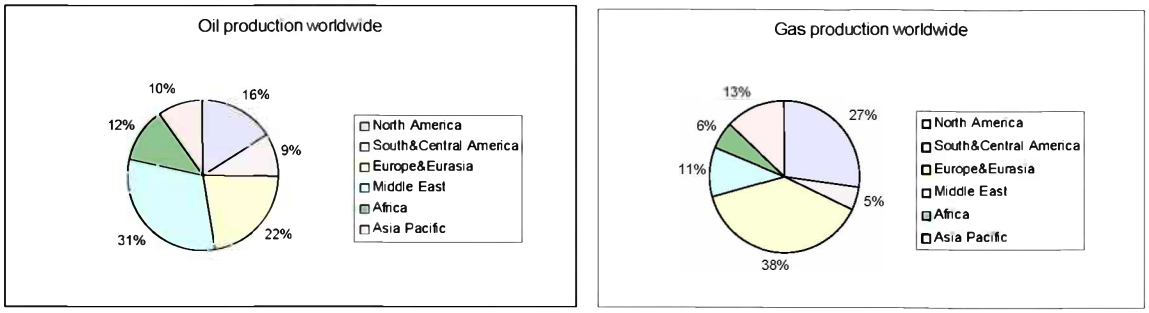

Fig. 4.2 Oil and gas production worldwide[135]

[133] Cf. Gibbons/Arnfield/Blanchard a.o.(2002),p.7
[134] see http://www.bp.com/statistalreview, Call: 12.6.07
[135] see http://www.bp.com/statistalreview, Call: 12.6.07

E&P companies can create a value if they add oil and gas reserves to the balance sheet. In addition, they can extend the value by increasing production while maintaining or increasing the return on capital. The oil and gas reserves are the tangible value of a company. The producers can add reserves through drilling, by reserve acquisitions or by acquiring fields as well as whole companies.
The intrinsic value of a producer is the discounted free cash flow described in chapter 2.1.5.2 or the net asset value (NAV) for all fields which currently produce and are expected to produce in the future. The discounted cash flow can be calculated for each field by using estimates for the oil prices, production rates, finding and development costs, production costs and time frames for the phases from exploration to abandonment. The sum of the discounted cash flows is the portfolio value of the assets (fields).
In addition, another important consideration in the potential of value creation is the type of contract the producer signed with a government. Many governments try to protect the domestic natural oil and gas resources and control them. Several different types of cooperation agreements and contracts are possible.
A joint venture agreement can include a government controlled oil company and a foreign producer. The foreign producer covers the exploratory risks and costs.
Another type of an agreement can include a production sharing contract. In this case a foreign producer spends a specified amount of money for exploration activities over a predetermined time. The government retains the ownership of the discovered reserves and the producer shares the production with the government.
Part of a concession agreement is a permit provided by the government which allows the producer to explore for oil and gas for a predetermined time and to develop any found. The producer has to pay the government a percentage of the profits or a production tax. In this type of agreement, the government is not involved in operations and the producer has the economic ownership of the assets.
Each of these agreements shifts the risk and return balance from one partner to another. The producer and the government have to come to arrangements that are acceptable for both.[136]
In order to understand the value drivers in the upstream business it is essential to look at the E&P process from the start to the end. The E&P process covers five major phases and each phase has its own cost structure and time steps. The process is described in figure 4.3. The timing of the E&P phases is an important part of the financial planning because of the long lead times from initial capital expenditures to the sale of oil and gas. As figure 4.3 shows, it can take three years or more before production can start. During this time the producer has to invest until cash flow can be received. In that way, the producer has to evaluate and analyze the economics of the field. The most important considerations have to include the quantity of recoverable oil and gas, the estimated acquisition, finding, development and production costs as well as the timing of future production and the estimated oil and gas prices. The cost structure can be divided into acquisition, exploration, development, production and decommissioning costs.
Acquisition costs are the costs for acquiring an economic interest in order to explore, drill and produce oil and gas.
Exploration and appraisal costs cover the costs for identifying prospects, for seismic operations and for exploratory drilling. They can be defined as finding costs too.
Development costs are the costs of development planning, reservoir modelling, optimization, well design plans, drilling and completion of wells as well as installing the gathering and processing infrastructure.
Production costs are all the costs which are related with the lifting of oil and gas to the surface as well as for gathering and processing the hydrocarbons for transportation.
Decommissioning and abandonment costs are the costs for plugging and abandoning a dry well or a mature field which does not produce anymore.
Each of these costs depend on the field characteristics (porosity, permeability, type of rock) as well as on the location of the field and on the supply and demand for drilling rigs and services.[137]

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[136] Cf. Gibbons/Arnfield/Blanchard a.o.(2002),p.36
[137] Cf. Gibbons/Arnfield/Blanchard a.o.(2002),p.38

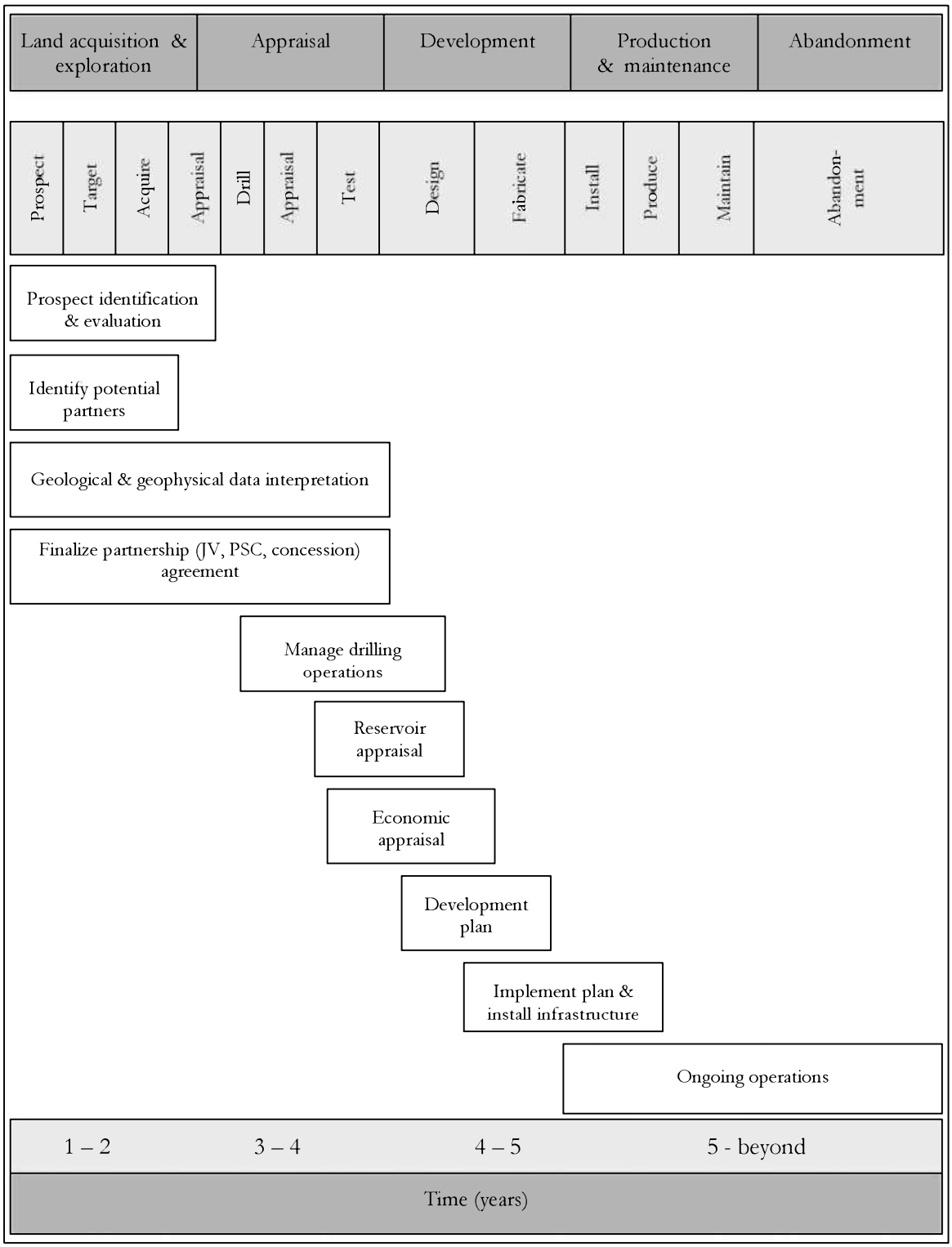

Fig. 4.3 E&P process[138]

[138] Source: Cf. Gibbons/Arnfield/Blanchard a.o.(2002),p.40

4.2 Strategic concepts in the petroleum industry

A changing political and economical environment (e.g. oil price) leads to different strategic behavior patterns for E&P companies which are active worldwide. The analysis of different kind of possible strategies in the petroleum business is the basis for the development of the special E&P focused morphological box which is described in chapter 4.3. The strategies are derived from the theoretical background of strategic management which is described in the chapters before. The shapes of these strategies are a consequence of performing a brainstorming process and of the expert opinions from Dr. Wolfgang Posch and Dr. Andrea Iro who are part of the strategic department of OMV Exploration & Production GmbH. The following strategies and possible shapes can be applied in the petroleum industry.

Differentiation strategy: The main differentiation of companies in the oil business is the separation into independent and integrated ones which is described in chapter 4.1.
An E&P company can achieve a differentiation from other competitors through extending its portfolio by new areas which are heavy accessible like the Polar region, Siberia or the deepwater region (e.g. Gulf of Mexico). The portfolio can also be added by political sensible regions like the Middle East (Iran, Iraq, Saudi Arabia...) or by certain conflict areas for example in Africa with Sudan or Nigeria. In addition, a differentiation can also be achieved by performing operations just in a special core area.
Differentiation strategy/technology leader: A potential differentiation position can be reached by a purchase or a development of technologies which can increase the discovery potential (e.g. seismic methods, special drilling techniques like horizontal and multilateral drilling) or improve the hydrocarbon profit out of existing reservoirs (e.g. EOR methods). Especially the differentiation through deepwater projects requires special technologies.
An E&P company can also achieve a differentiation from other competitors by investing in the midstream sector (e.g. pipelines). Further on, part of a differentiation strategy can be the additional production of natural gas. In that way, the supply chain with pipelines can be extended by LNG (liquefied natural gas).
A differentiation potential lies also in the expansion of the resource portfolio with unconventional resources like oil sands, heavy oil, tight gas, coalbed methane or LPG (liquefied petroleum gas).
All these kind of differentiation strategies require technological knowledge and can become a core competence of a company by following a technology leader strategy.
Market segmentation strategy: A petroleum company can focus its operations on segments with high or low technology demand, on mature fields or on fields which are left by competitors.
Growth/market extension strategy: An E&P company can increase its market position or reserves base by organic growth or by performing acquisitions of assets or whole companies.
Niche strategy/technology leader: A niche strategy in the oil business can be the extension of the energy portfolio with alternative energies like wind, solar or biomass. This kind of strategy can also be connected with a technology leader strategy if the company tries to reach a special position in the alternative energy sector.
Cooperation strategy: E&P companies follow a cooperation strategy in order to reduce the economical risk in projects. In addition, they try to get in contact with the NOC (National Oil Company) to get access to the country's resources. Different kind of cooperation agreements like a joint venture, production sharing or a concession agreement are described in chapter 4.1.
Withdrawal strategy: A withdrawal strategy can have its origin in economical and political reasons. (e.g. political changes in instable countries, non economic mature fields, need of high cost technology, non profit unconventional assets...).

4.3 Derivation of E&P focused morphological box

The basic for the development of the morphological box for the E&P business was the theoretical description by Pümpin introduced in chapter 3.4.1. The different strategic concepts and possible shapes which are introduced in chapter 4.2 served as a framework for the development of the morphological box. Nearly similar as the value chain by Porter described in chapter 2.2.5.2.1 the main activities which are part of the morphological box are defined with exploration & appraisal and development & production. In addition, the morphological box is extended with the segments acquisition, cooperation, human resources and energy portfolio. The general segmentation was the result of several meetings with Dr. Wolfgang Posch and Dr. Andrea Iro. The modified value chain is introduced in figure 4.4.

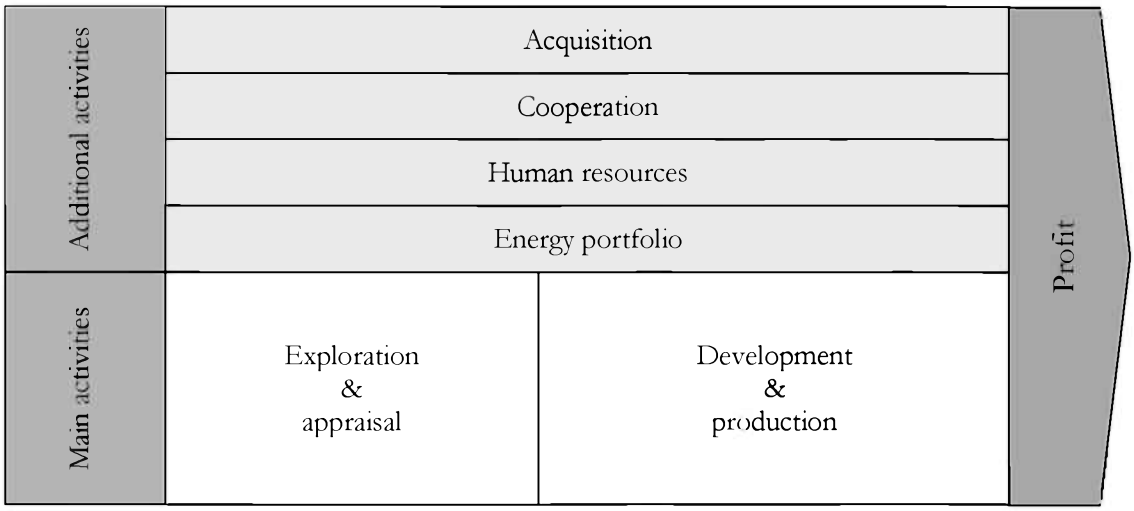

Fig. 4.4 Modification of the value chain (Porter) [139]

The next step covers the definition of a strategic view as well as indicators and possible behaviors for every segment. Based on the defined possible strategic concepts and shapes, the method of brainstorming was used to define strategic elements for every segment. The results were checked and evaluated in cooperation with the supervisors at the OMV. The concept of the morphological box is described in table 4.1.

Selected activities				
Strategic view	Strategic indicator	Strategic behavior		
...	...	...	...	...
...	...	...	...	...

Tab. 4.1 Concept of morphological box [140]

[139] Source: Cf. Al Laham/Welge (2003),p.245

[140] Source: Cf. Pümpin (1980),p.77

Exploration and appraisal

The exploration and appraisal segment covers different strategic behaviors out of the regional focus, the risk, the drilling and seismic technology, the investment and the reserve replacement view.

The regional focus tries to define if an E&P company explores in core countries, if it develops new exploration regions or if it performs near field exploration.

The next strategic view covers the overall risk value of the operating countries. It is classified as "low", "middle" or "high". The country risk values provided by Global Insight can be used for this classification. The company Global Insight has developed a unique country risk rating system which enables clients to compare and contrast the investment climate in 203 countries around the world. The system under which the political, economic, legal, tax, operational, and security environments are separately rated in each country provides a comprehensive picture of the quality of conditions and level of stability encountered by investors in each country.[141]

The technology strategic view is divided into a drilling and seismic part. The drilling part tries to characterize the technology focus of drilling operations classified as unconventional (e.g. polar, deepwater, fractured...), conventional onshore, shallow offshore or all of them and the type of drilling method used like multilateral, horizontal or normal drilling.

Fractured means that the reservoir is composed of numerous disjointed and disconnected layers out of hydrocarbon bearing rock.[142] Multilateral can be described as drilling of several deviated wells within one initial borehole. Multilateral drilling increases the productivity and decreases costs. Horizontal drilling is a part of directional drilling in which the angle of deviation reaches at least 80 degrees from the vertical. As a consequence, it maximizes the length of wellbore exposed to the formation. Horizontal wells enhance the well productivity by increasing the reservoir contact.

Further on, the technical success rate in percentage wants to show the drilling performance of a company. It can be calculated by dividing the number of exploratory wells drilled with a hydrocarbon potential (productive) through the total number of exploratory wells (productive and dry) drilled.

The last two strategic indicators of the drilling technology view cover the operatorship of a company in percentage. In general, an operator can be defined as the company or organization that drills wells and extracts hydrocarbons at a particular field or project. The operator maybe one member of a consortium of field owners or can sometimes be a joint venture between two or more of them.[143]

The general operatorship of an E&P company for the year 2006 which is asset based as defined in the morphological box can be calculated by dividing the operating E&P projects through the total number of projects (operating and participating). A high operatorship can indicate experiences in performing exploration projects. The deepwater operatorship can show possible technological competences in deepwater drilling. Deepwater is defined as the region below 300 meters water depth. The deepwater operatorship can be calculated by dividing the operated deepwater projects of 2006 through the total number of deepwater projects (operating and participating).

The possible strategic behavior patterns out of the regional, risk and drilling technology view are described in table 4.2.

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[141] see http://www.globalinsight.com, Call: 6.6.07

[142] Fractured reservoir: see http://www.andarko.com/operations_by_play_type/fractured_reservoirs.asp, Call: 11.6.07

[143] Cf. Gibbons/Arnfield/Blanchard a.o.(2002),p.145

Exploration and appraisal					
Strategic view	Strategic indicator	Strategic behavior			
Regional	Regional focus	Exploration concentration in core regions	Development of new exploration regions	Near field exploration	
Risk	Risk exposure	Low	Middle	High	
Drilling technology	Technology focus	Unconventional (Polar, Deepwater, Fractured…)	Conventional onshore	Shallow offshore	Covering all
	Focus on method	Multilateral	Horizontal	Normal	
	Technical success rate	≤ 25%	26% - 50%	51% - 75%	> 75%
	General operatorship (Asset based)	≤ 25%	26% - 50%	51% - 75%	> 75%
	Deepwater operatorship	≤ 25%	26% - 50%	51% -75%	> 75%

Tab. 4.2 Morphological box for exploration & appraisal (part 1)

The second part of the technological view covers the use of seismic methods. A seismic survey is a technique for mapping the subsurface structure of rocks by measuring reflections of acoustic waves at various depths. Seismic surveys are used to locate potential oil and gas bearing structures. The regional focus shows in which regions seismic surveys are performed (core or non core region). A non core region focus of seismics performed can indicate a possible development of new exploration regions. The utilization of different types of seismic methods covers the focus method. The focus technology is characterized by the usage of 2 D, 3 D, 4 D or all methods.
A 2 D survey reveals a cross section of the subsurface. In a 3 D survey, seismic data are collected in the in- and cross line directions to create a three dimensional image of the substructure. 4 D seismic technology makes the monitoring of the movement and the mobility of oil as it is extracted in the production process possible.[144] The seismic focus can provide information if a company prefers the best possible methods or if it invests less in this technology.
The investment view shows a profile of the exploration expenditures, which are defined in chapter 4.1, from the years 2000 to 2005 for every predetermined company. The possible profile behavior patterns can be classified as "increasing", "maintaining", "decreasing", as a "once increase" or a "once decrease".
The last strategic view covers the reserve replacement strategy. The total reserve replacement rate in percentage is calculated as the ratio of total reserves additions to production. The morphological box covers the reserve replacement rate for 2005 which is classified into different percentage ranges as described in table 4.3.
The annual reserve replacement rate profile can have the same possible behavior patterns as the investment profile.

[144] Cf. Gibbons/Arnfield/Blanchard a.o.(2002),p.147

By looking at the reserve replacement rate of different years it is essential to consider the acquisitions which were performed. A single massive increase of this rate can have its origin in an acquisition.
The technology seismic, the investment and the reserve replacement view as well as their possible behavior patterns are described in table 4.3.

Exploration and appraisal						
Strategic view	Strategic indicator	Strategic behavior				
Seismic technology	Regional focus	Core regions		Non core regions		
	Focus on method	2 D	3 D	4 D	All methods	
Investment	Investment profile					
Reserve replacement strategy	Reserve replacement rate 2005	≤ 50%	51% - 100%	101%-200%	201% - 300%	> 300%
	Annual reserve replacement profile					

Tab. 4.3 Morphological box for exploration & appraisal (part 2)

Development and production

The development and production segment covers the regional focus, EOR (enhanced oil recovery), the resource portfolio, midstream, downstream, the investment as well as the net production profile.
The regional focus which is also part of the exploration and appraisal segment is used to define if an E&P company performs development operations in core regions or non core regions.
EOR is a main part of development and production. It can be described as the recovering of oil from a field without using the reservoir's pressure. The EOR focus tries to find out which types of EOR techniques a company performs. Secondary recovery methods cover methods like water or gas injection which aid the recovery of liquid hydrocarbons. Two different types of gas lifting can be distinguished with the continuous and intermittent flow. In the continuous flow, a continuous volume of high pressure gas is injected into the producing tubing whereas in intermittent gas lift, gas is injected in regular intervals by an intermitter.
The operatorship concerning EOR tries to evaluate if the E&P company has technical competences or experiences in performing these kind of methods. The intensity of EOR operated projects are classified with "always", "in most cases", "seldom" or "never".
The resource portfolio view covers the conventional, the oil & gas production and reserves as well the unconventional focus.
The conventional resource portfolio focus of E&P companies is classified in percentage ranges as described in table 4.4 of the morphological box.
The oil & gas focus is separated into a production and reserves part. Both parts provide information about the average gas production as percentage of the total production and about the average gas reserves as percentage of total reserves between 2000 and 2005. The possible strategic behaviors are characterized in percentage ranges as shown in table 4.4.
The unconventional resource portfolio can have a focus on oil sands, heavy oil, tight gas, coalbed methane and on LPG.

Oil sand can be described as a mixture of clay, sand, water and hydrocarbons. In general, two tons of oil sands are required in order to produce one barrel of oil.[145] Heavy crude oils are extremely viscous. As a result, they can not be produced, transported and refined by conventional methods. These properties make it difficult to pump them out of the ground or through a pipeline and interfere with refining.[146] Tight gas is a natural gas that is found in reservoirs with low permeability and low porosity. Rock layers hold the gas very dense and so the gas does not flow easily.[147] Coalbed methane can be described as natural gas that is generated and stored within coal. Often a coal seam is saturated with water and the methane is held in the coal by water pressure. By producing the gas, water is drawn out of the coal seam which creates a pressure that allows the gas to flow.[148] Liquefied petroleum gas (LPG) can be defined as propane, butane and their mixtures which are in liquid phase under high pressure and gaseous under low pressure.[149]
The possible behavior patterns out of the regional, EOR and resource portfolio strategic view are described in table 4.4.

Development and production						
Strategic view	Strategic indicator	Strategic behavior				
Regional	Regional focus	Development activity focused on core regions		Development activity focused on non-core regions		
EOR	Focus on EOR-method	CO_2 injection	Gas cycling	Water flooding	All of them	
	Operatorship	Always	In most cases	Seldom	Never	
Resource portfolio	Conventional focus	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Oil & gas production focus [Gas as % of production]	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Oil & gas reserves focus [Gas as % of reserves]	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Non-conventional focus	Oil sands	Heavy oil	Tight gas	Coalbed methane	LPG

Tab. 4.4 Morphological box for development & production (part 1)

[145] Cf. Campbell/Liesenborghs/Schindler/Zittel (2007),p.89
[146] Cf. Campbell/Liesenborghs/Schindler/Zittel (2007),p.90
[147] Tight gas: see http://www.anadarko.com/operations_by_regions/u.s._rockies/tight_gas.asp, Call: 11.6.07
[148] Cf. Campbell/Liesenborghs/Schindler/Zittel (2007),p.119
[149] Cf. Campbell/Liesenborghs/Schindler/Zittel (2007),p.88

The midstream segment of the morphological box for development and production covers parts of the supply chain sector. The midstream view of this morphological box involves the LNG as well as the pipeline sector. LNG can be defined as liquefied natural gas which serves as a transportation medium. Possible strategic behavior patterns for both parts of the midstream segment can be that a company operates, participates or has no interests in LNG or pipelines.
The coordination strategy between upstream and downstream tries to evaluate the importance of these two sectors for a company. A possible strategic indicator of a downstream strategy can be the volume based integration of refining capacity through annual production. A percentage value of more than 100% means that a company's refining capacity is higher than its own production.
The significance of the upstream sector can be analyzed by looking at the upstream revenue as part of total sales and operating revenues. The indicator which is given in percentage is ordered in different percentage ranges as described in table 4.5. A high percentage value of this indicator can be expected by a strongly upstream focused E&P (integrated) company. The average values for both indicators have to be calculated between the years 2000 and 2005 for the coordination strategy part of the morphological box.
The investment view is also part of the development and production segment. The possible behavior patterns which are described in table 4.5 are the same as for the exploration and appraisal segment. An investment profile for every predetermined company can be created by using the development expenditures between the years 2000 and 2005.
The last element of the morphological box for development and production is the net production profile. It can describe a trend in the daily Boe (barrels of oil equivalent) production per net producible well. The time frame in this case is also defined with 2000 to 2005. The strategic behavior patterns can be classified as "increasing", "maintaining", "decreasing" as well as a "once decrease" or a "once increase".
The possible behaviors out of the midstream, coordination between upstream and downstream as well as out of the investment view are described in table 4.5.

Development and production						
Strategic view	Strategic indicator	Strategic behavior				
Midstream	Focus on LNG	No		Operating	Participating	
Midstream	Focus on pipelines	No		Operating	Participating	
Coordination strategy between upstream and downstream	Downstream strategy Volume based integration [Refining capacity/annual production]	No	< 33%	33% - 66%	67%-100%	> 100%
	Upstream strategy [Revenue of upstream as part of total sales and operating revenues]	< 10%	10% - 24%	25% - 50%	51% - 75%	> 75%
Investment	Investment profile					
Net production profile	Trend in daily Boe production per net producible well					

Tab. 4.5 Morphological box for development & production (part 2)

Acquisition

The morphological box of the acquisition segment covers different possible strategic behavior patterns by looking at the reserve and regional strategy, acquisition intensity and cost as well as at the acquisition vs. farm in preference.
The reserve strategy involves the average amount of acquired reserves per year between 2000 and 2005. The different ranges of million barrels of oil equivalent (MMBOE) of acquired reserves per year are described in table 4.6.
The so called regional strategy can be characterized by the percentage of performed acquisitions in core regions. A low percentage value can be a possible indication for the intention to develop new core regions.
The acquisition intensity defines the average number of acquisitions per year.
Further on, the acquisition costs are also a main strategic element of the acquisition focused morphological box. The costs are given in US Dollar per BOE acquired reserves. The different possible ranges of the average acquisition costs between 2000 and 2005 are described in table 4.6.
Finally, the last part of this morphological box tries to find out if an E&P company prefers farm ins or acquisitions. In that way, the acquisition rate as percentage of the total performed acquisitions and farm ins between 2000 and 2005 has to be calculated.
The morphological box with the strategic views and possible behaviors for the acquisition segment is described in table 4.6.

Acquisition					
Strategic view	Strategic indicator	Strategic behavior			
Reserve strategy	Acquiring reserves [MMBOE/year]	< 50	50 - 100	101 - 200	> 200
Regional	Regional focus [% of acquisitions in core regions]	< 25%	25% - 50%	51% - 75%	> 75%
Acquisition intensity	Intensity strategy [Acquisitions/year]	0	< 3	3 - 5	> 5
Acquisition cost strategy	Cost strategy Acquisition costs [USD/BOE]	< 3	3 - 5	6 - 8	> 8
Acquisition vs. farm in	Focusing on acquisitions or on farm ins [Acquisition rate as %]	< 25%	25% - 50%	51% - 75%	> 75%

Tab. 4.6 Morphological box for acquisition

Cooperation

The cooperation segment of the morphological box covers alliances, joint ventures and other partnerships. Different kind of contracts between a government and a foreign producer are already described in chapter 4.1.
The strategic alliance can be defined as a cooperation or collaboration where each partner hopes that the benefits from the alliance will be greater than those from individual efforts. The alliance can be characterized by a long term relationship with another company in order to compensate own weaknesses by strength potentials of the alliance partner. In that way, the main target is the improvement and the protection of the competition position of the company or the group of companies. [150]

[150] Cf. Al Laham/Welge (2003),p.463

Motives for strategic alliances in the oil industry can be the access to the partner's reserves, distribution channels, products, technology, intellectual property or the access to the partner's capital.
A cooperation can be defined as a joint venture if two or more parties form an independent and legal society.[151] The capital of this joint company can be supported by local and foreign partners. The joint venture is organized by separating of control, risk and profit. The venture can be developed for one specific project only or it can be a continuing relationship.[152] Joint ventures are very common in the oil and gas industry and are often cooperations between a local and foreign company.
The last part of the cooperation strategy covers other partnerships which can not be classified as strategic alliances or joint ventures. In general, a partnership can be defined as a type of business in which partners share with each other the profits or losses.
Possible applications of alliances, joint ventures and other partnerships in the petroleum industry are defined in the morphological box with refineries (downstream sector), LNG projects (midstream sector), oil/gas sale contracts (economics, supply chain sector) and development fields (E&P sector). Partners in cooperations can be national oil companies, states, major international oil companies as well as service companies. "No" defines the case if alliances, joint ventures or other partnerships are not performed.
The different kind of strategies and strategic behavior patterns for the cooperation part of the morphological box are described in table 4.7.

Cooperation						
Strategic view	Strategy	Strategic behavior				
Cooperation strategy	Alliance	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Alliance partner	No	NOCs	States	Major IOCs	Service companies
	Joint venture	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Joint venture partner	No	NOCs	States	Major IOCs	Service companies
	Other partnership	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Other partner	No	NOCs	States	Major IOCs	Service companies

Tab. 4.7 Morphological box for cooperation

[151] Cf. Bea/Haas (1995),p.431
[152] Cf. Al Laham/Welge (2003),p.472

Human resources (HR)

The HR strategy in the morphological box covers the development of staff as well as of the EBITDA per employee between 2000 and 2005.
EBITDA is the short version of earnings before interest, taxes, depreciation and amortization and can be used as an economic indicator to evaluate an enterprise.
The possible strategic shapes of these two parameters can be a strong or slight increase as well as decrease between the years 2000 and 2005 which is described in table 4.8.

Energy portfolio

An E&P company can follow a niche strategy by investing in alternative energies like wind power, solar energy or biomass.
Wind power is the conversion of wind energy into electricity by using turbines. The rotation of the turbine blades is converted into electrical current by means of a generator. This kind of energy technology is especially practiced in North- and West Europe.[153]
Solar energy or power is solar radiation emitted from the sun. It can be used in lots of applications like heat (hot water), electricity generation (photovoltaic, heat engines) or in the transportation sector (solar car).[154]
The third possibility of investing in alternative energies can be a focus on biomass. It refers to living or dead biological material which can be used in the energy production industry.[155] Biofuel for the transportation sector and pellets for heating purposes can be produced out of biomass. Pellets are small balls of biomass which are compressed tightly together.
Different kind of possible strategic behavior patterns out of the HR and energy portfolio view are introduced in table 4.8.

HR & energy portfolio					
Strategic view	Strategy	Strategic behavior			
HR	HR strategy	Strong increase of staff	Slight increase of staff	Slight decrease of staff	Strong decrease of staff
		Strong increase of EBITDA/employee	Slight increase of EBITDA/employee	Slight decrease of EBITDA/employee	Strong decrease of EBITDA/employee
Energy portfolio	Alternative energy focus	No	Focus on wind power	Focus on solar energy	Focus on biomass

Tab. 4.8 Morphological box for HR & energy portfolio

[153] Cf. Gudemann (1990),p.355
[154] Cf. Gudemann (1990),p.329
[155] Cf. Liebisch/Retzlaff (1986),p.62

4.4 Peer group analysis

The competition analysis, which is described in chapter 2.2.5.1.3, plays a significant role in the strategic concept of an enterprise. The strategic department of OMV E&P GmbH with Dr. Wolfgang Posch and DI Rainer Altenberger as the coaches of the diploma thesis defined the following E&P companies which are most relevant to compare with OMV AG.

- Marathon Oil
- Amerada Hess
- Apache Corporation
- Anadarko Corporation
- Occidental Petroleum
- British Gas
- Statoil ASA
- Repsol YPF

Marathon Oil, Amerada Hess, Statoil ASA, Repsol YPF and OMV AG are so called integrated companies. The other ones are upstream focused (independent) companies.
PFC Energy[156] which provides strategic analysis for countries and petroleum companies classifies Statoil ASA and Repsol YPF as regional players. This peer group is defined by companies which are dominant in one or two regions, often NOCs or former NOCs. Marathon Oil, Amerada Hess, Apache Corporation, Anadarko Corporation, Occidental Petroleum, British Gas and OMV AG are classified as focus players by PFC Energy. They are described as companies who occupy a competitive niche, created by a defined capability, a different business model or a geographic focus. In addition, PFC Energy also ranks the top 50 publicly traded companies in the oil and gas industry based on year end market capitalization. A list of the top ten as well as of the companies which are part of the external analysis is provided in table 4.9. Amerada Hess is the only E&P company of the external analysis which is not ranked under the top 50 petroleum companies introduced by PFC Energy.

Rank (2006)	Company name	Market capitalization [USD Billion]	Country of headquarters	Primary business
1	ExxonMobil	449,3	United States	Integrated
2	Gazprom	272,0	Russia	Integrated
3	Petrochina	253,6	China	Integrated
4	Royal Dutch Shell	225,9	Netherlands	Integrated
5	BP	218,8	Great Britain	Integrated
6	TOTAL	174,9	France	Integrated
7	Chevron	160,7	United States	Integrated
8	Eni	134,7	Italy	Integrated
9	ConocoPhillips	118,2	United States	Integrated
10	BHP Billiton	113,5	Australia	Diversified Minerals
16	Statoil ASA	57,3	Norway	Integrated
18	BG Group	46,3	Great Britain	Independent
20	Repsol YPF	42,2	Spain	Integrated
23	Occidental Petr.	41,1	United States	Independent
28	Marathon Oil	32,5	United States	Integrated
38	Apache Corp.	21,9	United States	Independent
42	Anadarko Corp.	20,0	United States	Independent
49	OMV AG	16,9	Austria	Integrated

Tab. 4 9 Top 50 companies in the petroleum industry (2006)[157]

[156] see http://pfcenergy.com, Call: 12.6.07
[157] Source: see http://pfcenergy.com, Call: 12.6.07

5 Data analysis of determined E&P companies

The development of the morphological box which is described in chapter 4.3 was the basis for the strategic comparison of the determined E&P companies. The data analysis which was very intensive covered most of the practical work at the OMV E&P headquarters in Vienna. Annual reports of the E&P companies from 2000 to 2006 as well as the online data bases Herold and PFC Energy were the main sources for quantitative and qualitative information which were relevant for using the developed morphological box.
A short overview about the average daily production [thousand barrels per day] of 2005 for every analyzed E&P company is provided in figure 5.1 in order to get an idea about the size and production potential of each company.

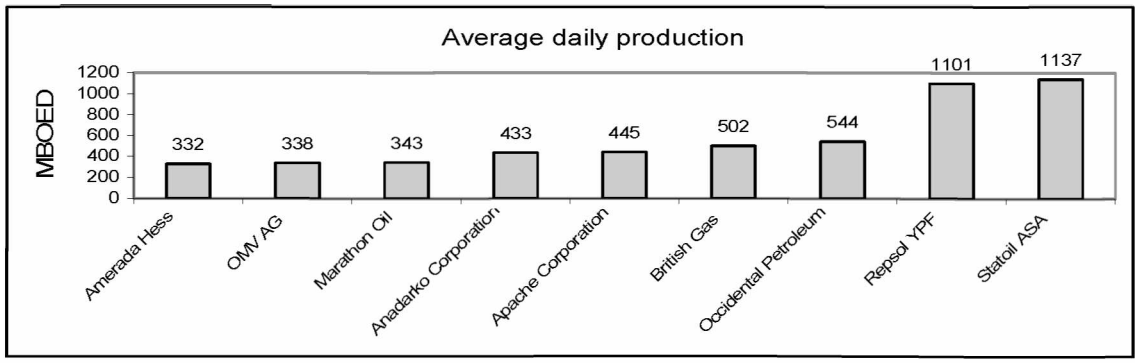


Fig. 5.1 Average daily production of analyzed E&P companies (2005)

5.1 Amerada Hess

5.1.1 General overview

Hess Corporation is a global integrated company with the headquarters in New York City, United States. Detailed information about activities of Amerada Hess between 2000 and 2005 are provided on pages A1 till A6 in the appendix. In order to get an overview of the performance of Amerada Hess between 2000 and 2005, data about the reserve base, the production as well as about the financial situation are given in figures 5.2, 5.3 and 5.4.

Figure 5.2 provides information about the total proved reserves as well as for liquid hydrocarbons and natural gas. Proved reserves are given in million barrels of oil equivalent [MMBOE]. The company's main proved reserves regions are Europe, Africa, Asia as well as the USA.

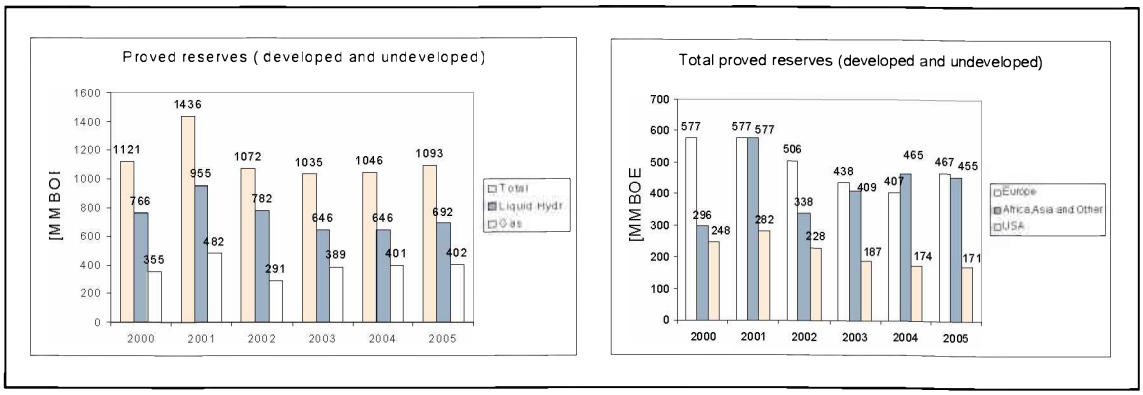


Fig. 5.2 Proved reserves base (Hess)[158]

[158] Source: see Annual Reports (2000-2006)

Figure 5.3 provides information about the economic performance between 2000 and 2005 with the EBIT, ROACE and cash flow. The total average daily production as well as the production data for liquid hydrocarbons and natural gas of Amerada Hess is introduced in figure 5.4. The units are given in thousands of barrels oil equivalent per day [MBOED]. The main production regions are Europe, the USA, Africa as well as Asia and Latin America.

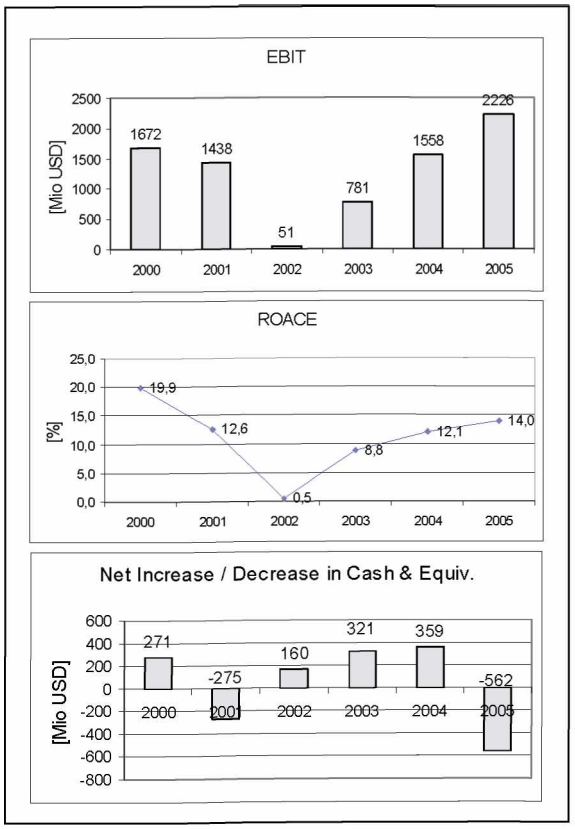


Fig. 5.3 Economic performance (Hess)[159]

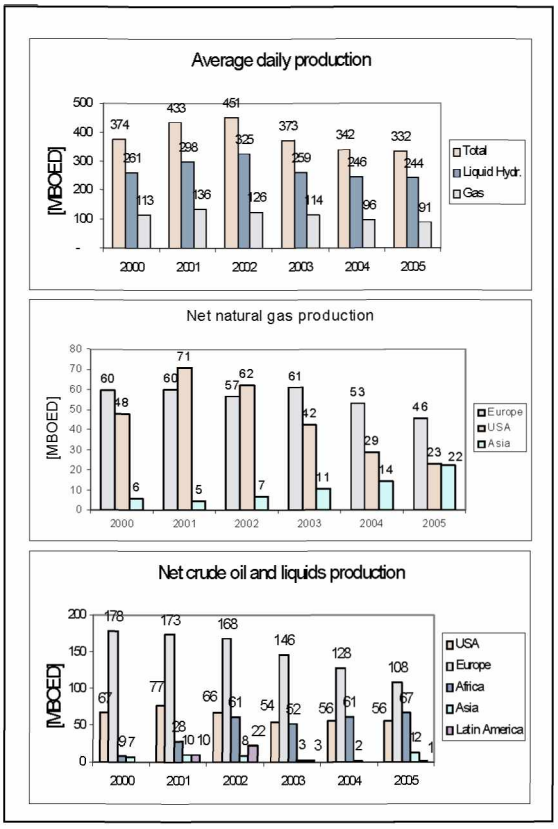


Fig. 5.4 Average daily production (Hess)[160]

The worldwide E&P activities of Amerada Hess are introduced in figure 5.5.

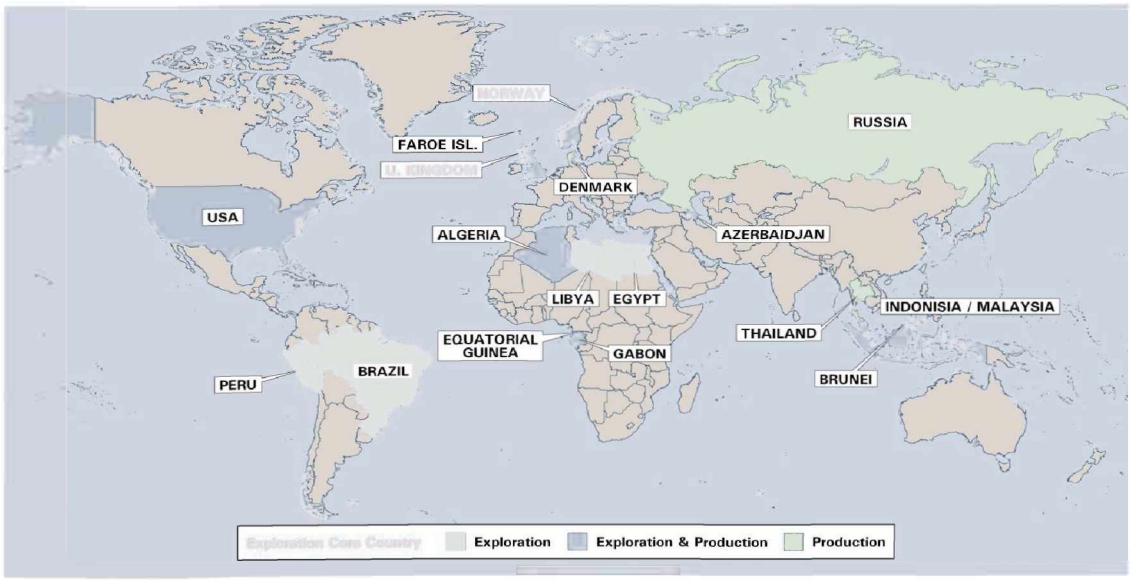


Fig. 5.5 E&P activities geographically (Hess)

[159] Source: see http://www.herold.com

[160] Source: see http://www.herold.com

5.1.2 Exploration and appraisal (part 1)

Regional focus

The main exploration operations of Amerada Hess were concentrated on the four core areas defined as the USA (Gulf of Mexico), the North Sea (Norway, Faroe Islands, United Kingdom), North/West Africa (Algeria, Equatorial Guinea, Gabon) and South/East Asia (Indonesia, Malaysia, Brunei). Figure 5.6 shows the number and regions of net exploratory wells drilled between 2000 and 2005.

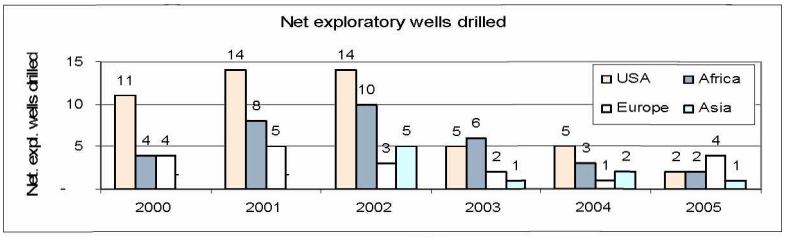


Fig. 5.6 Net exploratory wells drilled (Hess)[161]

In 2005 Hess returned to Libya as part of the so called Oasis Consortium. In addition, Hess entered into Russia through the acquisition of a 65% interest in the company Trabant Holding International which operates in the Volga Ural region. Costs for this acquisition were USD 400 million. The 2nd new entry of 2005 was Egypt, where Hess acquired a 55% interest in a deepwater block from the company Apache for USD 413 million. Minor exploration interests can be observed in Latin America (Peru, Brazil).

Risk exposure

By taking the relevant core countries, the average risk value of 2,4 is defined by Global Insight as a „moderate" overall risk („moderate" risk level between 2,0 and 2,49). The other exploration interests in Brazil or Peru are classified as „significant" risk activities. As a consequence, the average overall risk of the company's activities can be defined as „medium". The relevant operation countries are listed up in table 5.1.

	Current overall risk	Political [25%]	Econ. [25%]	Legal [15%]	Tax [15%]	Operational [10%]	Security [10%]
United States	1,51	1,5	1,5	1	1	1,5	2,5
Norway	1,44	1,25	1,25	1	2	1,75	1,5
Faroe Islands	1,34	1	2	1,25	1,25	1,5	1
United Kingdom	1,46	1,25	1,5	1	1,25	1,25	2,5
Algeria	2,89	3	2,5	2,75	2,5	3,5	3,5
Equatorial Guinea	3,54	3,75	2,75	4	4	4	2,75
Gabon	3,14	3,5	3,5	2,5	2,75	3,25	2,5
Indonesia	3,1	2,75	3	3,5	3	3,5	3,25
Malaysia	2,0	1,75	2,25	2	1,5	2,25	2,5
Brunei	2,01	2,25	2,5	1,25	1	2,25	1,75
Lybia	3,02	3	2,75	3,5	3,5	3	2
Russia	2,95	2,75	2,75	2,75	2,75	3,5	3,75
Egypt	2,78	2,75	2,5	3,5	2,5	3	2,5
Average	**2,40**	2,35	2,37	2,31	2,23	2,63	2,46

Tab. 5.1 Current overall risk of operating countries (Hess)[162]

[161] Source: see Annual Reports (2000-2006)

[162] Source: see http://www.globalinsight.com

Drilling technology (focus and method)

The exploration drilling activities of Amerada Hess were focused more on offshore areas than on onshore regions. At the end of 2006, around 87% of the operations were based offshore. The deepwater projects (defined as more than 300 meters water depth) accounted for nearly two third of all operations. Most of the deepwater projects during the last years were concentrated on the Gulf of Mexico, on the North Sea, offshore Libya, Egypt, Equatorial Guinea as well as on offshore Indonesia and Malaysia. Especially, horizontal drilling methods in combination with EOR techniques were used. Table 5.2 describes all E&P projects as well as the location and operatorship of Amerada Hess during 2006.

Exp./Dev. projects of Amerada Hess (2006)	Total	General operator	Onshore area	Offshore area (less than 300m)	Deepwater area (more than 300m)	Deepwater operator
Gulf of Mexico	15	8	0	0	15	8
Brazil	1	0	0	0	1	0
Peru	2	0	2	0	0	0
Denmark	1	1	0	1	0	0
Faroe Islands	1	0	0	0	1	0
Norway	6	0	0	2	4	0
United Kingdom	6	1	0	5	1	0
Algeria	2	1	2	0	0	0
Egypt	1	1	0	0	1	1
Libya	2	1	1	0	1	1
Equatorial Guinea	5	4	0	0	5	4
Gabon	1	1	0	0	1	1
Azerbaijan	1	0	0	0	1	0
Brunei	1	0	0	0	1	0
Indonesia	3	2	1	2	0	0
Malaysia	2	2	0	1	1	1
Thailand	2	1	1	1	0	0
Sum	52	23	7	12	33	16

Tab. 5.2 E&P projects of Amerada Hess (2006) [163]

Technical success rate

Amerada Hess achieved an average technical success rate of 47% between 2000 and 2005 concerning the net exploratory wells drilled. The success rates in percent are given in figure 5.7.

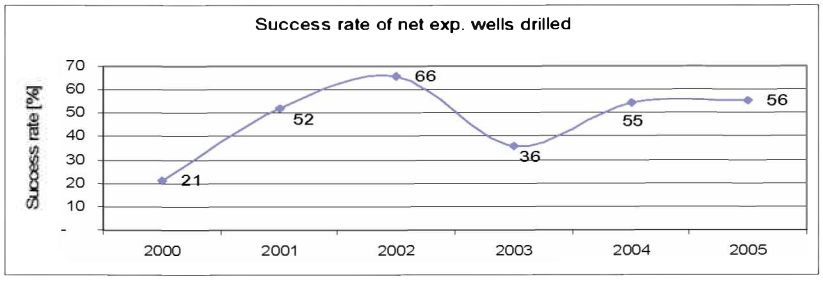


Fig. 5.7 Technical success rates (Hess) [164]

[163] Source: see http://www.pfcenergy.com

[164] Source: see Annual Reports (2000-2006)

Operatorship

The general operatorship as well as the deepwater operatorship can be calculated with the data provided in table 5.2. Amerada Hess has a general operatorship of 44% and a deepwater operatorship of 48% in its E&P projects during 2006.

The results of qualitative and quantitative analysis of the regional focus, the risk exposure, as well as of the drilling technology can be used for the first part of the exploration and appraisal segment in the morphological box which is described in table 5.3.

Amerada Hess					
Exploration and appraisal (results in dark grey)					
Strategic view	Strategic indicator	Strategic behavior			
Regional	Regional focus	Exploration concentration in core regions	Development of new exploration regions	Near field exploration	
Risk	Risk exposure	Low	Middle	High	
Drilling technology	Technology focus	Unconventional (Polar, Deepwater, Fractured…)	Conventional onshore	Shallow offshore	Covering all
	Focus on method	Multilateral	Horizontal	Normal	
	Technical success rate	≤ 25%	26% - 50%	51% - 75%	> 75%
	General operatorship (Asset based)	≤ 25%	26% - 50%	51% - 75%	> 75%
	Deepwater operatorship (Asset based)	≤ 25%	26% - 50%	51% -75%	> 75%

Tab. 5.3 Morphological box for exploration & appraisal (part 1) (Hess)

5.1.3 Exploration and appraisal (part 2)

Seismic technology (focus and method)

Amerada Hess focused on seismic surveys on its core regions. The company initiated several seismic projects in Algeria, Malaysia, Brunei or on the Faroe Islands. Especially 2 D as well as 3 D seismic methods were used.

Investment profile

The average exploration expenditures of Amerada Hess per year were USD 191 million. The profile can be characterized by a constant behavior. The exploration expenditures between 2000 and 2005 are provided in figure 5.8.

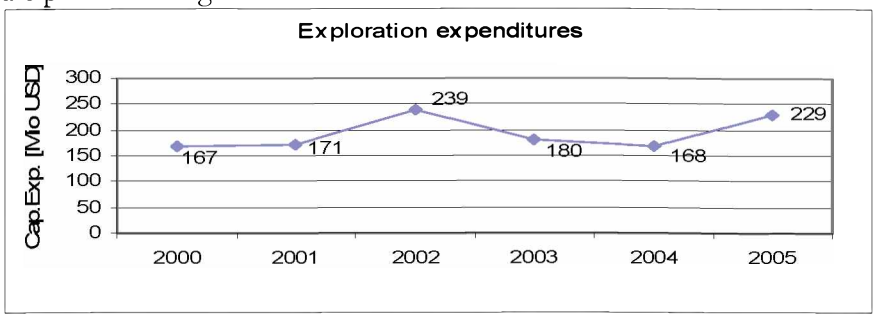


Fig. 5.8 Exploration expenditures (Hess)[165]

Reserve replacement rate (2005)

The reserve replacement rate of Amerada Hess in 2005 was 116%. By looking at the reserve replacement rates from 2000 and 2005, the company's average rate was 124%.
The main acquisitions during the last years were performed in 2001 and 2005. Hess acquired the company Triton Energy Limited for USD 2,7 billion with assets based in West Africa and South/East Asia. This transaction increased the company's reserves by 20%. In addition, Hess acquired all the production and exploration assets from the E&P company LLOG in the Gulf of Mexico and onshore Louisiana with estimated proved reserves of 60 MMBoe for USD 750 million. The acquisitions of 2005 were based in Egypt, Libya and Russia. Figure 5.9 describes the reserve replacement rate profile for Amerada Hess. The profile can be characterized by a "once increase".

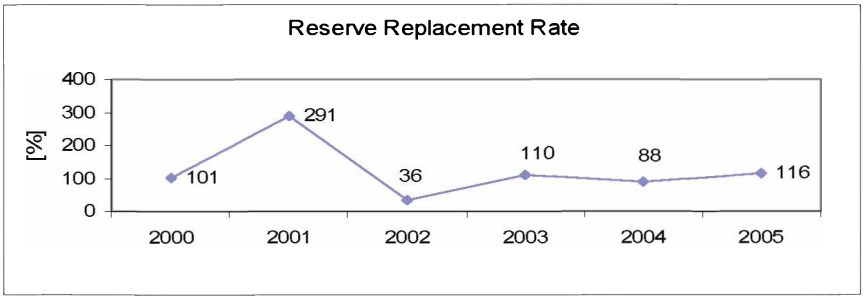
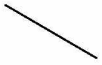


Fig. 5.9 Reserve replacement rates (Hess)[166]

The results of the analysis of the seismic technologies, the investment profile as well as of the reserve replacement profile are provided in the morphological box which is described in table 5.4.

[165] Source: see Annual Reports (2000-2006)
[166] Source: see Annual Reports (2000-2006)

Amerada Hess						
Exploration and appraisal (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Seismic technology	Regional focus	Core regions		Non core regions		
	Focus on method	2 D	3 D	4 D	All methods	
Investment	Investment profile					
Reserve replacement strategy	Reserve replacement rate 2005	≤ 50%	51% - 100%	101%-200%	201% - 300%	> 300%
	Annual reserve replacement profile					

Tab. 5.4 Morphological box for exploration & appraisal (part 2) (Hess)

5.1.4 Development and production (part 1)

Regional focus

Development operations were focused on the defined core regions. Stimulation and development programs were especially initiated in the domestic core regions of the USA to work against the poor performance of mature fields (Dakota, Texas). Internationally, Amerada Hess´ main development operations were concentrated on the North Sea, Equatorial Guinea and on the so called Joint Development Area (JDA) between Malaysia and Thailand. Figure 5.10 shows the main regions of net development wells drilled.

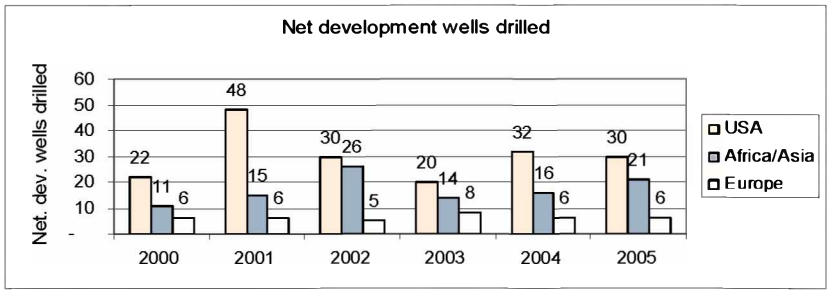


Fig. 5.10 Net development wells drilled (Hess)[167]

The main reasons of the production decline of minus 26% from 2002 (451 MBoe/d) to 2005 (332 MBoe/d) which is also described in figure 5.4 was the natural decline in mature fields, the massive impact of the hurricanes in the Gulf of Mexico as well as the sale of assets in the North Sea and in the Gulf of Mexico because of high costs.

[167] Source: see Annual Reports (2000-2006)

EOR

Amerada Hess used all types of possible stimulation techniques to increase the oil recovery. The company is an industry leader in operating carbon dioxide injection technology. Amerada Hess performed several water and CO_2 injection projects in West Texas and North Dakota because of the production reduction in mature fields. Internationally, the company operated or participated in waterflood projects in the North Sea (United Kingdom, Norway) and operated EOR programs in the Ceiba field of Equatorial Guinea.

Resource portfolio

The resource portfolio of Amerada Hess is strongly conventional focused (> 75%). There were no relevant data available concerning to unconventional resources. Minor information is given that at the end of 2006, a 15% interest in a heavy oil discovery located in the Gulf of Mexico was sold to Petrobras (NOC of Brazil).

Oil & gas production focus

Amerada Hess´ average gas production accounted for 30% of the total production. The gas production as % of the total production between 2000 and 2005 is described in figure 5.11.

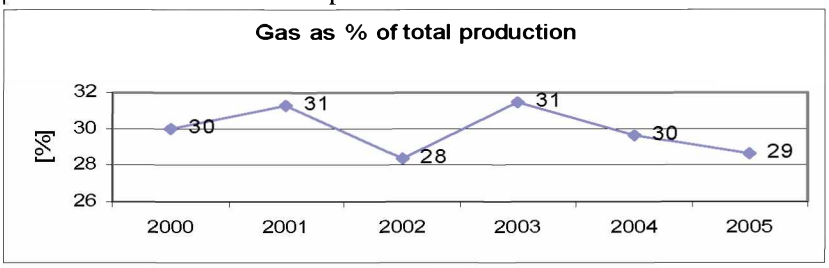


Fig. 5.11 Gas as % of total production (Hess)[168]

Oil & gas reserves focus

The average gas reserves of Amerada Hess accounted for 35% of the total proved reserves base. The gas reserves development as % of the total proved reserves between 2000 and 2005 is introduced in figure 5.12.

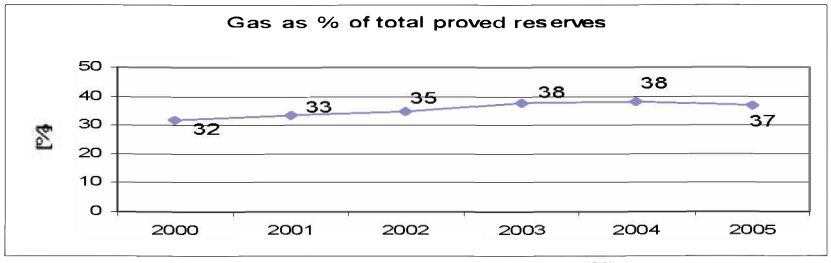


Fig. 5.12 Gas reserves as % of total proved reserves (Hess)[169]

[168] Source: see http://www.herold.com

[169] Source: see http://www.herold.com

Table 5.5 describes the morphological box after the analysis of the first part of the development and production segment.

Amerada Hess						
Development and production (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Regional	Regional focus	Development activity focused on core regions		Development activity focused on non-core regions		
EOR	Focus on EOR-method	CO_2 injection	Gas cycling	Water flooding	All of them	
	Operatorship	Always	In most cases	Seldom	Never	
Resource port-folio	Conventional focus*	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Oil & gas production focus [Gas as % of production]	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Oil & gas reserves focus [Gas as % of reserves]	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Non-conventional focus	Oil sands	Heavy oil	Tight gas	Coalbed methane	LPG

Tab. 5.5 Morphological box for development & production (part 1) (Hess) * Assumption

5.1.5 Development and production (part 2)

Focus on LNG

Hess formed a 50% owned joint venture called Hess LNG which develops LNG terminals. Since 2005, the company is planning a LNG terminal in Massachusetts (USA) In addition, Hess holds a 3% interest in the Snohvit LNG (Barents Sea) plant operated by Statoil.

Focus on pipelines

Hess holds a 2,7% interest in the Baku Tbilisi Ceyhan (BTC) pipeline which transports crude oil from Azerbaijan to Turkey (operated by BP). The company has also a 2,7% interest in the so called Azeri Chirag Guneshli (ACG) development project in the Caspian region (operated by BP). The crude oil from ACG is transported via two pipelines from the Black Sea to the BTC pipeline.

Downstream strategy

Amerada Hess and Petroleos de Venezuela (PDVSA) jointly own the HOVENSA refinery on the Virgin Islands. In addition, Hess operates a refinery in New Jersey at Port Reading. Both refineries have an average refining capacity of 13,6 MMTOE (million tons of oil equivalent) per year. The average annual production between 2000 and 2005 accounted for 19,2 MMTOE. As a consequence the volume based integration, refining capacity divided by annual production leads to a percentage value of 70%. Refining capacities and the integration volume calculation are listed up in table 5.6.

Year	2000	2001	2002	2003	2004	2005
Refining [MBBLD]						
HOVENSA (Venezuela)	211	202	181	220	242	231
Port Reading (New Jersey)	60	57	55	54	54	55
Sum	271	259	236	274	296	286
Average refining capacity [MMTOE]	13,6					
Average production [MMTOE]	19,2					
Downstream strategy [Capacity/production] [%]	**70,4**					

Tab. 5.6 Integration volume calculation (Hess)[170]

Upstream strategy

The average upstream production revenue as part of total sales and operating revenue is 24%. That's a typical percentage value for an integrated company. The calculation is based on data provided in table 5.7.

Year	2000	2001	2002	2003	2004	2005
Total upstream production revenue [Mio USD]	3.178	3.957	3.580	2.837	3.284	4.072
Total sales & operating revenue [Mio USD]	11.994	12.413	11.932	14.311	16.733	22.747
Upstream production revenue as part of total sales & operating revenue [%]	26	30	30	20	20	18
Average [%]	**24**					

Tab. 5.7 Upstream revenue (Hess)[171]

Investment profile

The average development expenditures of Amerada Hess per year were USD 1.125 million. The profile can be characterized as "increasing" in the morphological box. The development expenditures between 2000 and 2005 are provided in figure 5.13.

[170] Source: see Annual Reports (2000-2006)

[171] Source: see http://www.herold.com

Fig. 5.13 Development and production expenditures (Hess)[172]

Daily Boe production

Amerada Hess achieved an average daily Boe production per well of 386 Boe between 2000 and 2005. The daily Boe production profile is provided in figure 5.14.

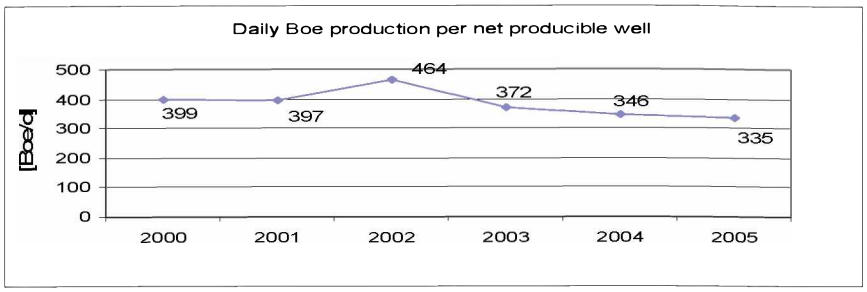


Fig. 5.14 Daily Boe production per net producible well (Hess)[173]

The results of the analysis of the midstream, downstream and upstream sector, as well as of the investment and production profile are introduced in table 5.8.

Amerada Hess						
Development and production (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Midstream	Focus on LNG	No		Operating	Participating	
Midstream	Focus on pipelines	No		Operating	Participating	
Coordination strategy between upstream and downstream	Downstream strategy Volume based integration [Refining capacity/annual production]	No	< 33%	33% - 66%	67%-100%	> 100%
	Upstream strategy [Revenue of upstream as part of total sales and operating revenues]	< 10%	10% - 24%	25% - 50%	51% - 75%	> 75%
Investment	Investment profile					
Net production profile	Trend in daily Boe production per net producible well					

Tab. 5.8 Morphological box for development & production (part 2) (Hess)

[172] Source: see Annual Reports (2000-2006)

[173] Source: see http://www.herold.com

5.1.6 Acquisition

Acquiring reserves

Amerada Hess acquired an average of 131 MMBOE of reserves per year between 2000 and 2005. Detailed data are provided in table 5.9.

Year	2000	2001	2002	2003	2004	2005
Total reserves acquired [MMBOE]	89,67	347,67	Not announced	128,5	0	90,83
Average [MMBOE]	**131**					

Tab. 5.9 Total reserves acquired per year (Hess)[174]

Regional focus

Amerada Hess performed nearly 63% of its acquisitions in core regions. Table 5.10 highlights every acquisition in a core region per year.

Year	Acquisition
2000	Azerbaijan (1), **U.K. (1)**
2001	**Gulf of Mexico (1),**Colombia (1), **Equatorial Guinea (1), Indonesia/Thai./Malaysia (1)**
2002	0
2003	**Indonesia (1)**
2004	0
2005	Russia (1)

Tab. 5.10 Acquisitions in core and non core regions (Hess)[175]

Intensity strategy

The data from table 5.10 can be used to calculate an acquisition intensity of 1,3 (<3) performed acquisitions per year.

Cost strategy

Amerada Hess performed acquisitions as it can be seen in table 5.10 in 2000, 2001, 2003 and 2005. The average acquisitions costs were 3 USD per Boe acquired reserves. The different acquisition costs per year are introduced in figure 5.15.

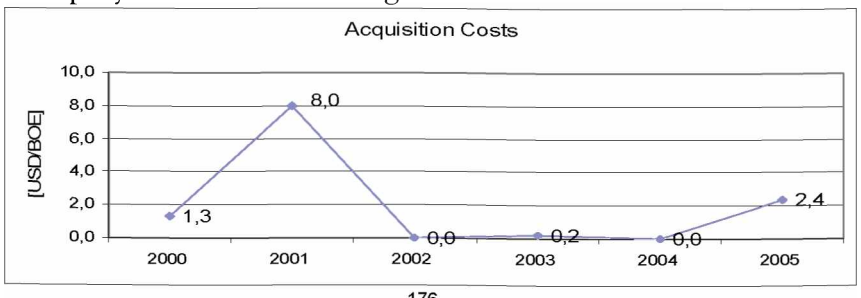


Fig. 5.15 Acquisition costs per year (Hess)[176]

[174] Source: see http://www.herold.com
[175] Source: see http://www.herold.com
[176] Source: see http://www.herold.com

Focusing on acquisitions or farm ins

Amerada Hess performed 68 farm ins and eight acquisitions between 2000 and 2005. The acquisition rate accounted for nearly 11% by dividing the number of acquisitions through the number of farm ins and acquisitions. The numbers of acquisitions and farm ins are listed up in table 5.11.

Year	2000	2001	2002	2003	2004	2005
Farm in	9	14	14	15	11	5
Acquisition	2	4	0	1	0	1
Acquisition rate as % of farm ins and acquisitions	11					

Tab. 5.11 Numbers of performed acquisitions and farm ins (Hess)[177]

The results of the analysis of the acquisition segment for Amerada Hess are provided in table 5.12.

Amerada Hess					
Acquisition (results in dark grey)					
Strategic view	Strategic indicator	Strategic behavior			
Reserve strategy	Acquiring reserves [MMBOE/year]	< 50	50 - 100	101 - 200	> 200
Regional	Regional focus [% of acquisitions in core regions]	< 25%	25% - 50%	51% - 75%	> 75%
Acquisition intensity	Intensity strategy [Acquisitions/year]	0	< 3	3 - 5	> 5
Acquisition cost strategy	Cost strategy Acquisition costs [USD/BOE]	< 3	3 - 5	6 - 8	> 8
Acquisition vs. farm in	Focusing on acquisitions or farm ins [Acquisition rate as %]	< 25%	25% - 50%	51% - 75%	> 75%

Tab. 5.12 Morphological box for acquisition (Hess)

5.1.7 Cooperation

Alliance

In 2005, the Oasis Consortium which consists of Amerada Hess, Marathon Oil, ConocoPhillips and the NOC of Libya (operator) re-animated its alliance in Libya and started production from the so called Waha fields (Waha Concession). The partners had to pay USD 1,3 billion for the re-entry and around USD 530 million for non defined investments over the last two decades.

[177] Source: see http://www.herold.com

Joint venture

Amerada Hess holds a 50% interest in a joint venture called Hess LNG which plans LNG projects. In the downstream sector, Amerada Hess and Petroleos de Venezuela S.A. (PDVSA) jointly own the HOVENSA refinery on the Virgin Islands (capacity of around 500.000 bbl per day). The national oil company of Algeria (SONATRACH) and Amerada Hess formed a joint venture company called Sona Hess. Sona Hess was initiated for a redevelopment project with estimated EOR costs of USD 500 million. Amerada Hess is also part (50%) of a development joint venture with Petronas (NOC of Malaysia) in the so called Joint Development Area (JDA) offshore in Malaysia and Indonesia. Amerada Hess and BG as the operator jointly developed a field in the British North Sea. In Azerbaijan, Hess holds a 2,7% interest in a joint venture offshore development project (operator BP).

Other partnership

In general, Amerada Hess tried to get in contact with the NOCs of the operating regions.
Amerada Hess was part of a water injection project (Valhall) operated by BP in the Norwegian North Sea. In Equatorial Guinea, Amerada Hess operated several water injection programs with GEPetrol (NOC of Equatorial Guinea). During 2005, a gas sale agreement was signed with the state of Thailand. The agreement covered around 500 Bcf from the operated Phu Horm field.
In the LNG sector, Amerada Hess is a partner with a 3% interest in the Snohvit LNG project.

The results of the analysis of different kind of cooperations are provided in table 5.13.

Amerada Hess						
Cooperation (results in dark grey)						
Strategic view	Strategy	Strategic behavior				
Cooperation strategy	Alliance	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Alliance partner	No	NOCs	States	Major IOCs	Service companies
	Joint venture	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Joint venture partner	No	NOCs	States	Major IOCs	Service companies
	Other partnership	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Other partner	No	NOCs	States	Major IOCs	Service companies

Tab. 5.13 Morphological box for cooperation (Hess)

5.1.8 Human resources

The HR strategy of Amerada Hess between 2000 and 2005 can be characterized by a slight increase of staff as well as by a slight increase of the EBITDA per employee. The development of the number of employees as well as of the EBITDA per employee is described in figures 5.16 and 5.17.

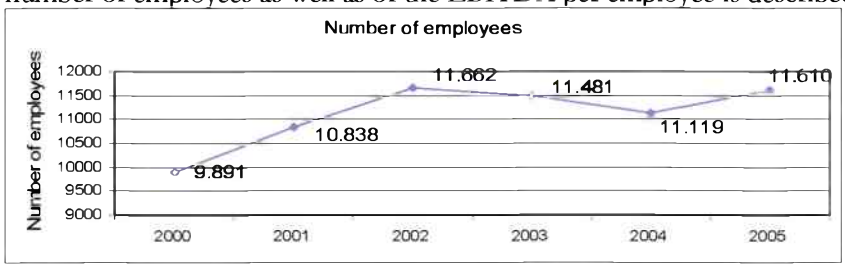


Fig. 5.16 Employee development (Hess)[178]

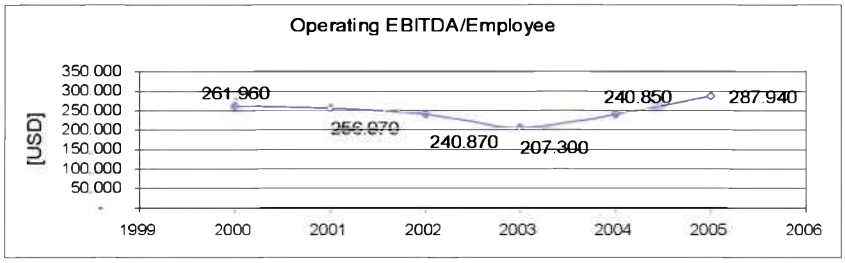


Fig. 5.17 EBITDA/employee development (Hess)[179]

5.1.9 Energy portfolio

No information was available about any investments of Hess in wind power, solar or in biomass.

The results of the analysis of the HR and energy portfolio segment are provided in table 5.14.

Amerada Hess					
HR & energy portfolio (results in dark grey)					
Strategic view	Strategy	Strategic behavior			
HR	HR strategy	Strong increase of staff	Slight increase of staff	Slight decrease of staff	Strong decrease of staff
		Strong increase of EBITDA/employee	Slight increase of EBITDA/employee	Slight decrease of EBITDA/employee	Strong decrease of EBITDA/employee
Energy portfolio	Alternative energy focus	No	Focus on wind power	Focus on solar energy	Focus on biomass

Tab. 5.14 Morphological box for HR & energy portfolio (Hess)

[178] Source: see Annual Reports (2000-2006)

[179] Source: see http://www.herold.com

5.2 Marathon Oil

5.2.1 General overview

Marathon Oil is the fourth largest US based integrated company with the headquarters located in Houston, Texas. Detailed information about Marathon Oil can be looked up on pages A7 till A11 in the appendix. In order to get an overview of the performance of Marathon between 2000 and 2005, information about the reserve base, the production as well as about the financial situation is provided in figures 5.18, 5.19 and 5.20.

Figure 5.18 gives information about the total proved reserves as well as for the proved reserves of liquid hydrocarbons and natural gas. Proved reserves are given in million barrels of oil equivalent [MMBOE]. The company's main proved reserves regions are the USA, West Africa, and Europe.

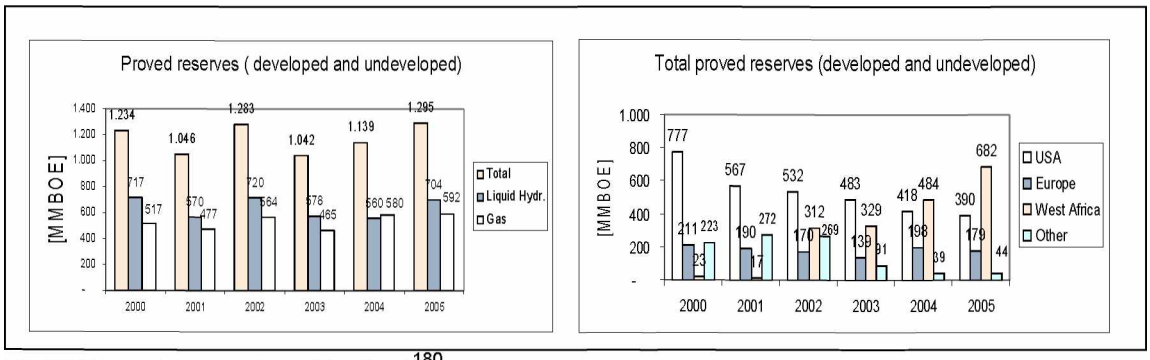


Fig. 5.18 Proved reserves base (Marathon)[180]

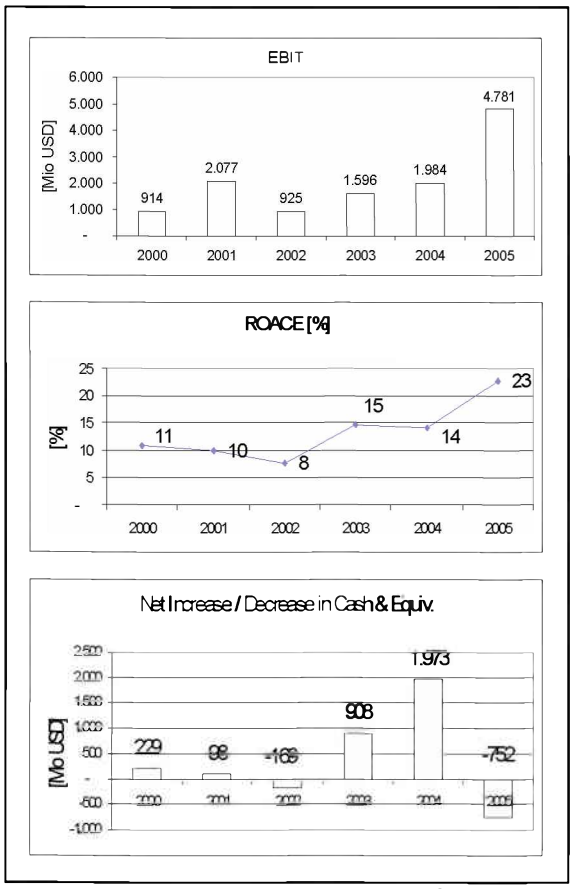


Fig. 5.19 Economic performance (Marathon)[181]

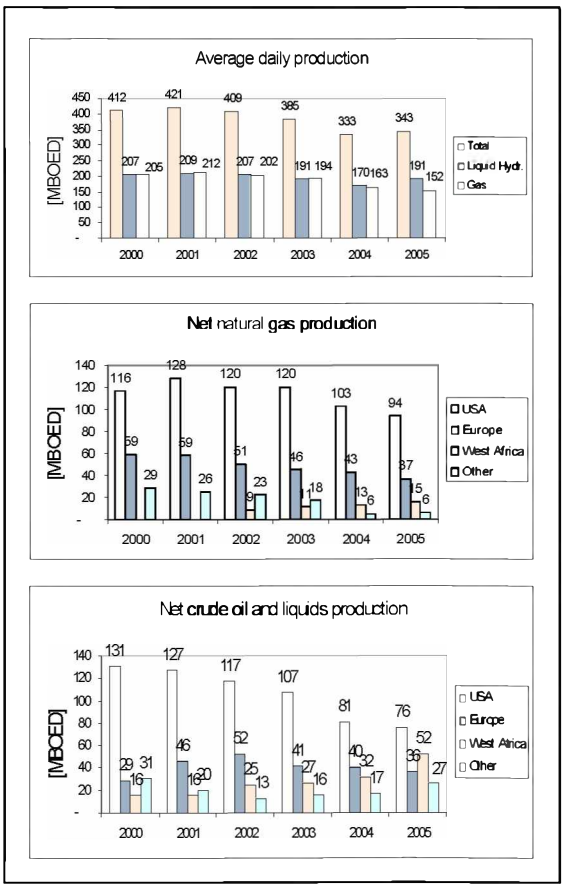


Fig. 5.20 Average daily production (Marathon)[182]

[180] Source: see Annual Reports (2000-2006)
[181] Source: see http://www.herold.com
[182] Source: see Annual Reports (2000-2006)

Information about the economic performance between 2000 and 2005 by looking at the EBIT, ROACE and cash flow are provided in figure 5.19. The total average daily production as well as the production rate of liquid hydrocarbons and natural gas of Marathon Oil is introduced in figure 5.20. The units are given in thousands of barrels oil equivalent per day [MBOED]. The main production regions are the USA, Europe and West Africa.

The worldwide E&P activities of Marathon Oil are introduced in figure 5.21.

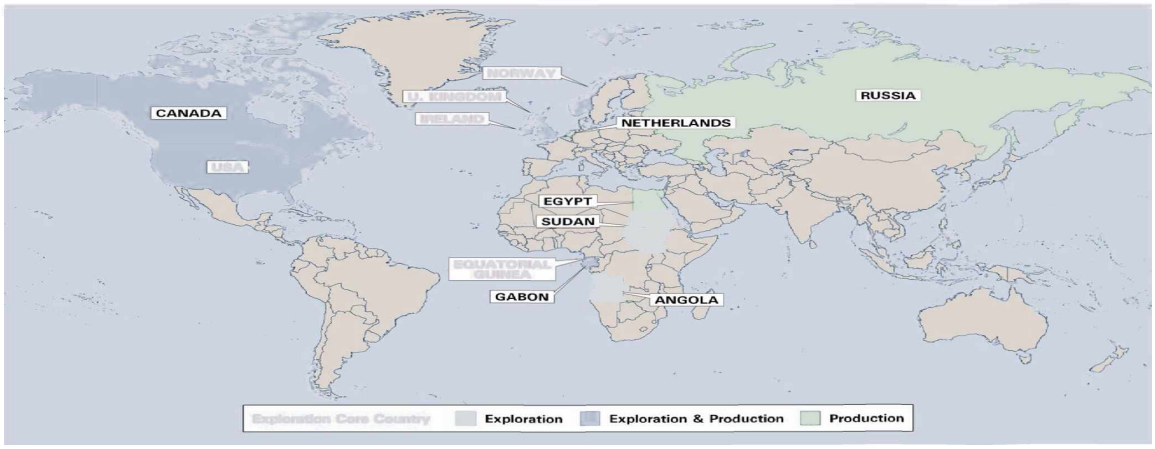


Fig. 5.21 E&P activities geographically (Marathon)

5.2.2 Exploration and appraisal (part 1)

Regional focus

The domestic exploration activity of Marathon was concentrated on the Gulf of Mexico, as well as on onshore USA and Alaska. The main international exploration operations were focused on the defined core countries in North Europe (United Kingdom, Norway, Ireland) and on West Africa (Equatorial Guinea). Some exploration activities could also be observed in Canada and Angola. Figure 5.22 provides the available information concerning the net exploratory wells drilled.

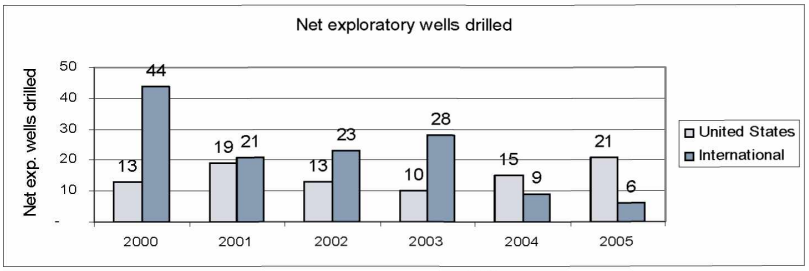


Fig. 5.22 Net exploratory wells drilled (Marathon)[183]

Risk exposure

By taking the relevant core countries, the average risk value of 1,86 is defined by Global Insight as a „low" overall risk („low" risk level between 1,75 and 1,99). If Canada and Angola are taken into this account too, the resulting average overall risk value of 2 is defined as „moderate". („moderate" risk level between 2 and 2,49).
As a consequence, the average overall risk of the company's operations can be classified as "low" in the morphological box. The relevant operation countries are listed up in table 5.15.

[183] Source: see Annual Reports (2000-2006)

	Current overall risk	Political [25%]	Econ. [25%]	Legal [15%]	Tax [15%]	Operational [10%]	Security [10%]
USA	1,51	1,5	1,5	1	1	1,5	2,5
Norway	1,44	1,25	1,25	1	2	1,75	1,5
United Kingdom	1,46	1,25	1,5	1	1,25	1,25	2,5
Ireland	1,35	1,5	1,5	1	1	1,75	1
Equatorial Guinea	3,54	3,75	2,75	4	4	4	2,75
Angola	3,4	3,5	3,25	3,25	3,5	3,5	3,5
Canada	1,32	1,5	1,5	1	1	1,5	1
Average	2	2,04	1,89	1,75	1,96	2,18	2,11

Tab. 5.15 Current overall risk of operating countries (Marathon)[184]

Drilling technology (focus and method)

Marathon is a technology leader in deepwater drilling. The main deepwater operations were focused on the Gulf of Mexico and on West Africa. The company was also active in the Polar region of Alaska and discovered natural gas at the so called Ninilchik Prospect. In 2001 a massive development program in Texas included several horizontal wells. Table 5.16 provides information about E&P projects of Marathon Oil in 2006. Nearly 74% of all these projects were performed in offshore and deepwater areas.

Exp./Dev. projects of Marathon Oil (2006)	Total	General operator	Onshore area	Offshore area (less than 300m)	Deepwater area (more than 300m)	Deepwater operator
Canada	4	4	0	0	4	4
Alaska	3	3	2	1	0	0
Gulf of Mexico	7	3	0	0	7	3
USA onshore	7	7	7	0	0	0
Ireland	3	1	0	1	2	0
Norway	4	2	0	4	0	0
United Kingdom	4	1	0	4	0	0
Libya	1	1	1	0	0	0
Angola	2	0	0	0	2	0
Equatorial Guinea	5	5	0	5	0	0
Gabon	1	1	0	1	0	0
Sudan	1	0	1	0	0	0
Sum	42	28	11	16	15	7

Tab. 5.16 E&P projects of Marathon Oil (2006)[185]

Technical success rate

Marathon's average technical success rate between 2000 and 2005 concerning the net exploratory wells drilled was 69%. The success rates in percent are given in figure 5.23.

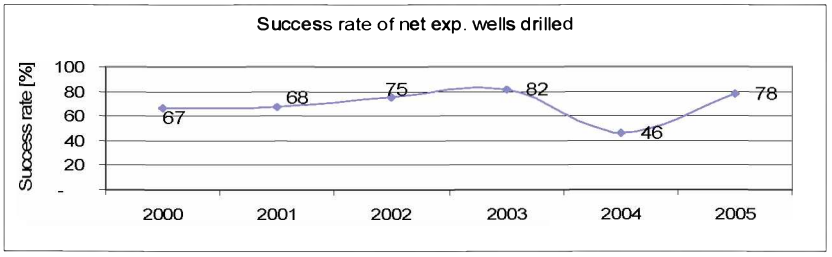


Fig. 5.23 Success rates of net exploratory wells drilled (Marathon)[186]

[184] Source: see http://www.globalinsight.com
[185] Source: see http://www.pfcenergy.com
[186] Source: see Annual Reports (2000-2006)

Operatorship

The general operatorship as well as the deepwater operatorship of 2006 can be calculated with the data provided in table 5.16. Marathon has a general operatorship of 67% and a deepwater operatorship of 47%.

The results of the strategic analysis of the regional focus, the risk exposure as well as of the drilling technology are provided in the first part of the exploration and appraisal segment in the morphological box which is described in table 5.17.

Marathon Oil					
Exploration and appraisal (results in dark grey)					
Strategic view	Strategic indicator	Strategic behavior			
Regional	Regional focus	Exploration concentration in core regions	Development of new exploration regions	Near field exploration	
Risk	Risk exposure	Low	Middle	High	
Drilling technology	Technology focus	Unconventional (Polar, Deepwater, Fractured…)	Conventional onshore	Shallow offshore	Covering all
	Focus on method	Multilateral	Horizontal	Normal	
	Technical success rate	≤ 25%	26% - 50%	51% - 75%	> 75%
	General operatorship (Asset based)	≤ 25%	26% - 50%	51% - 75%	> 75%
	Deepwater operatorship (Asset based)	≤ 25%	26% - 50%	51% -75%	> 75%

Tab. 5.17 Morphological box for exploration & appraisal (part 1) (Marathon)

5.2.3 Exploration and appraisal (part 2)

Seismic technology (focus and method)

Marathon Oil performed seismic surveys in the core exploration areas of the USA and the Gulf of Mexico as well as in the relevant operation regions in Canada and Angola. Especially 3 D and 4 D seismic surveys were used.

Investment profile

The average exploration expenditures of Marathon Oil per year were USD 279 million. The profile of exploration expenditures between 2000 and 2005 can be described as "increasing" in the morphological box. Detailed information can be looked up in figure 5.24.

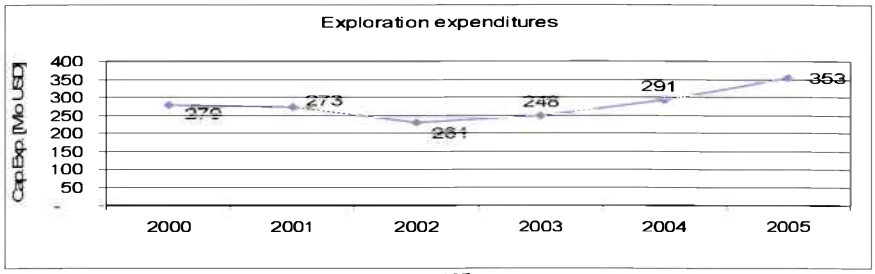


Fig. 5.24 Exploration expenditures (Marathon)[187]

Reserve replacement rate (2005)

The reserve replacement rate of Marathon Oil in 2005 was 181%. The company's average reserve replacement rate between 2000 and 2005 accounted for 134%.
Marathon Oil followed an intensive acquisition strategy during the last years. In 2001 Marathon increased its proved reserves by 249 MMBoe through the acquisition of production & refining interests from CMS Energy in Equatorial Guinea for USD 1,6 billion. The acquisition of Pennaco Energy in the same year increased the reserve base in North America by 42 MMBoe. Total costs for this transaction were USD 506 million. In 2002 the acquisition of Globex Energy for USD 155 million added 38 MMBoe of proved reserves mainly in Equatorial Guinea. During 2003, Marathon acquired the Khanty Mansiysk Oil Corporation (KMOC) which had proved and probable reserves of 250 MMBoe in Western Siberia for USD 280 million. Marathon wanted to develop a new production area in Russia but the assets were sold in 2006 to Lukoil for USD 787 million because of bad results. In 2005 Marathon got its former Waha concession in Libya back. The proved reserves which cover this concession were expected to be 160 MMBoe. Figure 5.25 describes the reserve replacement rate profile for Marathon Oil. The profile can be characterized by an "increasing" behavior pattern in the morphological box.

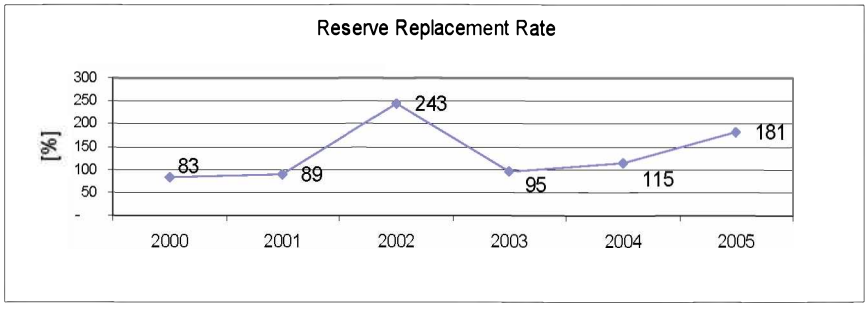


Fig. 5.25 Reserve replacement rates (Marathon)[188]

The results of the analysis of the 2nd part of the exploration and appraisal segment can be summarized in the morphological box introduced in table 5.18.

[187] Source: see http://www.herold.com
[188] Source: see http://www.herold.com

Marathon Oil						
Exploration and appraisal (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Seismic technology	Regional focus	Core regions		Non core regions		
	Focus on method	2 D	3 D	4 D	All methods	
Investment	Investment profile					
Reserve replacement strategy	Reserve replacement rate 2005	≤ 50%	51% - 100%	101%-200%	201% - 300%	> 300%
	Annual reserve replacement profile					

Tab. 5.18 Morphological box for exploration & appraisal (part 2) (Marathon)

5.2.4 Development and production (part 1)

Regional focus

Development operations were concentrated on the defined core regions. Especially the United States are the main development focused country. At the end of 2005, around 40% of the worldwide liquid and 62% of the natural gas production came from operations in the USA. The production in the USA accounted for nearly 50% of the worldwide production. Figure 5.26 introduces the main regions of net development wells drilled.

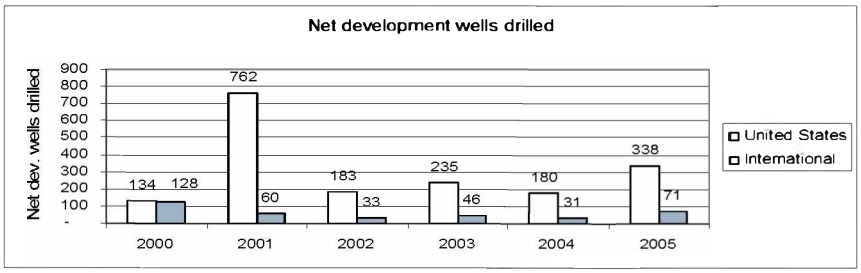


Fig. 5.26 Net development wells drilled (Marathon)[189]

EOR

Marathon operated gas cycling programs in the North and East Brae fields of the British North Sea. The company was also a partner in a water injection project in the North Sea. In addition, several gas injection wells were drilled in the operated Alba Field, located in Equatorial Guinea.

[189] Source: see Annual Reports (2000-2006)

Resource portfolio

Marathon produces conventional and unconventional resources. The company became the biggest producer of coalbed methane in the so called Powder River Basin of Wyoming after the acquisition of Pennaco Energy in 2001. In 2005 Marathon thought to sell its CBM assets because the proved reserves base fell from 210 Bcf to 153 Bcf. This indicates a decrease of 58%. In 2001 the company sold its Canadian heavy oil interests because of cost reasons. Marathon is also active in producing tight gas from deep formations in Texas. This resource base is expected to be around 320 Bcf. In addition, the company has a 52% interest in a LPG plant in Equatorial Guinea after the acquisitions of CMS Energy and Globex Energy. Around 19.000 gross barrels per day of LPG were produced at the end of 2005.

Oil & gas production focus

The average gas production of Marathon between 2000 and 2005 accounted for 48% of the total production. Data about the gas production as % of the total production are provided in figure 5.27.

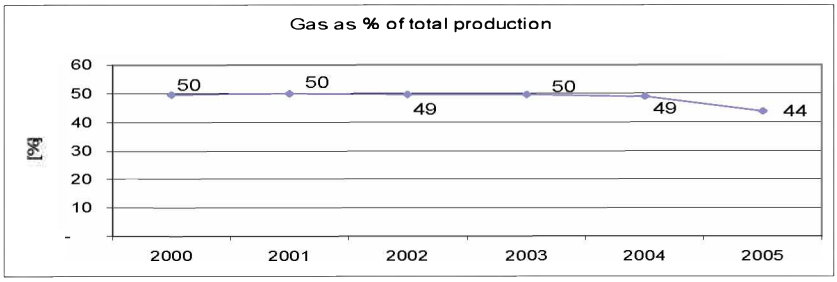


Fig. 5.27 Gas as % of total production (Marathon)[190]

Oil & gas reserves focus

The average gas reserves of Marathon Oil accounted for 45% of the total proved reserves base. The gas reserves development in % between 2000 and 2005 is introduced in figure 5.28.

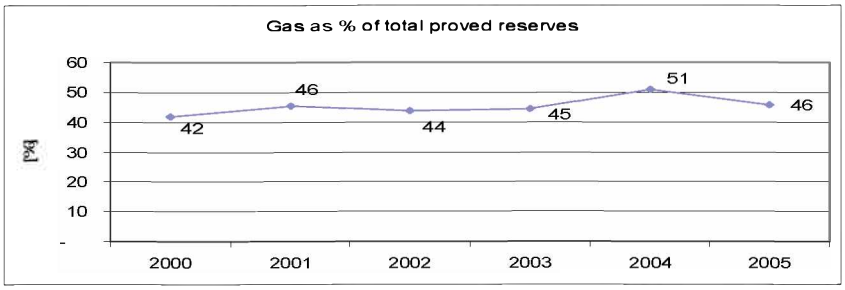


Fig. 5.28 Gas reserves as % of total proved reserves (Marathon)[191]

The results of the analysis of the regional focus, the used EOR technology as well as of the resource portfolio of Marathon can be looked up in the morphological box of table 5.19

[190] Source: see http://www.herold.com
[191] Source: see http://www.herold.com

Marathon Oil						
Development and production (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Regional	Regional focus	Development activity focused on core regions		Development activity focused on non-core regions		
EOR	Focus on EOR-method	CO_2 injection	Gas cycling	Water flooding	All of them	
	Operatorship	Always	In most cases	Seldom	Never	
Resource portfolio	Conventional focus*	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Oil & gas production focus [Gas as % of production]	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Oil & gas reserves focus [Gas as % of reserves]	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Non-conventional focus	Oil sands	Heavy oil	Tight gas	Coalbed methane	LPG

Tab. 5.19 Morphological box for development & production (part 1) (Marathon) * Assumption

5.2.5 Development and production (part 2)

Focus on LNG

In 2004 Marathon operated a LNG project on Bioko Island with the NOC of Equatorial Guinea. The Bioko LNG plant which is constructed for a capacity of 3,4 million tons per year will start production at the end of 2007. The idea behind this project was to use Marathon's gas reserves which are estimated to be 4,4 Tcf from the Alba Field in Equatorial Guinea. Marathon has also a 30% interest in a LNG plant located in Alaska (operated by ConocoPhillips). In addition, the company holds interests in two LNG tankers to transport LNG to Japan. On the regasification side, Marathon is the owner of capacity rights in the Elba Island terminal in Georgia (USA) and is planning a plant near Tijuana in Mexico.

Focus on pipelines

Since 2005 Marathon is the owner of the Marathon Ashland Petroleum Company (MAP), which has interests in pipelines with a total length of 10.000 km.
In addition, Marathon operates the so called Kenai Kachemak Pipeline which transports gas from the operated Ninilchik Unit in Alaska to the major pipeline infrastructure in the south.

Internationally, Marathon has interests in the BRAE Group which owns a pipeline system from the BRAE field in the North Sea to the gas processing terminal at St. Fergus, Scotland. As a consequence of the growing gas market in the United Kingdom, Marathon started the so called Bacton Pipeline project with regional Norwegian and British companies in 2007.

Downstream strategy

Since 2001 Marathon is the main holder of the Marathon Ashland Petroleum Company (MAP). It uses this company for refining, marketing and transportation reasons through the Midwest and Southeast of the USA. MAP plays a key role in Marathon's downstream strategy. The company operates a system of pipelines and terminals to supply its refineries with crude oil. MAP is the owner of seven refineries with an average capacity of 47 MMTOE per year. The average annual production between 2000 and 2005 accounted for 19 MMTOE. As a consequence the volume based integration, refining capacity divided by annual production leads to a percentage value of 246%. The company's refining capacity is nearly two and a half times bigger than its production potential. Refining capacities and the integration volume calculation are listed up in table 5.20.

Year	2000	2001	2002	2003	2004	2005
Refining [BBLD]						
Garyville, LA	232.000	232.000	232.000	232.000	245.000	245.000
Catlettsburg,KY	222.000	222.000	222.000	222.000	222.000	222.000
Robinson, IL	192.000	192.000	192.000	192.000	192.000	192.000
Detroit, MI	74.000	74.000	74.000	74.000	74.000	100.000
Canton, OH	73.000	73.000	73.000	73.000	73.000	73.000
Texas City, TX	72.000	72.000	72.000	72.000	72.000	72.000
St. Paul Park	70.000	70.000	70.000	70.000	70.000	70.000
Sum	935.000	935.000	935.000	935.000	948.000	974.000
Average refining capacity [MMTOE]	47					
Average production [MMTOE]	19					
Downstream strategy [Capacity/production] [%]	**246**					

Tab. 5.20 Integration volume calculation (Marathon)[192]

Upstream strategy

The average upstream production revenue as part of total sales and operating revenue is 11%. That's a typical percentage value for an integrated company. The calculation is based on data provided in table 5.21.

Year	2000	2001	2002	2003	2004	2005
Total upstream production revenue [Mio USD]	4.214	4.524	3.880	3.990	4.897	6.486
Total sales & operating revenue [Mio USD]	34.487	33.075	31.464	40.963	49.589	63.311
Upstream production revenue as part of total sales & operating revenue [%]	12	14	12	10	10	10
Average [%]	**11**					

Tab. 5.21 Upstream revenue (Marathon)[193]

[192] Source: see Annual Reports (2000-2006)

[193] Source: see http://www.herold.com

Investment profile

The average development expenditures of Marathon Oil per year were USD 1.125 million. The profile can be characterized as "increasing" in the morphological box. The development expenditures between 2000 and 2005 are provided in figure 5.29.

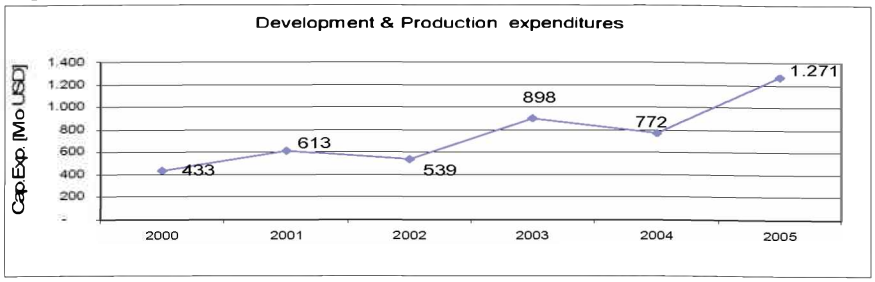


Fig. 5.29 Development and production expenditures (Marathon)[194]

Daily Boe production

The average daily Boe production per well of Marathon Oil was 59 Boe between 2000 and 2005. The trend can be defined as "maintaining" in the morphological box. The daily Boe production profile is provided in figure 5.30.

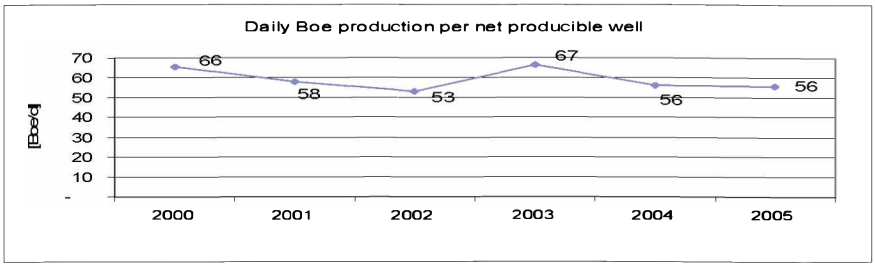


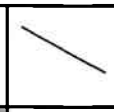
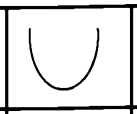
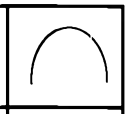
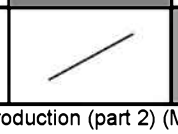
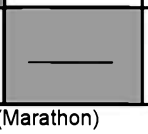
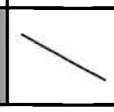
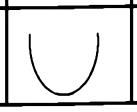
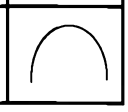
Fig. 5.30 Daily Boe production per net producible well (Marathon)[195]

The results of the analysis of the midstream, downstream and upstream sector, as well as of the investment and production profile are introduced in table 5.22.

Marathon Oil						
Development and production (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Midstream	Focus on LNG	No		Operating	Participating	
Midstream	Focus on pipelines	No		Operating	Participating	
Coordination strategy between upstream and downstream	Downstream strategy Volume based integration [Refining capacity/annual production]	No	< 33%	33% - 66%	67%-100%	> 100%
	Upstream strategy [Revenue of upstream as part of total sales and operating revenues]	< 10%	10% - 24%	25% - 50%	51% - 75%	> 75%

194 Source: see Annual Reports (2000-2006)

195 Source: see http://www.herold.com

Investment	Investment profile					
Net production profile	Trend in daily Boe production per net producible well					

Tab. 5.22 Morphological box for development & production (part 2) (Marathon)

5.2.6 Acquisition

Acquiring reserves

Marathon Oil acquired an average of 90 MMBOE of reserves per year between 2000 and 2005. Detailed data are provided in table 5.23.

Year	2000	2001	2002	2003	2004	2005
Total reserves acquired [MMBOE]	48,5	45,17	206,67	67,17	3,17	172
Average [MMBOE]	**90,4**					

Tab. 5.23 Total reserves acquired per year (Marathon)[196]

Regional focus

Marathon Oil performed nearly 88% of its acquisitions in core regions. Table 5.24 highlights every acquisition in a core region per year.

Year	Acquisition
2000	**Norway (1)**
2001	**Norway (1), Equatorial Guinea (1), USA (1)**
2002	**USA (1)**
2003	Russia(1)
2004	**Norway (1)**
2005	**Norway (1)**

Tab. 5.24 Acquisitions in core and non core regions (Marathon)[197]

Intensity strategy

The data from table 5.24 can be used to calculate an acquisition intensity of 1,3 (<3) performed acquisitions per year.

Cost strategy

Marathon Oil performed acquisitions as it can be seen in table 5.24 in every year between 2000 and 2005. The average acquisitions costs were 2,9 USD per Boe acquired reserves. The different acquisition costs per year are introduced in figure 5.31.

[196] Source: see http://www.herold.com

[197] Source: see http://www.herold.com

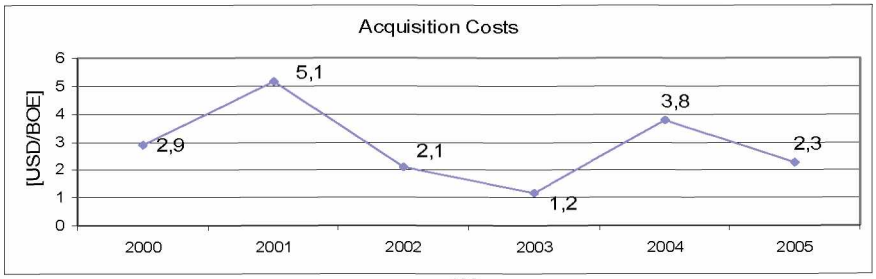


Fig. 5.31 Acquisition costs per year (Marathon)[198]

Focusing on acquisitions or farm ins

Marathon Oil performed 16 farm ins and eight acquisitions between 2000 and 2005. The acquisition rate accounted for 33% by dividing the number of acquisitions through the number of farm ins and acquisitions. The numbers of acquisitions and farm ins are listed up in table 5.25.

Year	2000	2001	2002	2003	2004	2005
Farm in	2	6	3	2	2	1
Acquisition	1	3	1	1	1	1
Acquisition rate as % of farm ins and acquisitions	33					

Tab. 5.25 Numbers of performed acquisitions and farm ins (Marathon)[199]

The results of the analysis of the acquisition segment for Marathon Oil are provided in table 5.26.

Marathon Oil					
Acquisition (results in dark grey)					
Strategic view	Strategic indicator	Strategic behavior			
Reserve strategy	Acquiring reserves [MMBOE/year]	< 50	50 - 100	101 - 200	> 200
Regional	Regional focus [% of acquisitions in core regions]	< 25%	25% - 50%	51% - 75%	> 75%
Acquisition intensity	Intensity strategy [Acquisitions/year]	0	< 3	3 - 5	> 5
Acquisition cost strategy	Cost strategy Acquisition costs [USD/BOE]	< 3	3 - 5	6 - 8	> 8
Acquisition vs. farm in	Focusing on acquisitions or farm ins [Acquisition rate as %]	< 25%	25% - 50%	51% - 75%	> 75%

Tab. 5.26 Morphological box for acquisition (Marathon)

[198] Source: see http://www.herold.com

[199] Source: see http://www.herold.com

5.2.7 Cooperation

Alliance

In 2005 the Oasis Consortium which consists of Marathon Oil, Amerada Hess, ConocoPhillips and the NOC of Libya reanimated its alliance in Libya and started production from the so called Waha fields (Waha concession).

Other partnership

During 2002, Marathon (operator) as well as BP and ENI started a development project in the Brae field located in the British part of the North Sea. Since 2002 Marathon operated a development program for the Ninilchik gas field of Alaska together with Chevron.
Chevron (operator) was also partner in the development of the Perseus field in the Gulf of Mexico. In addition, Marathon held a 50% interest in the Petronius platform which was operated by Chevron. Petronius is located in the Gulf of Mexico and one of the tallest free standing structures in the world.
Generally, Marathon tries to get in contact with the NOC of Equatorial Guinea to get access to its resources. In 2004 Marathon and the NOC of Equatorial Guinea started the Bioko LNG project. Marathon has also capacity rights in the Elba regasification terminal located in the USA and signed a gas sale agreement with the company BP in 2005. BP supplies Marathon with 58 Bcf of natural gas as LNG per day.

The results of the analysis of different kind of cooperations are provided in table 5.27.

Marathon Oil						
Cooperation (results in dark grey)						
Strategic view	Strategy	Strategic behavior				
Cooperation strategy	Alliance	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Alliance partner	No	NOCs	States	Major IOCs	Service companies
	Joint venture	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Joint venture partner	No	NOCs	States	Major IOCs	Service companies
	Other partnership	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Other partner	No	NOCs	States	Major IOCs	Service companies

Tab. 5.27 Morphological box for cooperation (Marathon)

5.2.8 Human resources

The HR strategy of Marathon Oil between 2000 and 2005 can be characterized by a slight decrease of staff as well as by a strong increase of the EBITDA per employee. The development of the number of employees as well as of the EBITDA per employee is described in figures 5.32 and 5.33.

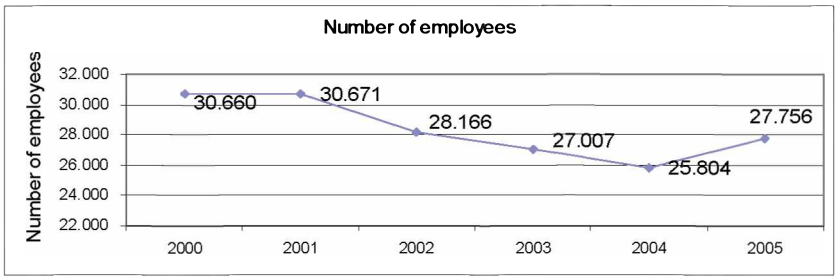


Fig. 5.32 Employee development (Marathon)[200]

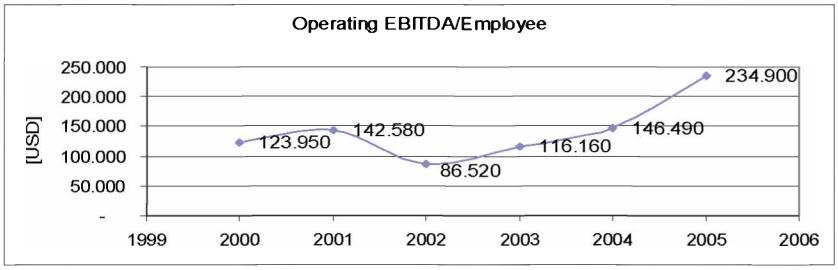


Fig. 5.33 EBITDA/employee development (Marathon)[201]

5.2.9 Energy portfolio

No information was available about any investments of Marathon Oil in wind power, solar or in biomass.

The results of the analysis of the HR and energy portfolio segment are provided in table 5.28.

Marathon Oil					
HR & energy portfolio (results in dark grey)					
Strategic view	Strategy	Strategic behavior			
HR	HR strategy	Strong increase of staff	Slight increase of staff	Slight decrease of staff	Strong decrease of staff
		Strong increase of EBITDA/employee	Slight increase of EBITDA/employee	Slight decrease of EBITDA/employee	Strong decrease of EBITDA/employee
Energy portfolio	Alternative energy focus	No	Focus on wind power	Focus on solar energy	Focus on biomass

Tab. 5.28 Morphological box for HR & energy portfolio (Marathon)

[200] Source: see Annual Reports (2000-2006)

[201] Source: see http://www.herold.com

5.3 Anadarko Petroleum Corporation

General overview

Anadarko Petroleum Corporation is an independent oil and gas exploration company. The headquarters are located in Houston, Texas. Detailed information about Anadarko can be looked up on pages A12 till A25 in the appendix. In order to get an overview of the performance of Anadarko between 2000 and 2005, data about the reserve base, the production as well as about the financial situation are provided in figures 5.34, 5.35 and 5.36.

Figure 5.34 provides information about the total proved reserves as well as for the proved reserves of liquid hydrocarbons and natural gas. Proved reserves are given in million barrels of oil equivalent [MMBOE]. The company's main proved reserves regions are defined as the USA, Canada, and other international regions.

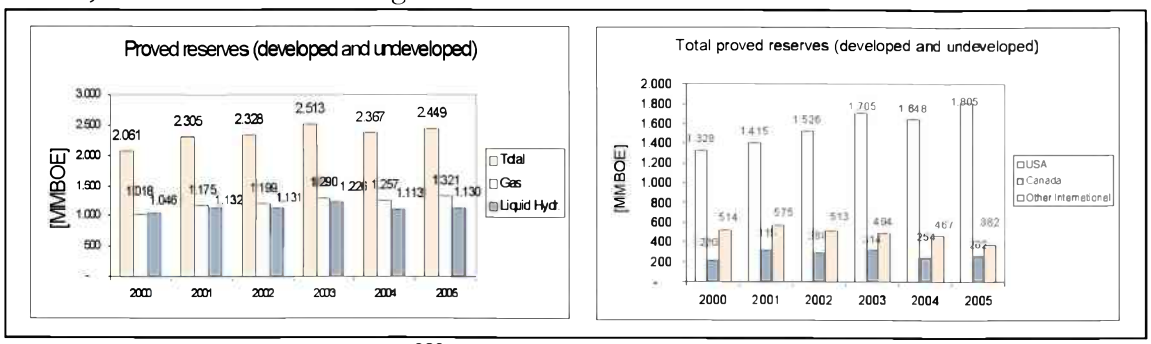


Fig. 5.34 Proved reserves base (Anadarko)[202]

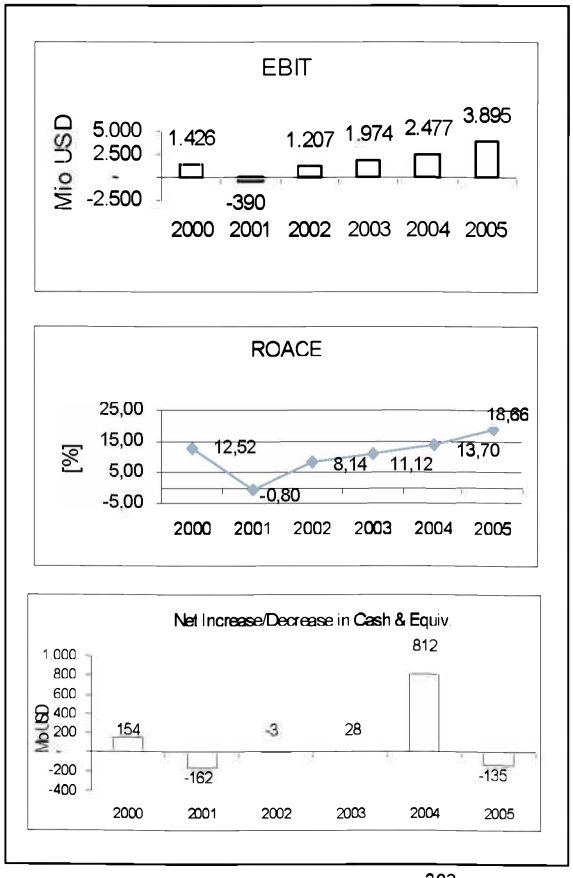


Fig. 5.35 Economic performance (Anadarko)[203]

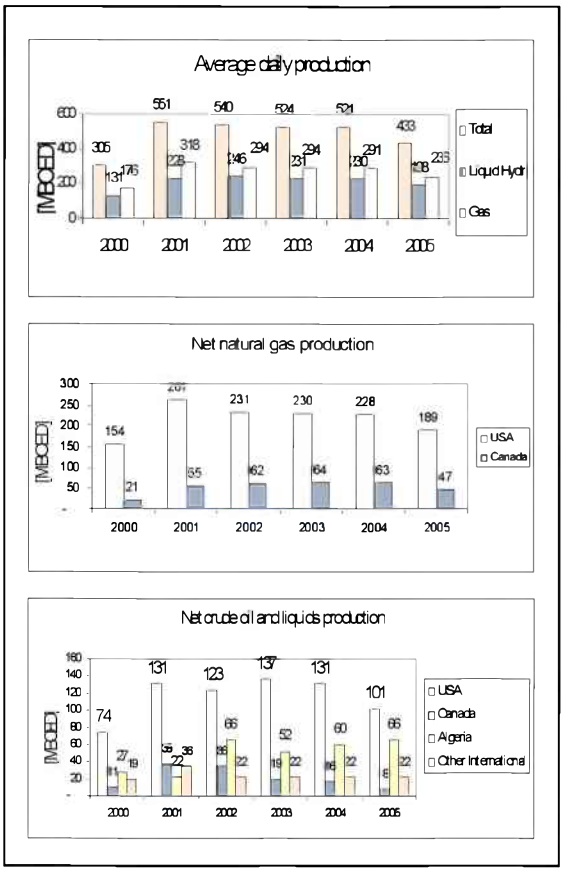


Fig. 5.36 Average daily production (Anadarko)[204]

[202] Source: see Annual Reports (2000-2006)
[203] Source: see http://www.herold.com
[204] Source: see Annual Reports (2000-2006)

Figure 5.35 provides information about the economic performance between 2000 and 2005 by looking at the EBIT, ROACE and cash flow. The total average daily production as well as the production rate of liquid hydrocarbons and natural gas of Anadarko is introduced in figure 5.36. The units are given in thousands of barrels oil equivalent per day [MBOED]. The main production regions are the USA, Canada and Algeria.

The worldwide E&P activities of Anadarko Corporation are introduced in figure 5.37.

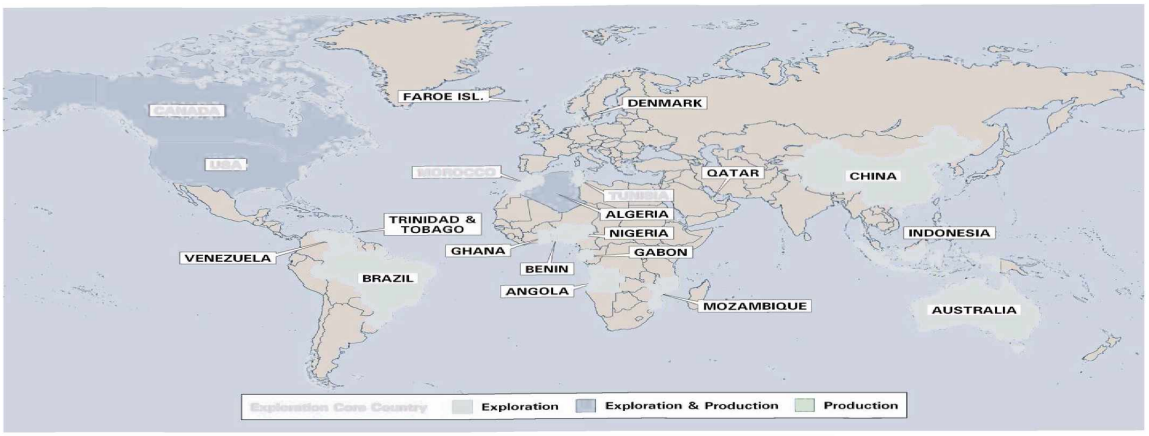


Fig. 5.37 E&P activities geographically (Anadarko)

5.3.1 Exploration and appraisal (part 1)

Regional focus

Anadarko concentrated its exploration activities on the core countries in North America. Minor additional operational activity can be observed in Algeria. Tunisia was defined by Herold as exploration core country. Since 2006 Anadarko tries to develop new exploration regions. Morocco became a core country after the acquisition of the company Kerr Mc Gee at the beginning of 2006 for USD 20 billion. The reason for this massive transaction was to increase the position in the domestic core areas as well as in Brazil, Trinidad & Tobago, Denmark, Angola, Benin, Australia and in China. Figure 5.38 provides information concerning the net exploratory wells drilled.

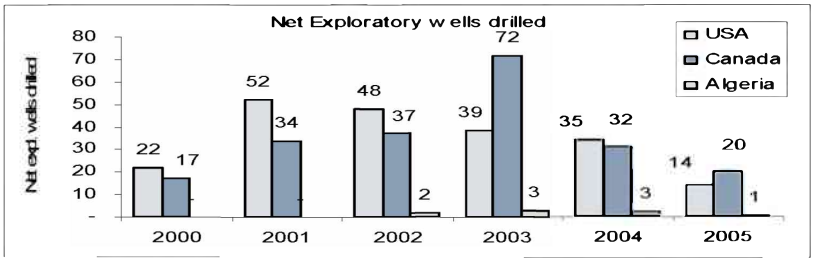


Fig. 5.38 Net exploratory wells drilled (Anadarko)[205]

Risk exposure

The United States and Canada as the core exploration countries have a "negligible" defined overall risk with 1,41 ("negligible" risk level defined by Global Insight between 1,25 and 1,74).

[205] Source: see Annual Reports (2000-2006)

The risk level changes from "low" to "medium" by taking exploration projects in South America, West/North Africa or South/East Asia into account ("medium" risk level defined by Global Insight between 2,5 and 2,99). As a consequence, the average overall risk of the company's operations can be classified as "middle" in the morphological box. The relevant operation countries are listed up in table 5.29.

	Current overall risk	Political [25%]	Econ. [25%]	Legal [15%]	Tax [15%]	Operational [10%]	Security [10%]
Canada	1,32	1,5	1,5	1	1	1,5	1
USA	1,51	1,5	1,5	1	1	1,5	2,5
Australia	1,51	1,5	1,25	1	1,5	1,5	2,5
Brazil	2,66	2,5	2,5	2,5	3	2,75	3
Venezuela	3,71	3,75	3,75	3,75	3,25	4,25	3,5
Trinidad& Tobago	2,28	2,5	1,75	2	2	2,75	3
Algeria	2,89	3	2,5	2,75	2,5	3,5	3,5
Tunisia	2,19	2,25	1,75	2,5	2,5	2,25	2
Morocco	2,47	2,5	2	3	2,5	2,5	2,5
Angola	3,4	3,5	3,25	3,25	3,5	3,5	3,5
Nigeria	3,9	3,75	3,25	4,25	4	4,25	4,5
Ghana	2,79	2,5	3,5	2,5	2,5	3	2
Benin	2,95	2,5	3,25	3,25	3	3,25	2,25
Mozambique	3,37	3,5	3,75	3,25	2,5	3,5	3,25
China	2,84	2,75	2,5	3,25	3	3,25	2,5
Indonesia	3,1	2,75	3	3,5	3	3,5	3,25
Average	**2,7**	2,6	2,6	2,7	2,5	2,9	2,8

Tab. 5.29 Current overall risk of operating countries (Anadarko)[206]

Drilling technology (focus and method)

Drilling activities between 2000 and 2005 were focused on known oil & gas fields in the USA, Canada and Algeria. Anadarko was one of the most active drillers in the USA and Canada during the last five years. Drilling operations in the USA were based onshore on the lower 48 states, offshore in the Gulf of Mexico as well as in Alaska (North Slope). In 2005 the company participated in more deepwater discoveries in the Gulf of Mexico than any other company. Anadarko used horizontal drilling methods to produce efficiently out of multiple fields and multiple pay zones (e.g. in Central Texas, Gulf Coast, Qatar or Oman).
Table 5.30 provides information about E&P projects of Anadarko Corporation in 2006. Nearly 69% of all these projects were performed offshore (offshore and deepwater areas).

Exp./Dev. projects of Anadarko Corp. (2006)	Total	General operator	Onshore area	Offshore area (less than 300m)	Deepwater area (more than 300m)	Deepwater operator
Canada	6	2	2	1	3	2
Alaska	10	3	8	2	0	0
Gulf of Mexico	50	40	0	2	48	34
USA	26	24	26	0	0	0
Brazil	6	3	0	2	4	2
Trinidad&Tobago	3	0	1	2	1	1
Venezuela	1	0	1	0	0	0
Denmark	1	0	0	1	0	0
Faroe Islands	2	0	0	0	2	0
Malta	1	0	0	0	1	0
Algeria	8	6	8	0	0	0
Morocco	2	1	0	0	2	1
Qatar	4	3	0	4	0	0
Tunisia	4	2	2	2	0	0
Angola	1	0	0	0	1	0

[206] Source: see http://www.globalinsight.com

Benin	1	1	0	0	1	1
Gabon	1	1	0	0	1	1
Ghana	2	0	0	0	2	0
Mozambique	1	1	0	0	1	1
Nigeria	2	1	0	0	2	1
Georgia	1	1	0	0	1	1
Australia	5	4	0	0	5	2
China	8	8	0	7	1	1
Indonesia	5	2	0	3	2	1
Sum	151	103	48	26	78	49

Tab. 5.30 E&P projects of Anadarko Corporation (2006) [207]

Technical success rate

The average technical success rate of Anadarko between 2000 and 2005 concerning the net exploratory wells drilled was 71%. The success rates in percent are given in figure 5.39.

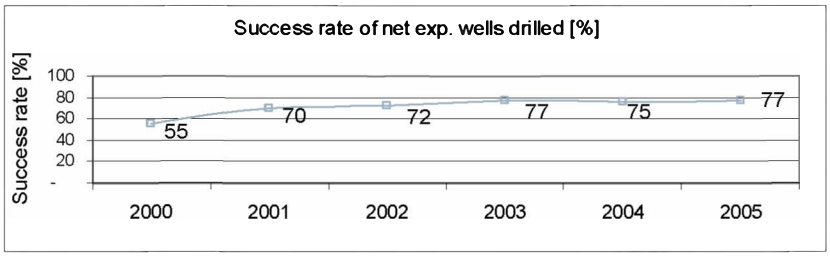


Fig. 5.39 Success rates of net exploratory wells drilled (Anadarko) [208]

Operatorship

The data provided in table 5.30 can be used to calculate the general operatorship as well as the deepwater operatorship. Anadarko can be characterized by a general operatorship of 68% and a deepwater operatorship of 63%.

The results of the strategic analysis of the regional focus, the risk exposure as well as of the drilling technology used are introduced in the first part of the exploration and appraisal segment in the morphological box which is described in table 5.31.

Anadarko Corporation					
Exploration and appraisal (results in dark grey)					
Strategic view	Strategic indicator	Strategic behavior			
Regional	Regional focus	Exploration concentration in core regions	Development of new exploration regions	Near field exploration	
Risk	Risk exposure	Low	Middle	High	
Drilling technology	Technology focus	Unconventional (Polar, Deepwater, Fractured…)	Conventional onshore	Shallow offshore	Covering all
	Focus on method	Multilateral	Horizontal	Normal	

[207] Source: see http://www.pfcenergy.com

[208] Source: see Annual Reports (2000-2006)

	Technical success rate	≤ 25%	26% - 50%	51% - 75%	> 75%
	General operatorship (Asset based)	≤ 25%	26% - 50%	51% - 75%	> 75%
	Deepwater operatorship (Asset based)	≤ 25%	26% - 50%	51% -75%	> 75%

Tab. 5.31 Morphological box for exploration & appraisal (part 1) (Anadarko)

5.3.2 Exploration and appraisal (part 2)

Seismic technology (focus and method)

Anadarko focused on seismic surveys on its core regions. The company operated several seismic programs in Canada, Algeria, Tunisia or in Venezuela. Especially 2 D as well as 3 D seismic methods were used.

Investment profile

The average exploration expenditures of Anadarko Corporation per year were USD 712 million. The profile of exploration expenditures between 2000 and 2005 can be described by a "once increase" in the morphological box. Detailed information can be looked up in figure 5.40.

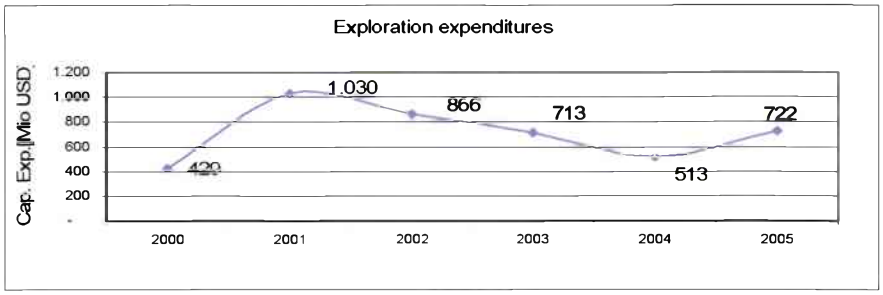


Fig. 5.40 Exploration expenditures (Anadarko)[209]

Reserve replacement rate (2005)

The reserve replacement rate of Anadarko in 2005 was 198%. The company's average reserve replacement rate between 2000 and 2005 accounted for 344%.
The major acquisition was performed in 2000. Anadarko merged with the company Union Pacific Resources. It was renamed to RME Company (RME). A consequence of this transaction was the acquisition of 912 MMBOE of proved reserves in the USA and Canada
Figure 5.41 describes the reserve replacement rate profile for Anadarko Corporation which can be characterized by a constant behavior pattern between 2001 and 2005.

[209] Source: see http://www.herold.com

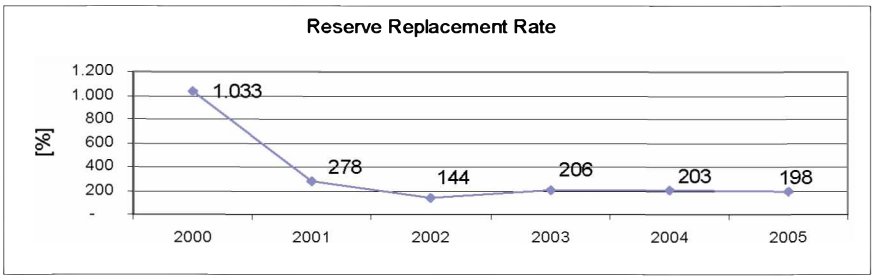


Fig. 5.41 Reserve replacement rates (Anadarko)[210]

The results of the analysis of the 2nd part of the exploration and appraisal segment are summarized in the morphological box introduced in table 5.32.

Anadarko Corporation						
Exploration and appraisal (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Seismic technology	Regional focus	Core regions		Non core regions		
	Focus on method	2 D	3 D	4 D	All methods	
Investment	Investment profile	↗	—	↘	∩	∪
Reserve replacement strategy	Reserve replacement rate 2005	≤ 50%	51% - 100%	101%-200%	201% - 300%	> 300%
	Annual reserve replacement profile	↗	—	↘	∩	∪

Tab. 5.32 Morphological box for exploration & appraisal (part 2) (Anadarko)

5.3.3 Development and production (part 1)

Regional focus

Anadarko concentrated its development operations on the core regions. Figure 5.42 introduces the main regions of net development wells drilled.

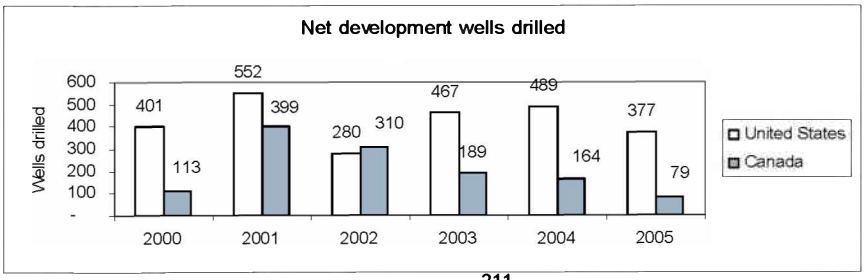


Fig. 5.42 Net development wells drilled (Anadarko)[211]

[210] Source: see http://www.herold.com

[211] Source: see Annual Reports (2000-2006)

EOR

Enhanced oil recovery programs were especially initiated in the USA and Canada. Anadarko tried to maintain the production rate constant in mature oil fields through several waterflood and CO_2 injection projects. The company constructed around 300 km of pipelines to inject CO_2 in its operating fields in Canada. Anadarko began a study concerning the long term storage of CO_2 in its enhanced oil recovery projects. The company wants to reduce the amount of greenhouse gases by reinjecting the produced CO_2 in their own fields.

Resource portfolio

Anadarko produces conventional as well as unconventional resources. In 2004 the development and production strategy was changed from conventional to unconventional resources. The company has several tight gas reservoirs in East Texas as well as in North Louisiana. The portion of tight gas reserves was about 40% of the total proved reserves in 2005. Coalbed methane reservoirs are located in Utah. During 2006, the production out of CBM projects could be increased to 145 MMcf/d compared to 66 MMcf/d in 2003. In addition, Anadarko tries to explore for methane hydrate resources in the arctic tundra of Alaska with an own operating drilling program. The unconventional heavy crude oil assets in Canada were sold in 2001.

Oil & gas production focus

The average gas production of Anadarko between 2000 and 2005 accounted for 56% of the total production. Data about the gas production as % of the total production are provided in figure 5.43.

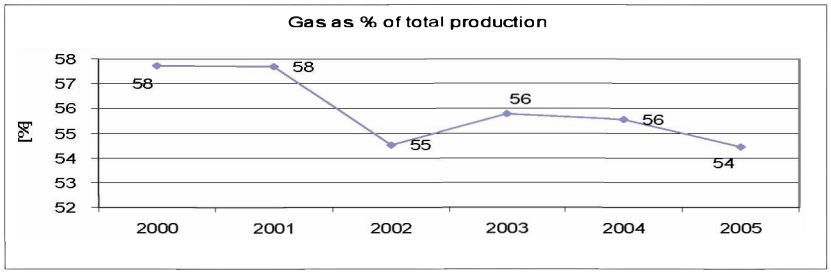


Fig. 5.43 Gas as % of total production (Anadarko)[212]

Oil & gas reserves focus

The average gas reserves of Anadarko accounted for 52% of the total proved reserves base. The gas reserves development in % between 2000 and 2005 is introduced in figure 5.44.

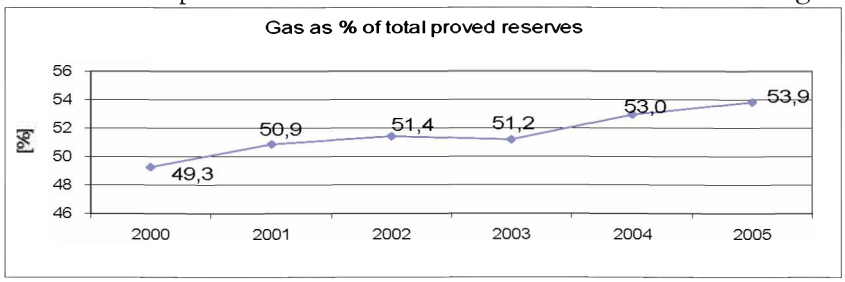


Fig. 5.44 Gas reserves as % of total proved reserves (Anadarko)[213]

[212] Source: see http://www.herold.com

[213] Source: see http://www.herold.com

The results of the analysis of the regional focus, the used EOR technology as well as of the resource portfolio of Anadarko Corporation can be summarized in the morphological box of table 5.33.

Anadarko Corporation						
Development and production (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Regional	Regional focus	Development activity focused on core regions		Development activity focused on non-core regions		
EOR	Focus on EOR-method	CO_2 injection	Gas cycling	Water flooding	All of them	
	Operatorship	Always	In most cases	Seldom	Never	
Resource portfolio	Conventional focus*	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Oil & gas production focus [Gas as % of production]	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Oil & gas reserves focus [Gas as % of reserves]	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Non-conventional focus	Oil sands	Heavy oil	Tight gas	Coalbed methane	LPG

Tab. 5.33 Morphological box for development & production (part 1) (Anadarko) * Assumption

5.3.4 Development and production (part 2)

Focus on LNG

In 2004 Anadarko acquired a private Canadian company which owned a liquefied natural gas (LNG) terminal in Nova Scotia. The terminal was extended to process 1 billion cubic feet of regasified LNG per day. During 2005 Anadarko expanded the LNG terminal by constructing two LNG storage tanks.

Focus on pipelines

Anadarko operates seven major gas gathering systems in the USA. These systems are located where the company has its major gas producing fields (Oklahoma, Texas and Kansas). Anadarko increased the system gradually through acquisitions. In 2005 the total gas gathering system which had a length of 5.240 kilometres connected 3.650 wells and delivered a gas throughput of 950 MMcf per day.

Internationally, Anadarko owns gathering facilities as well as a pipeline for operating fields in Guatemala. The Algerian company SONATRACH and Anadarko constructed gathering systems for developing the Algerian Hassi Berkine field during 2001.

Downstream strategy

Anadarko is an independent E&P company and does not follow a downstream strategy.

Upstream strategy

The average upstream production revenue as part of total sales and operating revenue is 98%. This indicates a clear upstream focused strategy. The calculation is based on data provided in table 5.34.

Year	2000	2001	2002	2003	2004	2005
Total upstream production revenue [Mio USD]	2.825	4.605	3.747	5.003	5.958	7.004
Total sales & operating revenue [Mio USD]	2.911	4.718	3.860	5.122	6.067	7.100
Upstream production revenue as part of total sales & operating revenue [%]	97	98	97	98	98	99
Average [%]	**98**					

Tab. 5.34 Upstream revenue (Anadarko)[214]

Investment profile

The average development expenditures of Anadarko Corporation per year were USD 1.685 million. The profile can be characterized as "increasing" in the morphological box. Data about the development expenditures between 2000 and 2005 are provided in figure 5.45.

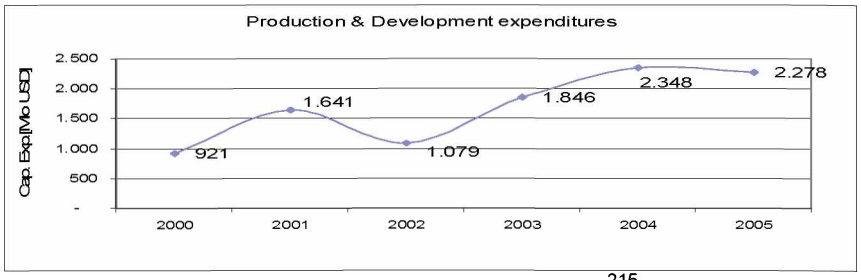


Fig. 5.45 Development and production expenditures (Anadarko)[215]

Daily Boe production

The average daily Boe production per well of Anadarko Corporation was 31,4 Boe between 2000 and 2005. The behavior pattern can be classified as "increasing" in the morphological box. The daily Boe production profile is introduced in figure 5.46.

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214 Source: see http://www.herold.com

215 Source: see Annual Reports (2000-2006)

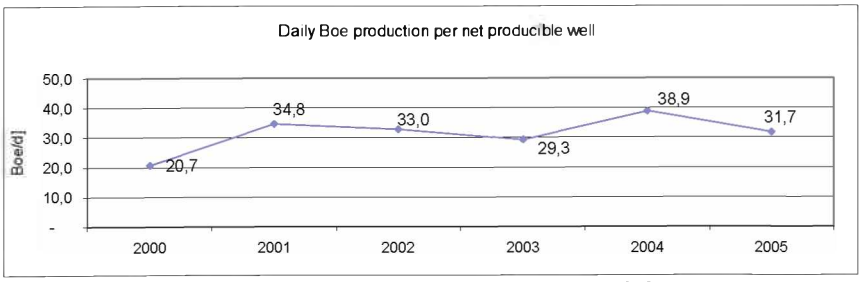

Fig. 5.46 Daily Boe production per net producible well (Anadarko)[216]

The results of the analysis of the midstream, downstream and upstream sector as well as of the investment and production profile are provided in table 5.35.

Anadarko Corporation						
Development and production (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Midstream	Focus on LNG	No		Operating	Participating	
Midstream	Focus on pipelines	No		Operating	Participating	
Coordination strategy between upstream and downstream	Downstream strategy [Volume based integration] [Refining capacity/annual production]	No	< 33%	33% - 66%	67%-100%	> 100%
	Upstream strategy [Revenue of upstream as part of total sales and operating revenues]	< 10%	10% - 24%	25% - 50%	51% - 75%	> 75%
Investment	Investment profile	↗	—	↘	∪	∩
Net production profile	Trend in daily Boe production per net producible well	↗	—	↘	∪	∩

Tab. 5.35 Morphological box for development & production (part 2) (Anadarko)

5.3.5 Acquisition

Acquiring reserves

Anadarko Corporation acquired an average of 205 MMBOE of reserves per year between 2000 and 2005. Detailed data are provided in table 5.36.

Year	2000	2001	2002	2003	2004	2005
Total reserves acquired [MMBOE]	925,7	156,5	87,5	54,2	3,2	5
Average [MMBOE]	205,3					

Tab. 5.36 Total reserves acquired per year (Anadarko)[217]

[216] Source: see http://www.herold.com
[217] Source: see http://www.herold.com

Regional focus

Anadarko Corporation performed 100% of its acquisitions in core regions. Table 5.37 highlights every acquisition in a core region per year.

Year	Acquisition
2000	**USA (1)**
2001	**Canada (2), Tunisia (1)**
2002	**Qatar (1), Tunisia (1), USA (2)**
2003	**Gulf of Mexico (3), Alaska (15)**
2004	**Alaska (1)**
2005	**Gulf of Mexico (1)**

Tab. 5.37 Acquisitions in core and non core regions (Anadarko)[218]

Intensity strategy

The data from table 5.37 can be used to calculate an acquisition intensity of 4,5 performed acquisitions per year.

Cost strategy

Anadarko Corporation performed acquisitions as it can be seen in table 5.37 in every year between 2000 and 2005. The average acquisitions costs were 4,6 USD per Boe acquired reserves. The different acquisition costs per year are introduced in figure 5.47.

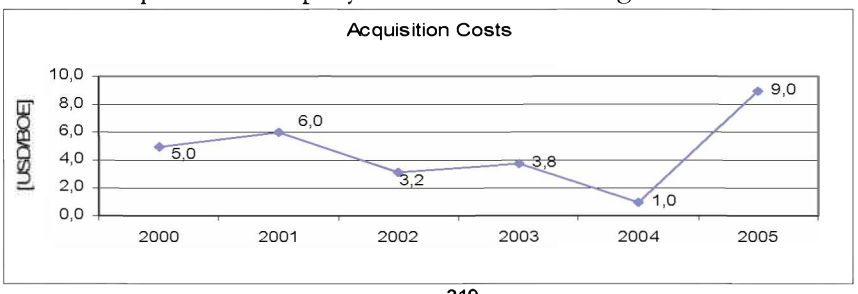

Fig. 5.47 Acquisition costs per year (Anadarko)[219]

Focusing on acquisitions or farm ins

Anadarko performed 45 farm ins and 28 acquisitions between 2000 and 2005. The acquisition rate accounted for 39% by dividing the number of acquisitions through the number of farm ins and acquisitions. The numbers of acquisitions and farm ins are listed up in table 5.38.

Year	2000	2001	2002	2003	2004	2005
Farm in	8	9	8	10	6	4
Acquisition	1	3	4	18	1	1
Acquisition rate as % of farm ins and acquisitions	**39**					

Tab. 5.38 Numbers of performed acquisitions and farm ins (Anadarko)[220]

[218] Source: see http://www.herold.com
[219] Source: see http://www.herold.com
[220] Source: see http://www.herold.com

The results of the analysis of the acquisition segment for Anadarko Corporation are summarized in table 5.39.

Anadarko Corporation					
Acquisition (results in dark grey)					
Strategic view	Strategic indicator	Strategic behaviour			
Reserve strategy	Acquiring reserves [MMBOE/year]	< 50	50 - 100	101 - 200	> 200
Regional	Regional focus [% of acquisitions in core regions]	< 25%	25% - 50%	51% - 75%	> 75%
Acquisition intensity	Intensity strategy [Acquisitions/year]	0	< 3	3 - 5	> 5
Acquisition cost strategy	Cost strategy Acquisition costs [USD/BOE]	< 3	3 - 5	6 - 8	> 8
Acquisition vs. farm in	Focusing on acquisitions or farm ins [Acquisition rate as %]	< 25%	25% - 50%	51% - 75%	> 75%

Tab. 5.39 Morphological box for acquisition (Anadarko)

5.3.6 Cooperation

Alliance

Anadarko has an excellent relationship with the NOC of Algeria (SONATRACH). The NOC is the owner of 5% of Anadarko's common stock. In 2000 Anadarko and SONATRACH formed the company Groupement Berkine for development and exploration operations in Algeria.

Joint venture

During 2002, Anadarko and the company Warren Resources started a joint venture to develop and explore coalbed methane resources in the so called Atlantic Rim of Wyoming.

Other partnership

A construction agreement was signed in 2000 between Anadarko & SONATRACH and the service company Brown & Root (subsidiary of Halliburton) to install a crude oil processing train and field gathering systems in Algeria. A partnership with a participation agreement was initiated in 2001 with the company BP to explore and develop 95 deepwater blocks owned by BP in the Gulf of Mexico. In the same year, Anadarko signed a construction agreement with El Paso Energy Partners (EPN) to install a floating platform which can produce from multiple fields out of the deepwater area in the Gulf of Mexico. EPN owns the platform and Anadarko becomes the operator.
During 2002, Anadarko signed a participation agreement with ExxonMobil in the Gulf of Mexico which covered 32 blocks. In the Middle East, Anadarko has a long term gas sale contract with the government of Oman. In addition, the company has an agreement with the state of Georgia which included the exploration rights for three blocks in the Black Sea.

The results of the analysis of different kind of cooperations are summarized in table 5.40.

Anadarko Corporation						
Cooperation (results in dark grey)						
Strategic view	Strategy	Strategic behavior				
Cooperation strategy	Alliance	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Alliance partner	No	NOCs	States	Major IOCs	Service companies
	Joint venture	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Joint venture partner	No	NOCs	States	Major IOCs	Service companies
	Other partnership	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Other partner	No	NOCs	States	Major IOCs	Service companies

Tab. 5.40 Morphological box for cooperation (Anadarko)

5.3.7 Human resources

The HR strategy of Anadarko Corporation between 2000 and 2005 can be characterized by a slight decrease of staff as well as by a strong increase of the EBITDA per employee. The development of the number of employees as well as of the EBITDA per employee is described in figures 5.48 and 5.49.

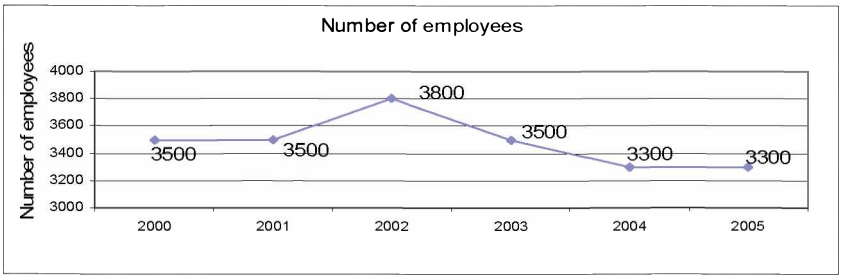

Fig. 5.48 Employee development (Anadarko)[221]

[221] Source: see Annual Reports (2000-2006)

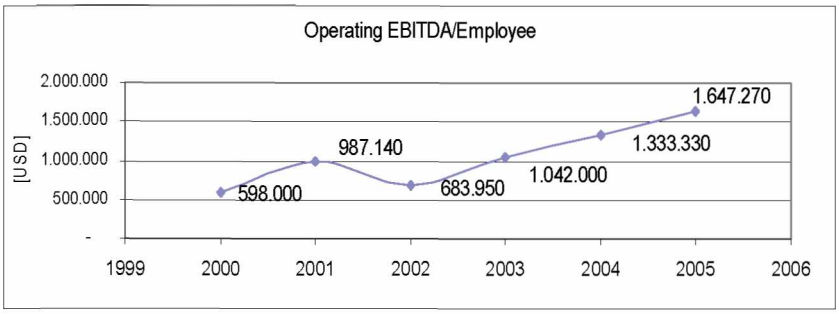

Fig. 5.49 EBITDA/employee development (Anadarko)[222]

5.3.8 Energy portfolio

No information was available about any investments of Anadarko Corporation in wind power, solar or in biomass.

The results of the analysis of the HR and energy portfolio segment are provided in table 5.41.

Anadarko Corporation					
HR & energy portfolio (results in dark grey)					
Strategic view	Strategy	Strategic behavior			
HR	HR strategy	Strong increase of staff	Slight increase of staff	Slight decrease of staff	Strong decrease of staff
		Strong increase of EBITDA/employee	Slight increase of EBITDA/employee	Slight decrease of EBITDA/employee	Strong decrease of EBITDA/employee
Energy portfolio	Alternative energy focus	No	Focus on wind power	Focus on solar energy	Focus on biomass

Tab. 5.41 Morphological box for HR & energy portfolio (Anadarko)

5.4 Apache Corporation

General overview

Apache Corporation is an independent energy company. The headquarters are located in Houston, Texas. Apache's main exploration and production operations are focused on North America (USA, Canada), on offshore Western Australia, on Egypt (off- and onshore) as well as on the British part of the North Sea. More information about activities of Apache Corporation between 2000 and 2005 are provided on pages A26 till A35 in the appendix. In order to get an overview of the performance of Apache between 2000 and 2005, data about the reserve base, the production as well as about the financial situation are provided in figures 5.50, 5.51 and 5.52.

Figure 5.50 provides information about the total proved reserves as well as for liquid hydrocarbons and natural gas. Proved reserves are given in million barrels of oil equivalent [MMBOE]. The company's main proved reserves regions are North America, Egypt, Australia and the North Sea.

[222] Source: see http://www.herold.com

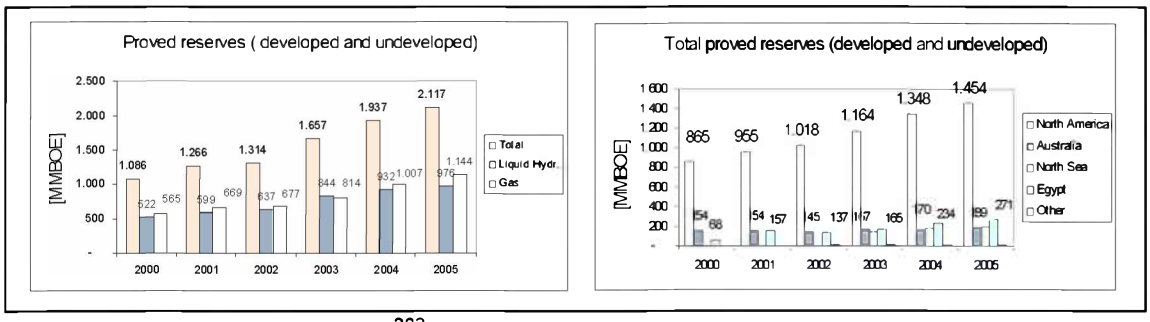

Fig. 5.50 Proved reserves base (Apache)[223]

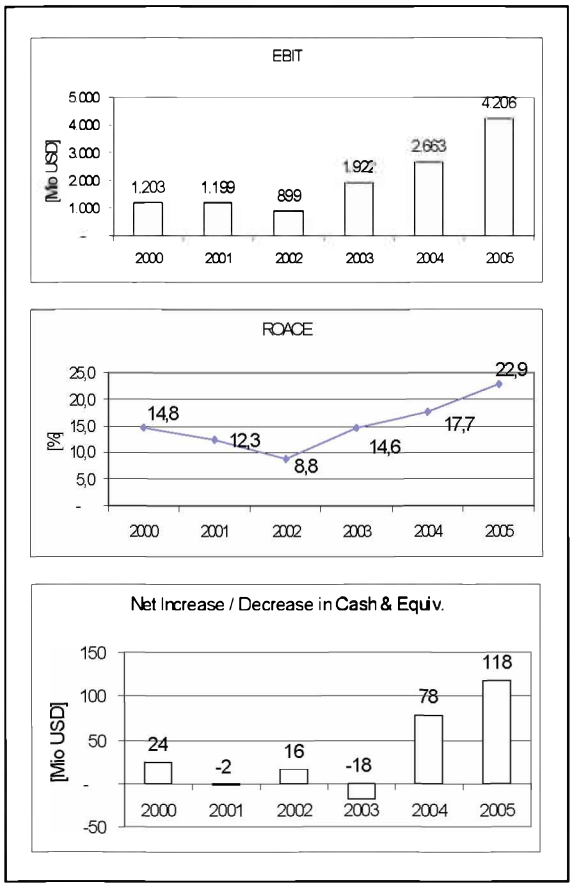

Fig. 5.51 Economic performance (Apache)[224]

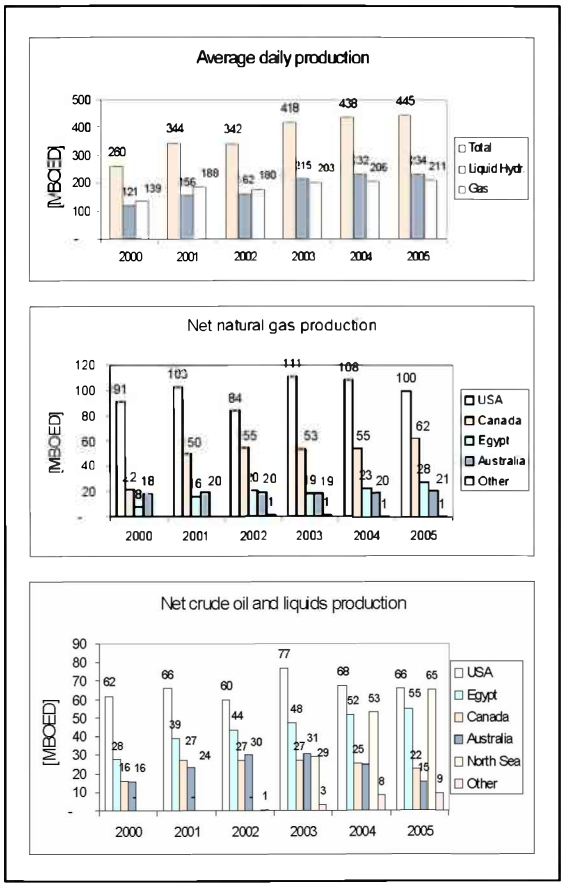

Fig. 5.52 Average daily production (Apache)[225]

Figure 5.51 provides information about the economic performance between 2000 and 2005 by looking at the EBIT, ROACE and cash flow. The total average daily production as well as the production rate of liquid hydrocarbons and natural gas of Apache is introduced in figure 5.52. The units are given in thousands of barrels oil equivalent per day [MBOED]. The main production regions are North America (USA, Canada), Egypt, the North Sea and Australia.

The worldwide E&P activities of Apache Corporation are introduced in figure 5.53.

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223 Source: see Annual Reports (2000-2006)

224 Source: see http://www.herold.com

225 Source: see Annual Reports (2000-2006)

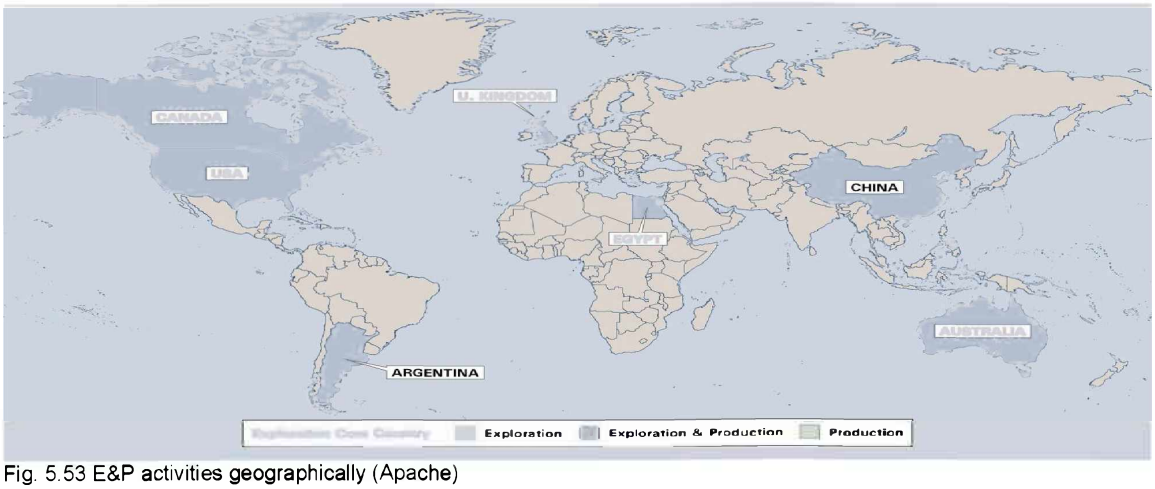

Fig. 5.53 E&P activities geographically (Apache)

5.4.1 Exploration and appraisal (part 1)

Regional focus

Apache concentrated its exploration operations on the defined core regions in North America (Canada, USA, Gulf of Mexico), in the British North Sea, in Egypt as well as in offshore Western Australia. In addition, the company performed minor operations in Argentina, Poland and offshore China. Figure 5.54 provides information concerning the net exploratory wells drilled.

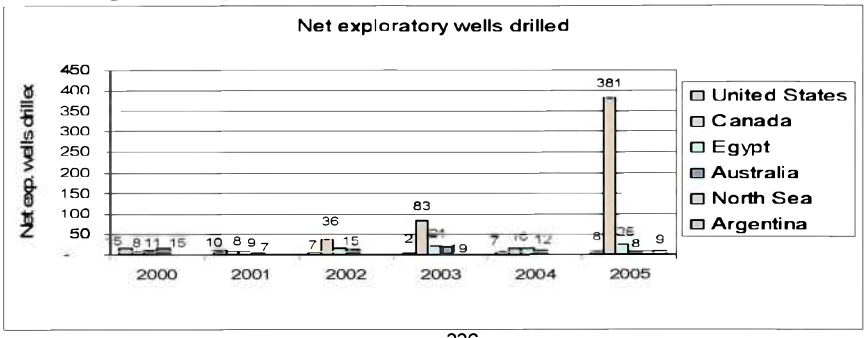

Fig. 5.54 Net exploratory wells drilled (Apache)[226]

Risk exposure

The average overall risk value of the five core regions is given with 1,72. This risk level is defined by Global Insight as „negligible"(between 1,25 and 1,74). If the non core countries are taken into this account too, the risk value of 2,08 is defined as „moderate" (between 2 and 2,49). As a consequence, the overall risk value of the company's operating countries can be characterized as „low". The relevant operation countries are listed up in table 5.42.

[226] Source: see Annual Reports (2000-2006)

	Current overall risk	Political [25%]	Econ. [25%]	Legal [15%]	Tax [15%]	Operational [10%]	Security [10%]
United States	1,51	1,5	1,5	1	1	1,5	2,5
Canada	1,32	1,5	1,5	1	1	1,5	1
United Kingdom	1,46	1,25	1,5	1	1,25	1,25	2,5
Egypt	2,78	2,75	2,5	3,5	2,5	3	2,5
Australia	1,51	1,5	1,25	1	1,5	1,5	2,5
Argentina	3,15	3,25	3,5	3,25	2,5	3,25	2,5
Poland	2,12	2,25	2,25	1,75	2	2	2,25
China	2,84	2,75	2,5	3,25	3	3,25	2,5
Average	**2,08**	2,09	2,06	2	1,84	2,15	2,28

Tab. 5.42 Current overall risk of operating countries (Apache)[227]

Drilling technology (focus and method)

Apache concentrated exploration drilling operations on offshore- (less than 300 meters water depth) as well as onshore regions. In general, Apache tried to be the operator in most of its activities. Beside the main onshore drilling areas in North America, Apache became the biggest operator in the Western desert of Egypt and the largest acreage holder in the Gulf of Mexico. The other main offshore regions have been the North Sea and Western Australia. Apache operated 64% of its exploration offshore projects at the end of 2006. Especially horizontal wells were drilled in the offshore operating fields of Australia during 2004. Table 5.43 provides information about E&P projects of Apache Corporation in 2006. Nearly 48% of all these projects were performed offshore.

Exp./Dev. projects of Apache Corp. (2006)	Total	General operator	Onshore area	Offshore area (less than 300m)	Deepwater area (more than 300m)	Deepwater operator
Canada	8	7	8	0	0	0
Gulf of Mexico	3	2	0	3	0	0
USA-onshore	3	2	3	0	0	0
Argentina	3	3	3	0	0	0
United Kingdom	9	7	0	9	0	0
Egypt	17	15	17	0	0	0
Australia	20	16	0	18	1	1
Sum	63	52	31	30	1	1

Tab. 5.43 E&P projects of Apache Corporation (2006)[228]

Technical success rate

Apache Corporation achieved an average technical success rate of 50% between 2000 and 2005 concerning the net exploratory wells drilled. The success rates in percent are given in figure 5.55.

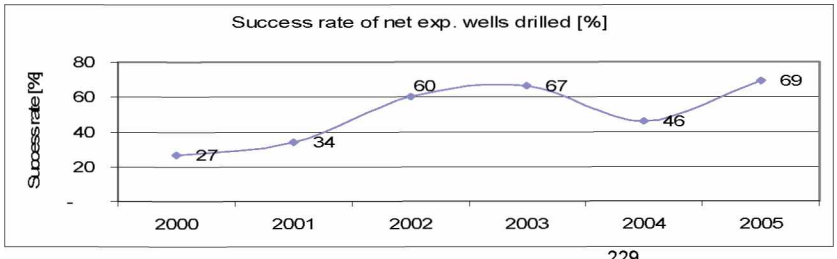

Fig. 5.55 Success rates of net exploratory wells drilled (Apache)[229]

[227] Source: see http://www.globalinsight.com
[228] Source: see http://www.pfcenergy.com
[229] Source: see Annual Reports (2000-2006)

Operatorship

The data provided in table 5.43 can be used to calculate the general operatorship. Apache's general operatorship was 83% at the end of 2006. The only deepwater concession in Egypt (Mediterranean block) was sold in 2006 to Amerada Hess for USD 413 million. As a consequence, the deepwater operatorship accounted for zero %. During 2006, Apache performed 30 offshore projects and operated 19 of them. This indicates an offshore operatorship of nearly 64%.

The results of the strategic analysis of the regional focus, the risk exposure as well as of the drilling technology used can be summarized in the morphological box which is described in table 5.44.

Apache Corporation					
Exploration and appraisal (results in dark grey)					
Strategic view	Strategic indicator	Strategic behavior			
Regional	Regional focus	Exploration concentration in core regions	Development of new exploration regions	Near field exploration	
Risk	Risk exposure	Low	Middle	High	
Drilling technology	Technology focus	Unconventional (Polar, Deepwater, Fractured…)	Conventional onshore	Shallow offshore	Covering all
	Focus on method	Multilateral	Horizontal	Normal	
	Technical success rate	≤ 25%	26% - 50%	51% - 75%	> 75%
	General operatorship (Asset based)	≤ 25%	26% - 50%	51% - 75%	> 75%
	Deepwater operatorship (Asset based)	≤ 25%	26% - 50%	51% -75%	> 75%

Tab. 5.44 Morphological box for exploration & appraisal (part 1) (Apache)

5.4.2 Exploration and appraisal (part 2)

Seismic technology (focus and method)

Apache focused on seismic surveys on its core regions. The company is one of the biggest acquirers of 3 D seismic data in the world. During 2003 Apache started a massive 3 D seismic survey after the acquisition of the Forties field in the North Sea from British Petrol. The costs for this acquisition were USD 630 million. The survey which was processed for 60% of Apache's North Sea blocks lead to a new 4 D snapshot which was used to define new drilling targets. In 2000 Apache initiated an exploration program for an offshore block in Australia which included 2 D as well as 3 D seismic surveys.

Investment profile

The average exploration expenditures of Apache Corporation per year were USD 258 million between 2000 and 2005. The profile of exploration expenditures can be described as "increasing" in the morphological box. Detailed information can be looked up in figure 5.56.

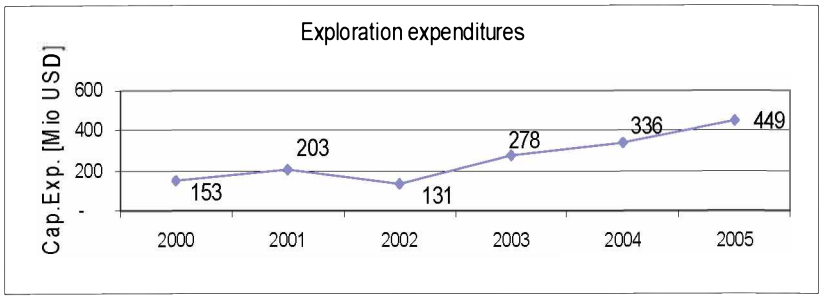

Fig. 5.56 Exploration expenditures (Apache)[230]

Reserve replacement rate (2005)

The reserve replacement rate of Apache in 2005 was 217%. The company's average reserve replacement rate between 2000 and 2005 accounted for 276%.
During 2000 Apache acquired worldwide around 254 MMBoe for USD 1,4 billion. The acquisitions were focused on North America (USA, Canada, Gulf of Mexico). In 2001 the company acquired 213 MMBoe of proved reserves for USD 1,2 billion. The acquired assets were based in Canada, Egypt and Argentina. Apache spent USD 355 million for the acquisition of 49 MMBoe of proved reserves in 2002. During 2003 Apache acquired 267 MMBoe of proved reserves for USD 1,6 billion. Apache became the 4th largest oil producer in the Gulf of Mexico and the 9th largest oil producer in the North Sea after these acquisitions in 2003. In addition, the North Sea became a new core area for the company. In 2004 Apache bought 80 fields and 112 platforms in the Gulf of Mexico from Anadarko and 23 US based producing fields onshore from ExxonMobil for a total of USD 855 million. The package included estimated proved reserves of 100 MMBoe. During 2005 Apache bought interests from Amerada Hess in the Permian Basin (Texas & New Mexico) for USD 269 million. The transaction contained estimated proved reserves of 32 MMBoe.
Figure 5.57 describes the reserve replacement rate profile for Apache Corporation which can be characterized by a "once decrease" in the morphological box.

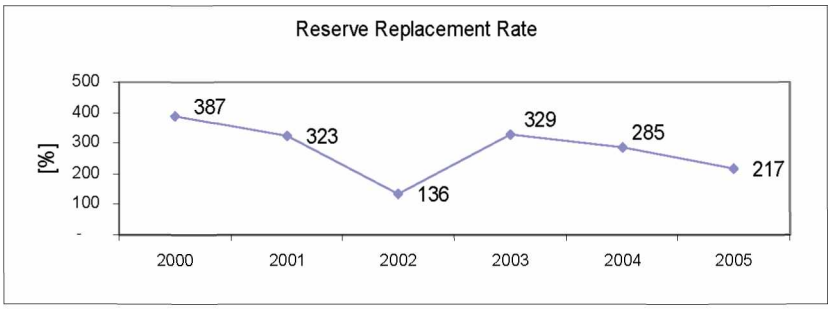

Fig. 5.57 Reserve replacement rates (Apache)[231]

The results of the analysis of the 2nd part of the exploration and appraisal segment are summarized in the morphological box introduced in table 5.45.

[230] Source: see http://www.herold.com
[231] Source: see http://www.herold.com

Apache Corporation						
Exploration and appraisal (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Seismic technology	Regional focus	Core regions		Non core regions		
	Focus on method	2 D	3 D	4 D		All methods
Investment	Investment profile					
Reserve replacement strategy	Reserve replacement rate 2005	≤ 50%	51% - 100%	101%-200%	201% - 300%	> 300%
	Annual reserve replacement profile					

Tab. 5.45 Morphological box for exploration & appraisal (part 2) (Apache)

5.4.3 Development and production (part 1)

Regional focus

The main development operations were concentrated on the defined core countries. USA and Canada were the most important development regions. The US operations of Apache were focused on the Gulf Coast, on- and offshore Louisiana as well as on Texas and New Mexico. At the end of 2005, the USA accounted for 42% of Apache's proved reserves and 37% of its global production. The proved US reserves decreased by 7% compared to 2000. The number of US workovers and recompletions performed increased from 746 in 2000 to 1.186 in 2005. This indicates an expansion of 59%. Canada with the main operation regions in Alberta, British Columbia, Saskatchewan and Northwest Territories accounted for 27% of the proved reserves and 19% of the total production at the end of 2005. The proved reserves in Canada increased by 6% compared to 2000. The number of workovers and recompletions performed in Canada was also increased from 200 in 2000 to 970 in 2005. This indicates an expansion of 385% compared to 2000. Egypt, Australia and the North Sea played a minor role in development considerations compared to North America. Figure 5.58 introduces the main regions of net development wells drilled.

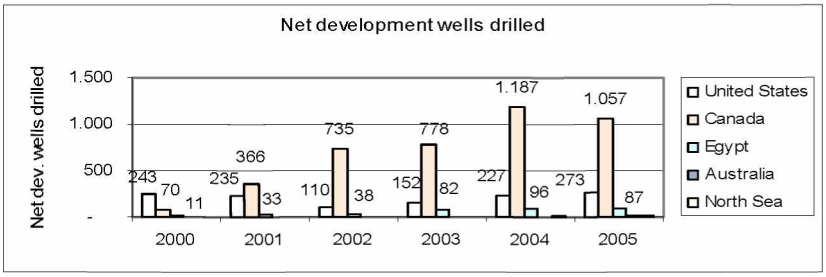

Fig. 5.58 Net development wells drilled (Apache)[232]

[232] Source: see Annual Reports (2000-2006)

EOR

Apache used all types of stimulation methods in order to maintain the production rate out of mature fields. During 2004 Apache operated an enhanced oil recovery project with gas injection in Canada. Total costs for this development program were USD 100 million. In addition, Apache was a partner in a gas injection program located offshore in Australia which was operated by the company BHP Billiton. In 2005 Apache operated two waterflood projects in the Western desert of Egypt as well as in the Forties Field located in the British North Sea.

Resource portfolio

In general, the resource strategy of Apache outside of Canada is focused on conventional resources. In 2004 Apache became after a farm in agreement with ExxonMobil the largest producer of coalbed methane in Canada. The farm in agreement included an undeveloped area of 1.550 km² in Western Canada. In 2006 Apache drilled around 175 wells in its Canadian provinces in order to increase the coalbed methane production which was around 130 MMcf per day at the end of 2005. The daily total Canadian gas production was 372 MMcf in 2005 which indicates that the coalbed methane production accounted for 35%. 27% of the proved reserves were located in Canada (2005) and therefore the worldwide unconventional reserves base can not be larger than 25% as defined in the morphological box.

Oil & gas production focus

The average gas production of Apache between 2000 and 2005 accounted for 50% of the total production. Data about the gas production as % of the total production are provided in figure 5.59.

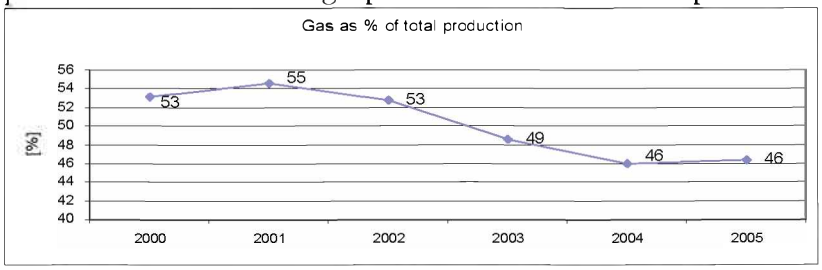

Fig. 5.59 Gas as % of total production (Apache)[233]

Oil & gas reserves focus

The average gas reserves of Apache accounted for 52% of the total proved reserves base. The gas reserves development in % between 2000 and 2005 is introduced in figure 5.60.

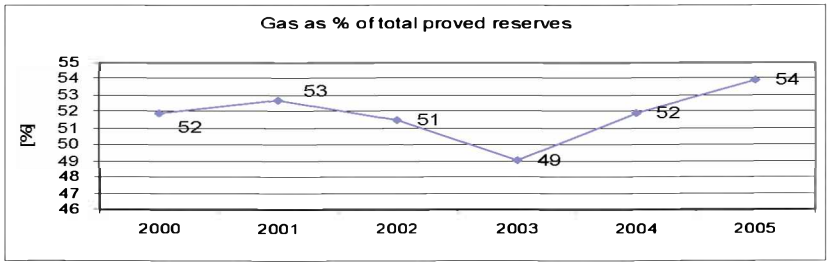

Fig. 5.60 Gas reserves as % of total proved reserves (Apache)[234]

[233] Source: see http://www.herold.com

[234] Source: see http://www.herold.com

The results of the analysis of the regional focus, the used EOR technology as well as of the resource portfolio of Apache Corporation can be summarized in the morphological box which is introduced in table 5.46.

Apache Corporation						
Development and production (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Regional	Regional focus	Development activity focused on core regions		Development activity focused on non-core regions		
EOR	Focus on EOR-method	CO_2 injection	Gas cycling	Water flooding	All of them	
	Operatorship	Always	In most cases	Seldom	Never	
Resource portfolio	Conventional focus*	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Oil & gas production focus [Gas as % of production]	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Oil & gas reserves focus [Gas as % of reserves]	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Non-conventional focus	Oil sands	Heavy oil	Tight gas	Coalbed methane	LPG

Tab. 5.46 Morphological box for development & production (part 1) (Apache) * Assumption

5.4.4 Development and production (part 2)

Focus on LNG

No information was available concerning any interests of Apache in the LNG sector.

Focus on pipelines

The subsidiary Apache Energy Limited operated two gas pipelines with a length of 100 km in Australia.

Downstream strategy

Apache Corporation is an independent E&P company and does not follow a downstream strategy.

Upstream strategy

The average upstream production revenue as part of total sales and operating revenue accounted for 100%. This indicates that the company focuses only on upstream operations. Data about the upstream revenue are provided in table 5.47.

Year	2000	2001	2002	2003	2004	2005
Total upstream production revenue [Mio USD]	2.309	2.823	2.560	4.199	5.308	7.457
Total sales & operating revenue [Mio USD]	2.309	2.823	2.560	4.199	5.308	7.457
Upstream production revenue as part of total sales & operating revenue [%]	100	100	100	100	100	100
Average [%]	**100**					

Tab. 5.47 Upstream revenue (Apache)[235]

Investment profile

The average development expenditures of Apache Corporation per year were USD 1.570 million. The profile can be characterized as "increasing" in the morphological box. The development expenditures between 2000 and 2005 are provided in figure 5.61.

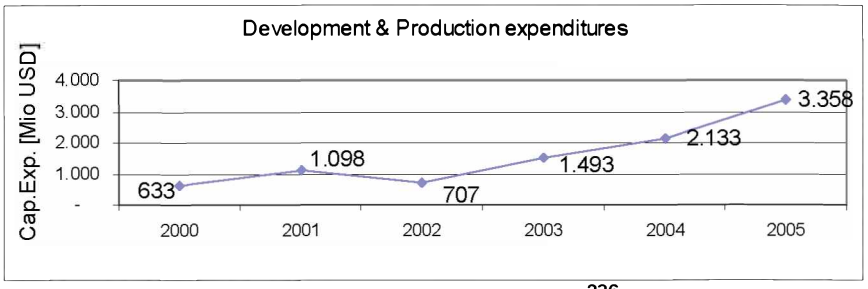

Fig. 5.61 Development and production expenditures (Apache)[236]

Daily Boe production

The average daily Boe production per well between 2000 and 2005 was 38 Boe for Apache. Detailed data are provided in figure 5.62. The behavior pattern of this profile can be classified as "maintaining".

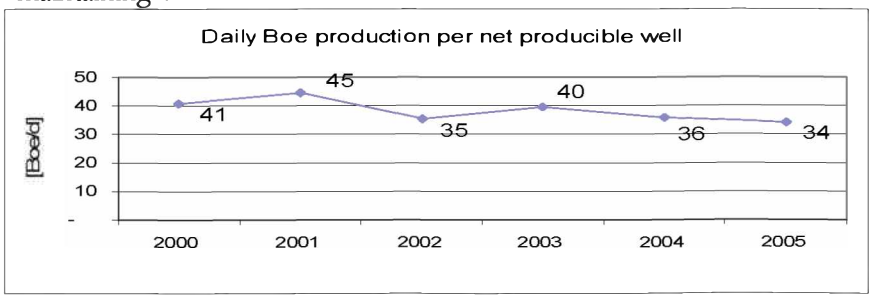

Fig. 5.62 Daily Boe production per net producible well (Apache)[237]

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[235] Source: see http://www.herold.com

[236] Source: see Annual Reports (2000-2006)

[237] Source: see http://www.herold.com

The results of the analysis of the midstream, downstream and upstream sector as well as of the investment and production profile are introduced in table 5.48.

Apache Corporation						
Development and production (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Midstream	Focus on LNG	No		Operating	Participating	
Midstream	Focus on pipelines	No		Operating	Participating	
Coordination strategy between upstream and downstream	Downstream strategy [Volume based integration] [Refining capacity/annual production]	No	< 33%	33% - 66%	67%-100%	> 100%
	Upstream strategy [Revenue of upstream as part of total sales and operating revenues]	< 10%	10% - 24%	25% - 50%	51% - 75%	> 75%
Investment	Investment profile					
Net production profile	Trend in daily Boe production per net producible well					

Tab. 5.48 Morphological box for development & production (part 2) (Apache)

5.4.5 Acquisition

Acquiring reserves

Apache Corporation acquired an average of 154 MMBOE of reserves per year between 2000 and 2005. Detailed data are provided in table 5.49.

Year	2000	2001	2002	2003	2004	2005
Total reserves acquired [MMBOE]	253,7	212,6	49	267	132,5	7,8
Average [MMBOE]	154					

Tab. 5.49 Total reserves acquired per year (Apache)[238]

Regional focus

Apache Corporation performed 100% of its acquisitions in core regions. Table 5.50 highlights every acquisition in a core region per year.

Year	Acquisition
2000	Canada (1), USA (1), Gulf of Mexico (1)
2001	Argentina (1), Canada (1), Egypt (2)
2002	USA (1)
2003	Gulf of Mexico (2), United Kingdom (1), Australia (1)
2004	USA (1), Gulf of Mexico (1)
2005	Australia (1), Canada (1), USA (1)

Tab. 5.50 Acquisitions in core and non core regions (Apache)[239]

[238] Source: see http://www.herold.com
[239] Source: see http://www.herold.com

Intensity strategy

The data from table 5.50 can be used to calculate an acquisition intensity of 2,8 (<3) performed acquisitions per year.

Cost strategy

Apache Corporation performed acquisitions as it can be seen in table 5.50 in every year between 2000 and 2005. The average acquisitions costs were 5,3 USD per Boe acquired reserves. The different acquisition costs per year are provided in figure 5.63.

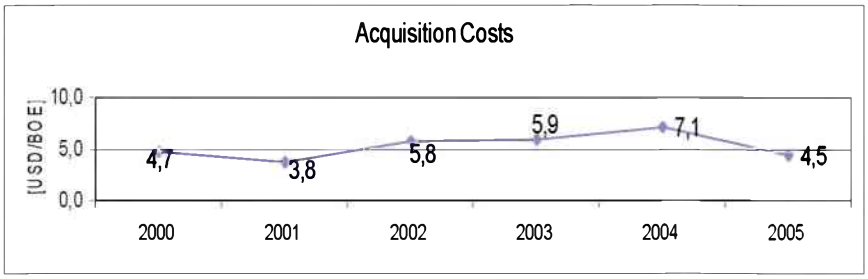

Fig. 5.63 Acquisition costs per year (Apache)[240]

Focusing on acquisitions or farm ins

Apache Corporation performed 21 farm ins and 17 acquisitions between 2000 and 2005. The acquisition rate accounted for 45% by dividing the number of acquisitions through the number of farm ins and acquisitions. The numbers of acquisitions and farm ins are listed up in table 5.51.

Year	2000	2001	2002	2003	2004	2005
Farm in	3	2	4	3	6	3
Acquisition	3	4	1	4	2	3
Acquisition rate as % of farm ins and acquisitions	45					

Tab. 5.51 Numbers of performed acquisitions and farm ins (Apache)[241]

The results of the analysis of the acquisition segment for Apache are provided in table 5.52.

Apache Corporation					
Acquisition (results in dark grey)					
Strategic view	Strategic indicator	Strategic behavior			
Reserve strategy	Acquiring reserves [MMBOE/year]	< 50	50 - 100	101 - 200	> 200
Regional	Regional focus [% of acquisitions in core regions]	< 25%	25% - 50%	51% - 75%	> 75%
Acquisition intensity	Intensity strategy [Acquisitions/year]	0	< 3	3 - 5	> 5

[240] Source: see http://www.herold.com
[241] Source: see http://www.herold.com

Acquisition cost strategy	Cost strategy Acquisition costs [USD/BOE]	< 3	3 - 5	6 - 8	> 8
Acquisition vs. farm in	Focusing on acquisitions or farm ins [Acquisition rate as %]	< 25%	25% - 50%	51% - 75%	> 75%

Tab. 5.52 Morphological box for acquisition (Apache)

5.4.6 Cooperation

Alliance

Since 1998 Apache has a strategic alliance with the company Cinergy Marketing & Trading. The alliance is used to market the produced natural gas in North America.

Joint venture

In 2004 Apache and ExxonMobil signed a joint venture agreement to explore for deep gas in the Gulf of Mexico. ExxonMobil became the operator for the high cost deepwater assets based on advanced technology and Apache operated the shallower prospects.

Other partnership

In 2003 Apache and the Egyptian General Petroleum Corporation signed a memorandum of understanding which included a gas sale agreement and several field development projects. During 2004 a crude oil sale contract was arranged with BP which had to market Apache's crude oil from the North Sea. In 2005 Apache and ExxonMobil signed an agreement to expand development & exploration activities in Western Canada. In Australia, Apache increased its gas sale contracts from two in 2000 to 32 contracts in 2005.

The results of the analysis of different kind of cooperations are provided in table 5.53.

Apache Corporation						
Cooperation (results in dark grey)						
Strategic view	Strategy	Strategic behavior				
Cooperation Strategy	Alliance	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Alliance partner	No	NOCs	States	Major IOCs	Service companies
	Joint venture	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Joint venture partner	No	NOCs	States	Major IOCs	Service companies

	Other partnership	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Other partner	No	NOCs	States	Major IOCs	Service companies

Tab. 5.53 Morphological box for cooperation (Apache)

5.4.7 Human resources

The HR strategy of Apache Corporation between 2000 and 2005 can be characterized by a strong increase of staff as well as by a strong increase of the EBITDA per employee in the morphological box. The development of the number of employees as well as of the EBITDA per employee is described in figures 5.64 and 5.65.

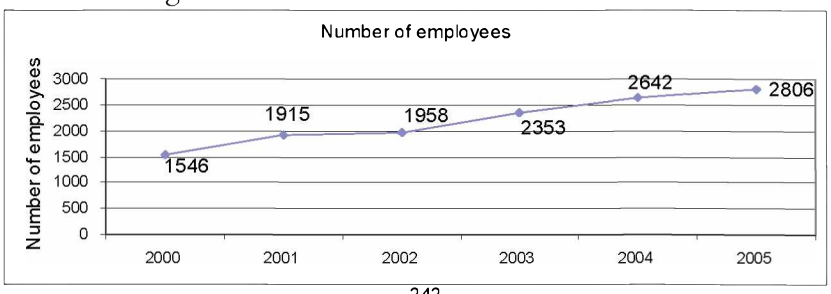

Fig. 5.64 Employee development (Apache)[242]

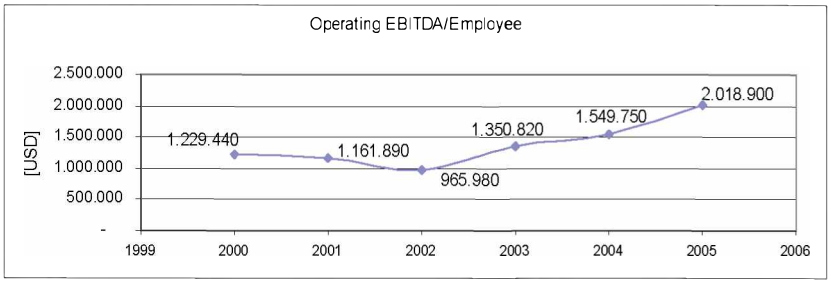

Fig. 5.65 EBITDA/employee development (Apache)[243]

5.4.8 Energy portfolio

No information was available about any investments of Apache Corporation in wind power, solar or in biomass.

The results of the analysis of the HR and energy portfolio segment are provided in table 5.54.

Apache Corporation					
HR & energy portfolio (results in dark grey)					
Strategic view	Strategy	Strategic behavior			
HR	HR strategy	Strong increase of staff	Slight increase of staff	Slight decrease of staff	Strong decrease of staff

[242] Source: see Annual Reports (2000-2006)
[243] Source: see http://www.herold.com

		Strong increase of EBITDA/employee	Slight increase of EBITDA/employee	Slight decrease of EBITDA/employee	Strong decrease of EBITDA/employee
Energy portfolio	Alternative energy focus	No	Focus on wind power	Focus on solar energy	Focus on biomass

Tab. 5.54 Morphological box for HR & energy portfolio (Apache)

5.5 Occidental Petroleum

5.5.1 General overview

Occidental Petroleum is the biggest independent oil and gas producing company in the world. The headquarters are located in Los Angeles, California. The main operations are situated in the United States, the Middle East/North Africa (Oman, Yemen, Qatar, Libya) as well as in Latin America (Colombia, Ecuador, Bolivia, Argentina). In the USA, Occidental is the largest oil producer in Texas and the largest natural gas producer of California.
Detailed information about Occidental Petroleum can be looked up on pages A36 till A41 in the appendix. In order to get an overview of the performance of Occidental between 2000 and 2005, information about the reserve base, the production as well as about the financial situation is provided in figures 5.66, 5.67 and 5.68.
Figure 5.66 provides information about the total proved reserves as well as for the proved reserves of liquid hydrocarbons and natural gas. Proved reserves are given in million barrels of oil equivalent [MMBOE]. The company's main proved reserves are located in the United States.

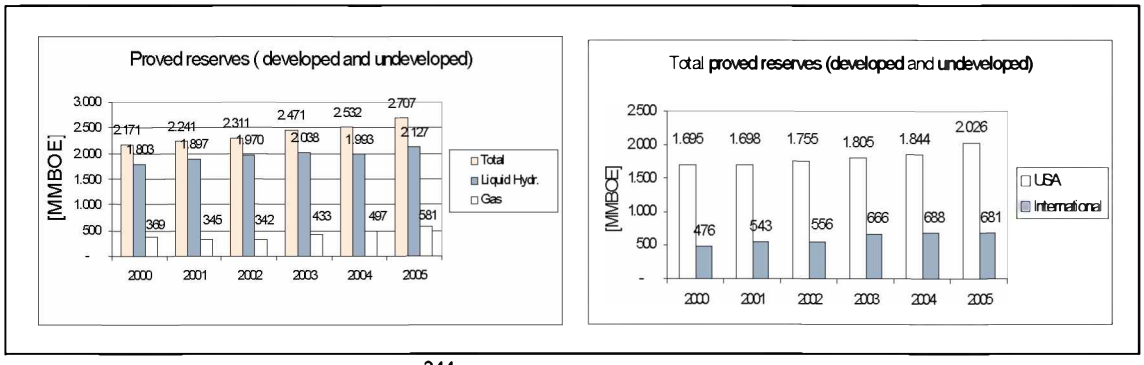

Fig. 5.66 Proved reserves base (Occidental)[244]

Figure 5.67 provides information about the economic performance between 2000 and 2005 by looking at the EBIT, ROACE and cash flow. The total average daily production as well as the production data for liquid hydrocarbons and natural gas of Occidental Petroleum is introduced in figure 5.68. The units are given in thousands of barrels oil equivalent per day [MBOED]. The main production regions are defined as the USA as well as Middle East/North Africa and Latin America.

[244] Source: see Annual Reports (2000-2006)

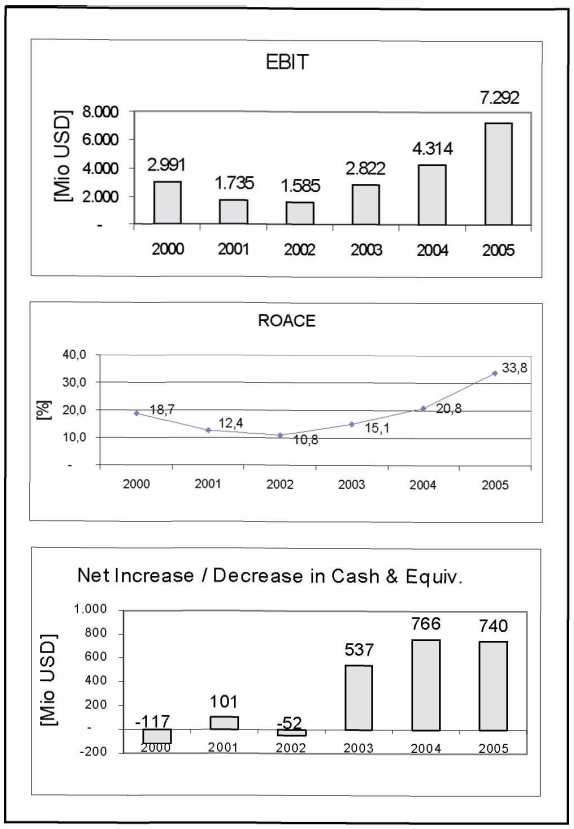

Fig. 5.67 Economic performance (Occidental)[245]

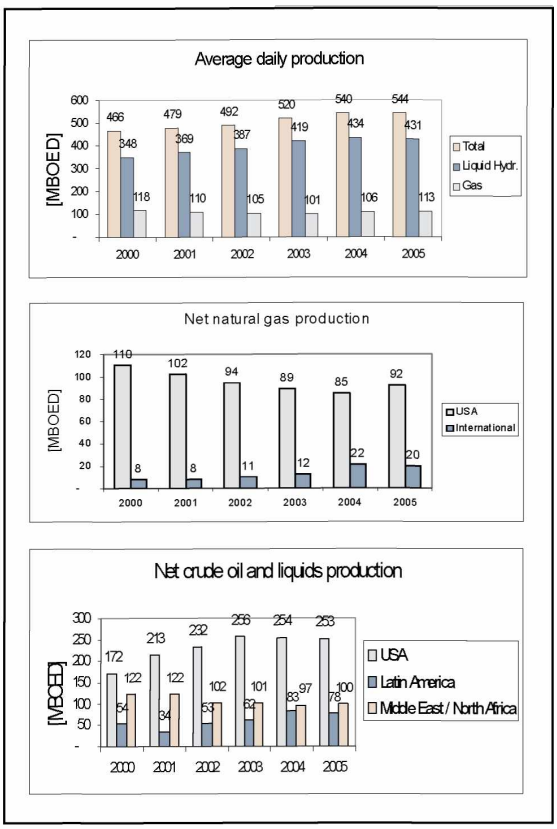

Fig. 5.68 Average daily production (Occidental)[246]

The worldwide E&P activities of Occidental Petroleum are introduced in figure 5.69.

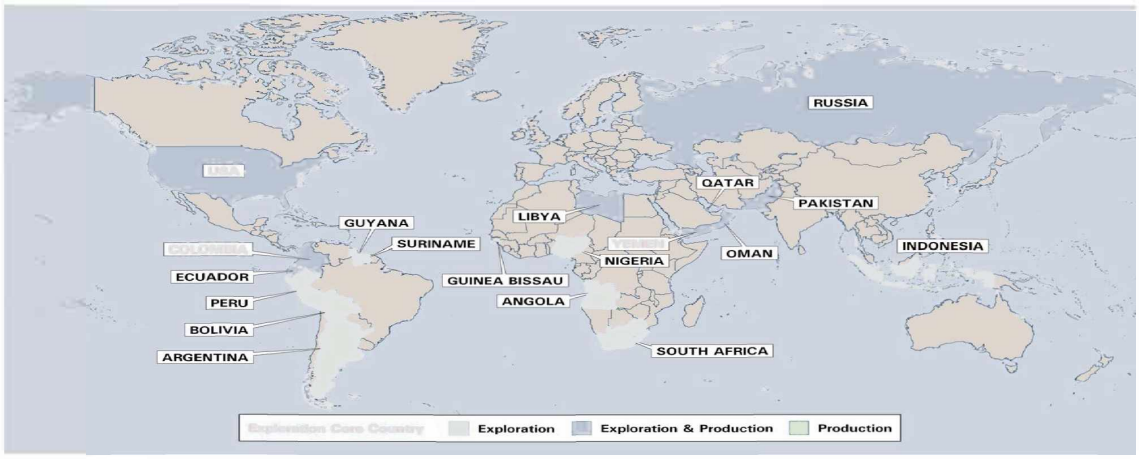

Fig. 5.69 E&P activities geographically (Occidental)

5.5.2 Exploration and appraisal (part 1)

Regional focus

Occidental has defined four exploration core regions which are the USA, Latin America, the Middle East/North Africa and other Eastern Hemisphere.

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245 Source: see http://www.herold.com

246 Source: see http://www.herold.com

The main exploration core countries are the USA, Colombia and Yemen. Figure 5.70 provides information concerning the net exploratory wells drilled.

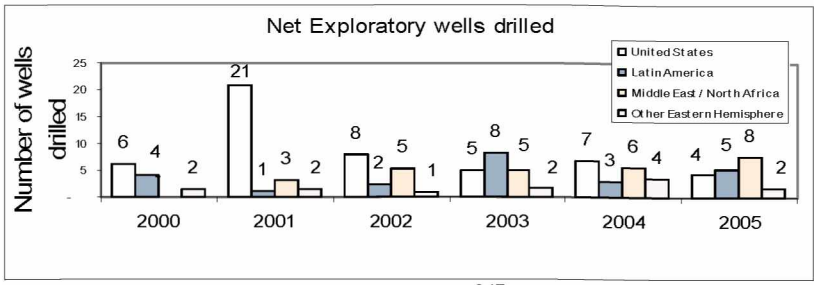


Fig. 5.70 Net exploratory wells drilled (Occidental)[247]

Risk exposure

The average overall risk value of the exploration core countries is 2,68 as described in table 5.55. This risk level is defined by Global Insight as „medium"(between 2,5 and 2,99). The risk potential changes from „medium" to „high" by taking the other relevant exploration projects into account like in Argentina, Bolivia, Ecuador, Nigeria or Indonesia. As a consequence, the risk level of the company's country operations can be classified as „high".

	Current overall risk	Political [25%]	Econ. [25%]	Legal [15%]	Tax [15%]	Operational [10%]	Security [10%]
United States	1,51	1,5	1,5	1	1	1,5	2,5
Yemen	3,46	2,75	3,25	4	4	3,5	3,75
Colombia	3,08	3,25	2,5	3	2,5	3,75	4
Average	**2,68**	2,5	2,4	2,7	2,5	2,9	3,4

Tab. 5.55 Current overall risk of operating countries (Occidental)[248]

Drilling technology (focus and method)

Occidental performs drilling operations mainly onshore. In addition, the company operated offshore development programs in Qatar (North & South Dome Fields). Occidental used multilateral and horizontal drilling techniques especially in Oman. 60% of the total production in Oman was based on these kind of wells. The horizontal wells were drilled to increase the production & recovery and to decrease the number of wells needed. Table 5.56 provides information about E&P projects of Occidental in 2006. Nearly 69% of these projects were based onshore.

Exp./Dev. projects of Occidental Petroleum (2006)	Total	General operator	Onshore area	Offshore area (less than 300m)	Deepwater area (more than 300m)	Deepwater operator
USA onshore	8	7	6	1	0	0
Gulf of Mexico	1	0	0	0	1	0
Argentina	1	1	1	0	0	0
Bolivia	1	1	1	0	0	0
Colombia	5	4	5	0	0	0
Guyana	1	0	0	1	0	0
Peru	3	3	3	0	0	0
Suriname	1	0	0	0	1	0
Libya	4	2	3	1	0	0
Oman	5	5	5	0	0	0
Qatar	2	1	0	2	0	0
Yemen	7	5	7	0	0	0

247 Source: see Annual Reports (2000-2006)

248 Source: see http://www.globalinsight.com

Angola	2	1	1	0	1	0
Guinea Bissau	2	0	0	0	2	0
Nigeria	1	0	0	0	1	0
South Africa	2	0	0	0	2	0
Indonesia	1	0	0	1	0	0
Pakistan	1	0	1	0	0	0
Sum	48	30	33	6	8	0

Tab. 5.56 E&P projects of Occidental Petroleum (2006) [249]

Technical success rate

Occidental Petroleum achieved an average technical success rate of 48% between 2000 and 2005 concerning the net exploratory wells drilled. The success rates in percent are given in figure 5.71.

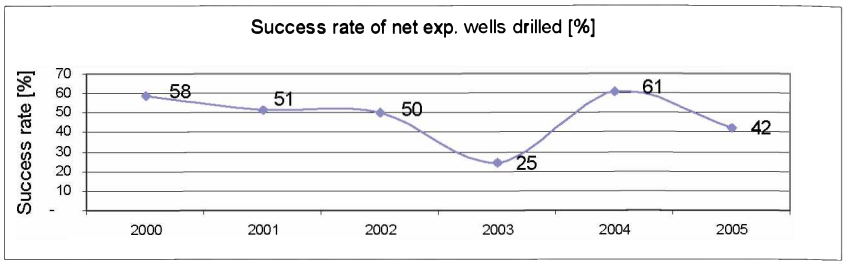


Fig. 5.71 Success rates of net exploratory wells drilled (Occidental) [250]

Operatorship

The data provided in table 5.56 can be used to calculate the general operatorship. Occidental's general operatorship was 63% at the end of 2006. The deepwater operatorship accounted for zero percent.

The results of the strategic analysis of the regional focus, the risk exposure as well as of the drilling technology used can be summarized in the morphological box which is described in table 5.57.

Occidental Petroleum					
Exploration and appraisal (results in dark grey)					
Strategic view	Strategic indicator	Strategic behavior			
Regional	Regional focus	Exploration concentration in core regions	Development of new exploration regions	Near field exploration	
Risk	Risk exposure	Low	Middle	High	
Drilling technology	Technology focus	Unconventional (Polar, Deepwater, Fractured…)	Conventional onshore	Shallow offshore	Covering all
	Focus on method	Multilateral	Horizontal	Normal	
	Technical success rate	≤ 25%	26% - 50%	51% - 75%	> 75%

[249] Source: see http://www.pfcenergy.com

[250] Source: see Annual Reports (2000-2006)

	General operatorship (Asset based)	≤ 25%	26% - 50%	51% - 75%	> 75%
	Deepwater operatorship (Asset based)	≤ 25%	26% - 50%	51% -75%	> 75%

Tab. 5.57 Morphological box for exploration & appraisal (part 1) (Occidental)

5.5.3 Exploration and appraisal (part 2)

Seismic technology (focus and method)

Occidental concentrated the seismic surveys on its core regions. The company operated and planned several seismic programs especially in its domestic core region (USA) as well as in the Middle East (Yemen, Oman) and in Latin America (Ecuador). Most common used technologies were 2 D as well as 3 D seismic methods.

Investment profile

The average exploration expenditures of Occidental Petroleum per year were USD 106 million between 2000 and 2005. The profile of exploration expenditures can be described as "increasing" in the morphological box. Detailed information is provided in figure 5.72.

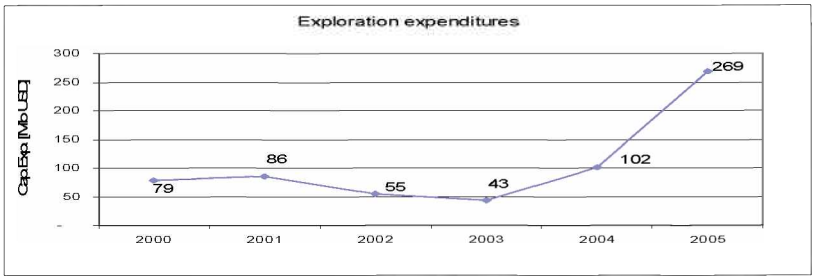


Fig. 5.72 Exploration expenditures (Occidental)[251]

Reserve replacement rate (2005)

Occidental Petroleum achieved a reserve replacement rate of 194% in 2005. The company's average reserve replacement rate between 2000 and 2005 accounted for 230%. The main acquisition was performed in 2000. Occidental acquired the company Altura Energy in Texas for USD 3,6 billion. Altura had proven reserves of 850 million barrels of oil equivalent. Figure 5.73 describes the reserve replacement rate profile for Occidental Petroleum which can be described as "maintaining" between 2001 and 2005 in the morphological box.

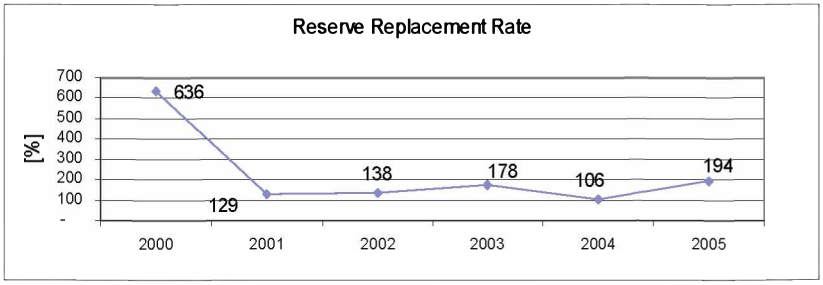
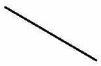


Fig. 5.73 Reserve replacement rates (Occidental)[252]

[251] Source: see http://www.herold.com
[252] Source: see http://www.herold.com

The results of the analysis of the 2nd part of the exploration and appraisal segment are introduced in the morphological box which is described in table 5.58.

Occidental Petroleum						
Exploration and appraisal (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Seismic technology	Regional focus	Core regions		Non core regions		
	Focus on method	2 D	3 D	4 D		All methods
Investment	Investment profile					
Reserve replacement strategy	Reserve replacement rate 2005	≤ 50%	51% - 100%	101%-200%	201% - 300%	> 300%
	Annual reserve replacement profile					

Tab. 5.58 Morphological box for exploration & appraisal (part 2) (Occidental)

5.5.4 Development and production (part 1)

Regional focus

Development operations were concentrated on the domestic onshore core regions in the USA (California, Permian Basin, Oklahoma and Texas). Massive stimulation and development programs were initiated to keep the production rate at a constant level. Internationally, Occidental's main development operations were focused on the operated offshore North/South Dome fields in Qatar, on the Cano Limon field in Colombia as well as on the Eden Yuturi field in Ecuador. Figure 5.74 introduces the main regions of net development wells drilled.

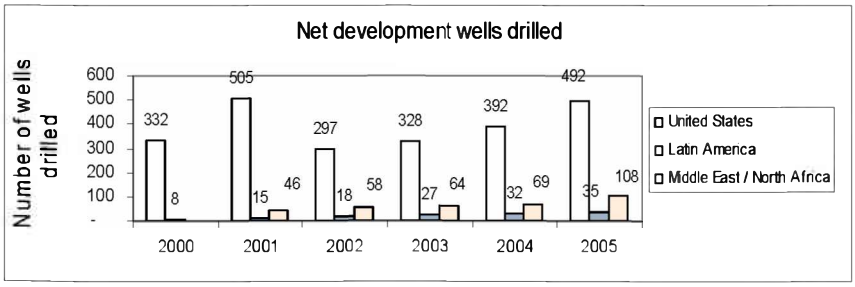


Fig. 5.74 Net development wells drilled (Occidental)[253]

[253] Source: see Annual Reports (2000-2006)

EOR

Occidental became a world leader in the development of enhanced oil recovery technologies after the acquisition of Altura Energy in 2000. Domestically, Occidental used CO_2 injection techniques primarily in the Permian Basin (Texas, Oklahoma) which is the main US core production area. In 2005 around 60% of the Permian production was based on CO_2 injection. Water and gas injection techniques were performed in the Californian fields (Elk Hills) to increase the recovery. Internationally, Occidental operated waterflood programs in the offshore North/South Dome fields of Qatar.

Resource portfolio

Occidental is the biggest independent oil and gas producing company in the world. The resource portfolio is strongly oil focused. Around 69% of the total proved reserves and 60% of the total production were based in the USA at the end of 2005. In Oman, Occidental had an interest in a tight gas development project and operated a heavy oil field (Mukhaizna). In Ecuador, Occidental produced heavy oil out of the operated Eden Yuturi field. During 2006 the government rescinded the operating license for this field.

Oil & gas production focus

The average gas production of Occidental between 2000 and 2005 accounted for 21% of the total production. Data about the gas production as % of the total production are provided in figure 5.75.

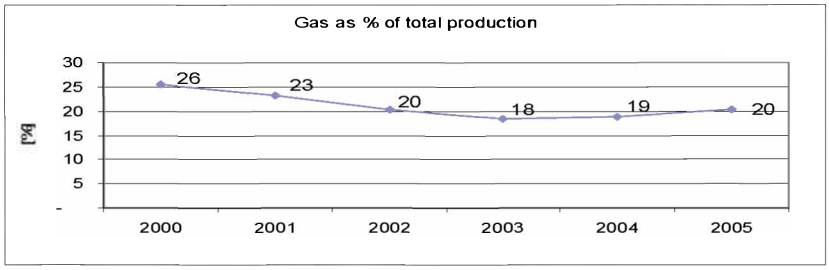


Fig. 5.75 Gas as % of total production (Occidental)[254]

Oil & gas reserves focus

The average gas reserves of Occidental accounted for 18% of the total proved reserves base. The gas reserves development in % between 2000 and 2005 is introduced in figure 5.76.

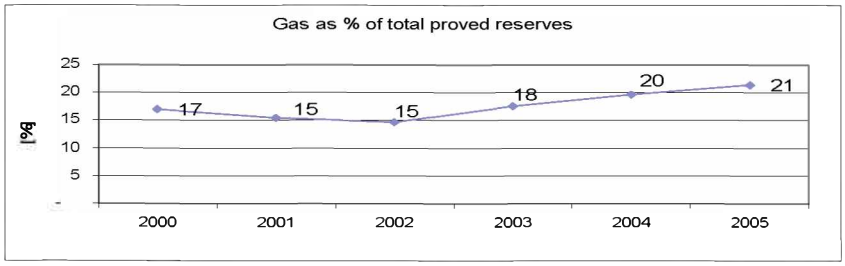


Fig. 5.76 Gas reserves as % of total proved reserves (Occidental)[255]

[254] Source: see http://www.herold.com
[255] Source: see http://www.herold.com

The results of the analysis of the regional focus, the used EOR technology as well as of the resource portfolio of Occidental can be looked up in the morphological box of table 5.59

Occidental Petroleum						
Development and production (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Regional	Regional focus	Development activity focused on core regions		Development activity focused on non-core regions		
EOR	Focus on EOR-method	CO_2 injection	Gas cycling	Water flooding	All of them	
	Operatorship	Always	In most cases	Seldom	Never	
Resource portfolio	Conventional focus*	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Oil & gas production focus [Gas as % of production]	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Oil & gas reserves focus [Gas as % of reserves]	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Non-conventional focus	Oil sands	Heavy oil	Tight gas	Coalbed methane	LPG

Tab. 5.59 Morphological box for development & production (part 1) (Occidental) * Assumption

5.5.5 Development and production (part 2)

Focus on LNG

In 2001 Occidental sold its interest in an Indonesian LNG project to Mitsubishi Corporation of Japan for USD 480 million. The LNG sector seems to be uninteresting for Occidental.

Focus on pipelines

In 2004 Occidental acquired an oil and gas gathering and pipeline system (2.166 km) in the Permian Basin (USA) for USD 143 million. Internationally, Occidental and Ecopetrol (NOC of Colombia, operator) jointly own the Cano Limon Covenas pipeline in Colombia. In addition, Occidental held a 12% interest in a heavy oil pipeline (500 km) in Ecuador which was used to transport oil from the operated Eden Yuturi field to the Pacific port of Esmeraldas. During 2006 the government of Ecuador closed the operating license for the Eden Yuturi field and Occidental sold its 12% pipeline interest.

Downstream strategy

Occidental Petroleum is an independent E&P company and does not follow a downstream strategy.

Upstream strategy

The average upstream production revenue as part of total sales and operating revenue accounted for 64% between 2000 and 2005. The calculation is based on data provided in table 5.60.

Year	2000	2001	2002	2003	2004	2005
Total upstream production revenue [Mio USD]	4.875	5.134	4.634	6.003	7.582	10.416
Total sales & operating revenue [Mio USD]	8.504	8.102	7.338	9.326	11.368	15.208
Upstream production revenue as part of total sales & operating revenue [%]	57	63	63	64	67	68
Average [%]	**64**					

Tab. 5.60 Upstream revenue (Occidental)[256]

Investment profile

The average development expenditures of Occidental Petroleum per year were USD 1.131 million. The profile can be characterized as "increasing" in the morphological box. Data about the development expenditures between 2000 and 2005 are provided in figure 5.77.

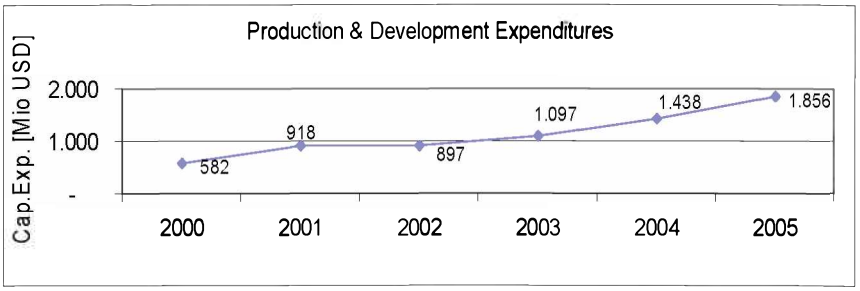


Fig. 5.77 Development and production expenditures (Occidental)[257]

Daily Boe production

The average daily Boe production per well of Occidental Petroleum was 37,1 Boe between 2000 and 2005. The behavior pattern can be classified as "maintaining" in the morphological box. The daily Boe production profile is introduced in figure 5.78.

[256] Source: see http://www.herold.com

[257] Source: see Annual Reports (2000-2006)

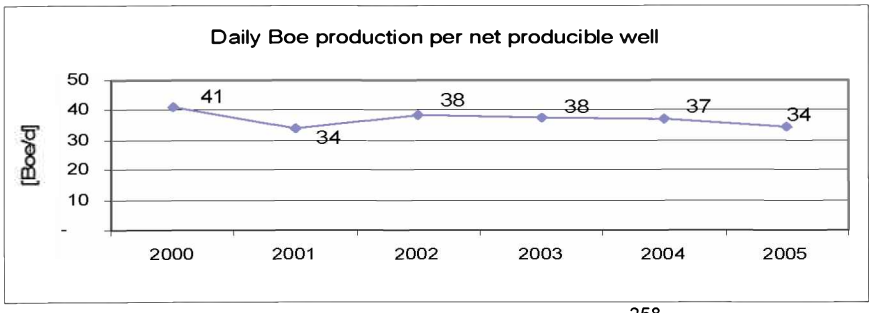
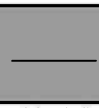


Fig. 5.78 Daily Boe production per net producible well (Occidental)[258]

The results of the analysis of the midstream, downstream and upstream sector as well as of the investment and production profile are provided in table 5.61.

Occidental Petroleum						
Development and production (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Midstream	Focus on LNG	No		Operating	Participating	
Midstream	Focus on pipelines	No		Operating	Participating	
Coordination strategy between upstream and downstream	Downstream strategy Volume based integration [Refining capacity/annual production]	No	< 33%	33% - 66%	67%-100%	> 100%
	Upstream strategy [Revenue of upstream as part of total sales and operating revenues]	< 10%	10% - 24%	25% - 50%	51% - 75%	> 75%
Investment	Investment profile					
Net production profile	Trend in daily Boe production per net producible well					

Tab. 5.61 Morphological box for development & production (part 2) (Occidental)

5.5.6 Acquisition

Acquiring reserves

Occidental Petroleum acquired an average of 221 MMBOE of reserves per year between 2000 and 2005. Detailed data are introduced in table 5.62.

Year	2000	2001	2002	2003	2004	2005
Total reserves acquired [MMBOE]	970	4	68	107	36	139
Average [MMBOE]	221					

Tab. 5.62 Total reserves acquired per year (Occidental)[259]

[258] Source: see http://www.herold.com

[259] Source: see http://www.herold.com

Regional focus

Occidental performed 88% of its acquisitions in core regions. Table 5.63 highlights every acquisition in a core region per year.

Year	Acquisition
2000	**USA (1)**
2001	**USA (1)**
2002	**Pakistan (1)**
2003	**USA (1)**
2004	**Pakistan (1)**
2005	Albania (1), **Colombia (1), USA (1)**

Tab. 5.63 Acquisitions in core and non core regions (Occidental)[260]

Intensity strategy

The data from table 5.63 can be used to calculate an acquisition intensity of 1,33 (<3) performed acquisitions per year.

Cost strategy

Occidental Petroleum performed acquisitions as it can be seen in table 5.63 in every year between 2000 and 2005. The average acquisitions costs were 5,7 USD per Boe acquired reserves. The different acquisition costs per year are introduced in figure 5.79.

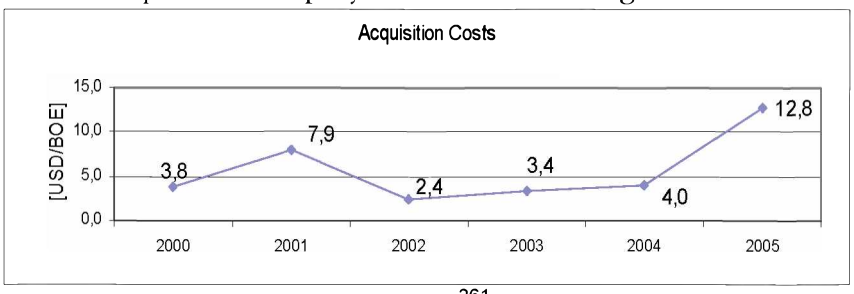


Fig. 5.79 Acquisition costs per year (Occidental)[261]

Focusing on acquisitions or farm ins

Occidental performed three farm ins and eight acquisitions between 2000 and 2005. The acquisition rate accounted for 73% by dividing the number of acquisitions through the number of farm ins and acquisitions. The numbers of acquisitions and farm ins are listed up in table 5.64.

Year	2000	2001	2002	2003	2004	2005
Farm in	0	1	0	2	0	0
Acquisition	1	1	1	1	1	3
Acquisition rate as % of farm ins and acquisitions	**73**					

Tab. 5.64 Numbers of performed acquisitions and farm ins (Occidental)[262]

[260] Source: see http://www.herold.com
[261] Source: see http://www.herold.com
[262] Source: see http://www.herold.com

The results of the analysis of the acquisition segment in the morphological box for Occidental Petroleum are summarized in table 5.65.

Occidental Petroleum					
Acquisition (results in dark grey)					
Strategic view	Strategic indicator	Strategic behaviour			
Reserve strategy	Acquiring reserves [MMBOE/year]	< 50	50 - 100	101 - 200	> 200
Regional	Regional focus [% of acquisitions in core regions]	< 25%	25% - 50%	51% - 75%	> 75%
Acquisition intensity	Intensity strategy [Acquisitions/year]	0	< 3	3 - 5	> 5
Acquisition cost strategy	Cost strategy Acquisition costs [USD/BOE]	< 3	3 - 5	6 - 8	> 8
Acquisition vs. farm in	Focusing on acquisitions or farm ins [Acquisition rate as %]	< 25%	25% - 50%	51% - 75%	> 75%

Tab. 5.65 Morphological box for acquisition (Occidental)

5.5.7 Cooperation

Alliance

Occidental holds a 20% interest in the so called Core Venture Consortium in Saudi Arabia. The Consortium was initiated by the Kingdom of Saudi Arabia to invest in the Red Sea region in order to develop new gas reserves for the domestic market in Saudi Arabia.

Joint venture

Occidental has a 50% interest in a joint venture company called Vanyoganneft which operates in Siberia. In 2002 Occidental acquired a 24,5% interest in the joint venture Dolphin Project of Qatar. The project which included the United Arabian Offset Group (51%) and TotalFinaElf (24,5%) consisted of the development of natural gas in Qatar's North Dome field and the construction of a subsea pipeline (433 km) to transport the natural gas from Qatar to the United Arabian Emirates. In 2005 Occidental signed a contract with the Sultanate of Oman to develop and operate the large Mukhaizana oil field with the joint venture partner Liwa Energy Limited which is the NOC of the Emirate of Abu Dhabi.

Other partnership

In 2005 Occidental signed a partnership agreement with Ecopetrol (NOC of Colombia) in order to develop a mature Colombian oil field. Several enhanced oil recovery projects were planned.
In addition, the company has several gas sale agreements with the government of Oman. For example, in 2002 Occidental signed an agreement to sell 130 MMcf of natural gas per day from an operating field the state of Oman. During 2003 the Dolphin project partners signed a contract with Oman which included the sale of 1 Bcf of natural gas per day.

The results of the analysis of different kind of cooperations are provided in table 5.66.

Occidental Petroleum						
Cooperation (results in dark grey)						
Strategic view	Strategy	Strategic behavior				
Cooperation strategy	Alliance	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Alliance partner	No	NOCs	States	Major IOCs	Service companies
	Joint venture	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Joint venture partner	No	NOCs	States	Major IOCs	Service companies
	Other partnership	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Other partner	No	NOCs	States	Major IOCs	Service companies

Tab. 5.66 Morphological box for cooperation (Occidental)

5.5.8 Human resources

The HR strategy of Occidental Petroleum between 2000 and 2005 can be characterized by a slight decrease of staff as well as by a strong increase of the EBITDA per employee. The development of the number of employees as well as of the EBITDA per employee is described in figures 5.80 and 5.81.

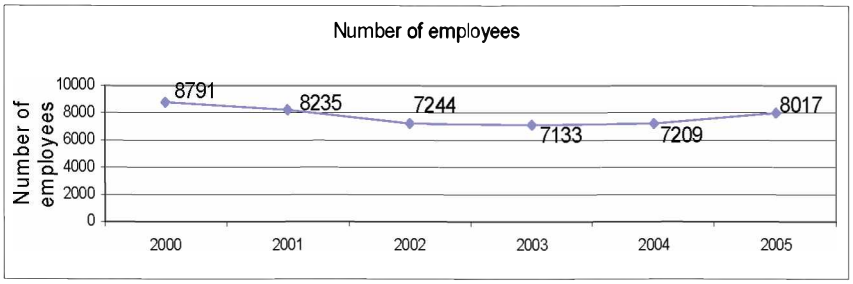


Fig. 5.80 Employee development (Occidental)[263]

[263] Source: see Annual Reports (2000-2006)

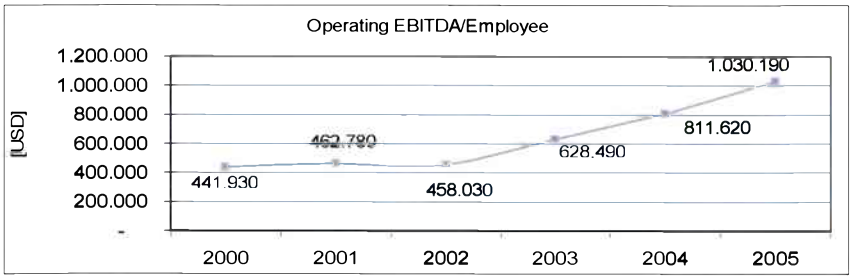


Fig. 5.81 EBITDA/employee development (Occidental)[264]

5.5.9 Energy portfolio

No information was available about any operations of Occidental Petroleum concerning wind power, solar or biomass.

The results of the analysis of the HR and energy portfolio segment are provided in table 5.67.

Occidental Petroleum					
HR & energy portfolio (results in dark grey)					
Strategic view	Strategy	Strategic behavior			
HR	HR strategy	Strong increase of staff	Slight increase of staff	Slight decrease of staff	Strong decrease of staff
		Strong increase of EBITDA/employee	Slight increase of EBITDA/employee	Slight decrease of EBITDA/employee	Strong decrease of EBITDA/employee
Energy portfolio	Alternative energy focus	No	Focus on wind power	Focus on solar energy	Focus on biomass

Tab. 5.67 Morphological box for HR & energy portfolio (Occidental)

5.6 BG Group

5.6.1 General overview

The BG Group consists of the business segments exploration & production, liquefied natural gas, transmission & distribution and power generation.
The company is active on four continents and has interests in 20 countries. The core exploration and development areas are the United Kingdom, Egypt, Tunisia, Kazakhstan, India, Thailand, Canada, Bolivia as well as Trinidad & Tobago.
More information about operations of the BG Group between 2000 and 2005 are provided on pages A42 till A49 in the appendix. In order to get an overview of the performance of BG between 2000 and 2005, data about the reserve base, the production as well as about the financial situation are provided in figures 5.82, 5.83 and 5.84.
Figure 5.82 provides information about the total proved reserves as well as for liquid hydrocarbons and natural gas. Proved reserves are given in million barrels of oil equivalent [MMBOE]. The company's main proved reserves are located in the United Kingdom.

[264] Source: see http://www.herold.com

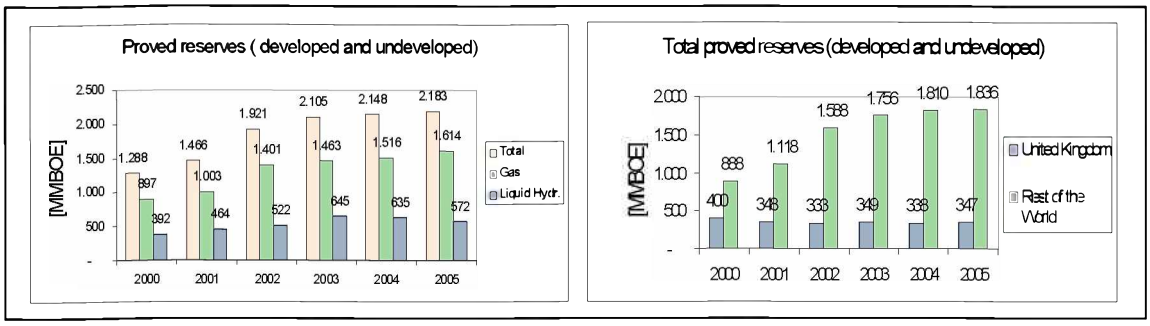


Fig. 5.82 Proved reserves base (BG)[265]

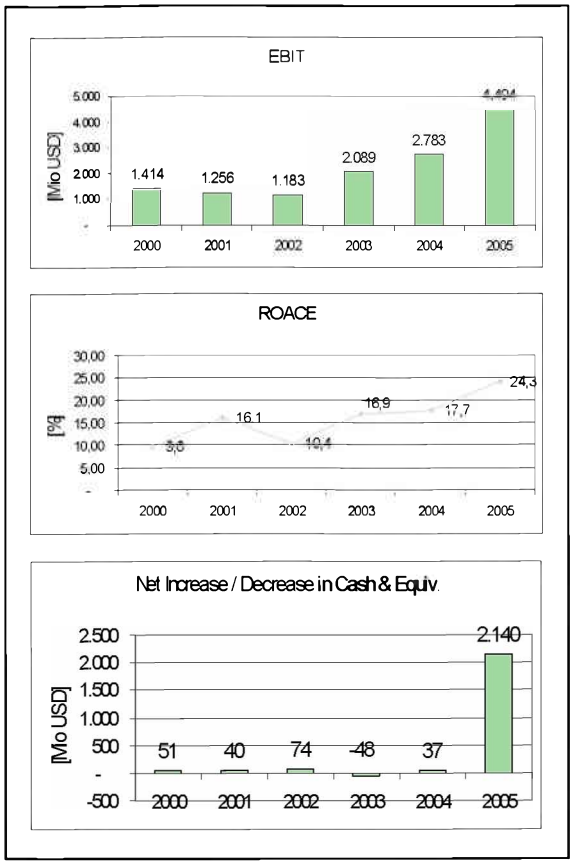


Fig. 5.83 Economic performance (BG)[266]

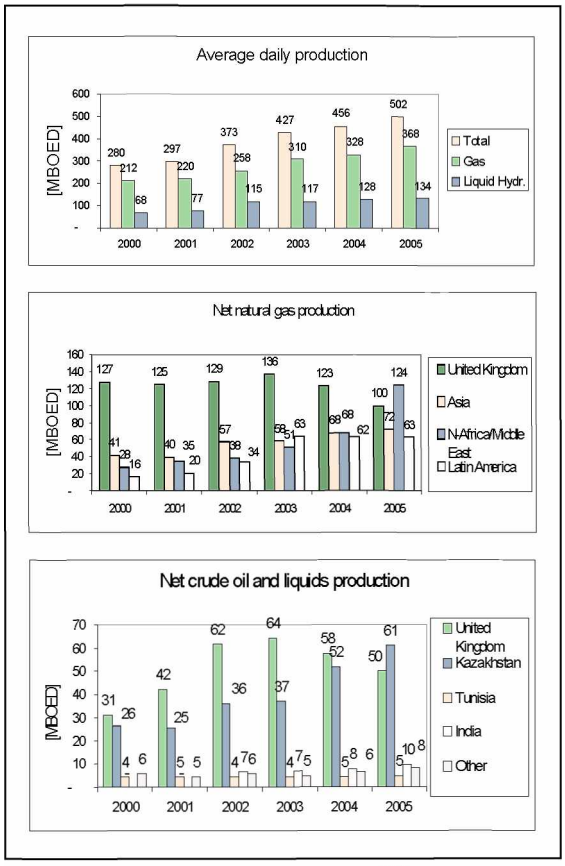


Fig. 5.84 Average daily production (BG)[267]

Figure 5.83 provides information about the economic performance between 2000 and 2005 by looking at the EBIT, ROACE and cash flow. The total average daily production as well as the production rate of liquid hydrocarbons and natural gas of BG is described in figure 5.84. The units are given in thousands of barrels oil equivalent per day [MBOED]. The main production regions are the United Kingdom, Asia (Kazakhstan, India, Thailand), North Africa (Tunisia, Egypt) as well as Latin America (Bolivia) and Trinidad & Tobago.

The worldwide E&P activities of the BG Group are introduced in figure 5.85.

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265 Source: see Annual Reports (2000-2006)

266 Source: see http://www.herold.com

267 Source: see Annual Reports (2000-2006)

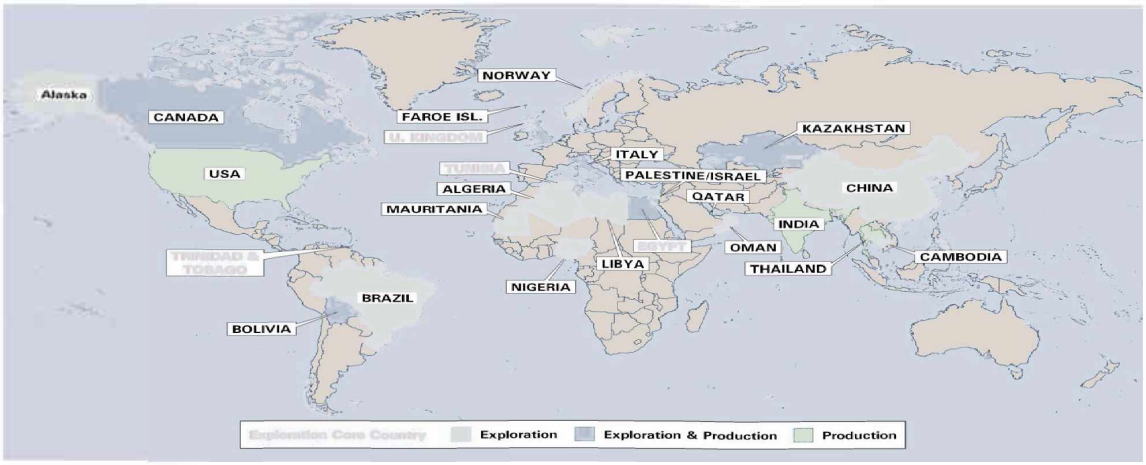

Fig. 5.85 E&P activities geographically (BG)

5.6.2 Exploration and appraisal (part 1)

Regional focus

In general, BG does not report drilling activities in detail. Most of the exploration operations during the last five years were focused on the countries introduced in figure 5.86. "Other" determines exploration operations in Bolivia, Italy and Tunisia. In addition, BG tried to develop new exploration regions in Brazil, India, China, Norway, Canada, USA (Alaska), Cambodia as well as in Mauritania. Figures 5.86 and 5.87 provide the available information concerning the gross exploratory wells drilled.

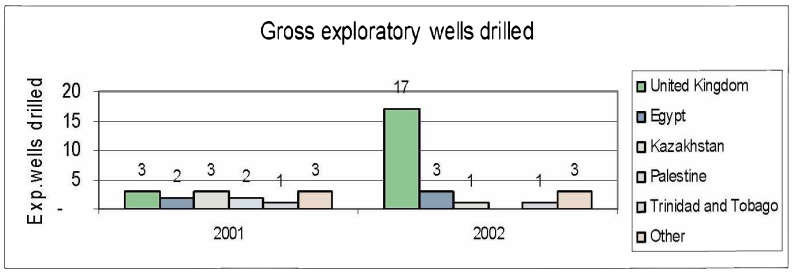

Fig. 5.86 Gross exploratory wells drilled after regions (BG)[268]

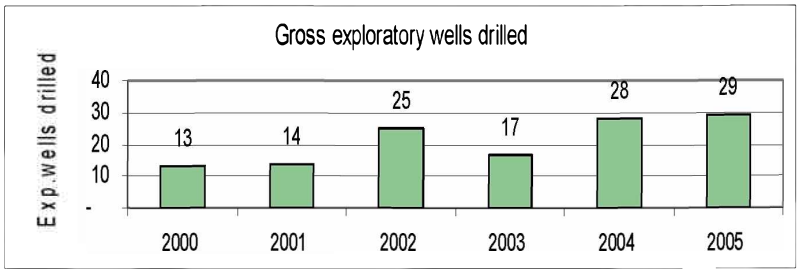

Fig. 5.87 Number of gross exploratory wells drilled per year (BG)[269]

[268] Source: see Annual Reports (2000-2006)
[269] Source: see Annual Reports (2000-2006)

Risk exposure

By taking all relevant operation regions into account the average risk value of 2,54 is defined by Global Insight as „medium" (between 2,5 and 2,99). The relevant operation countries are listed up in table 5.68.

	Current overall risk	Political [25%]	Econ. [25%]	Legal [15%]	Tax [15%]	Operational [10%]	Security [10%]
United Kingdom	1,46	1,25	1,5	1	1,25	1,25	2,5
Canada	1,32	1,5	1,5	1	1	1,5	1
USA	1,51	1,5	1,5	1	1	1,5	2,5
Italy	1,87	1,75	1,75	1,75	2	2	2,25
Tunisia	2,19	2,25	1,75	2,5	2,5	2,25	2
Palestine	2,25	2,5	2,25	1	1,5	2,25	3,5
Trinidad & Tobago	2,28	2,5	1,75	2	2	2,75	3
Thailand	2,62	3	2,25	2,25	2,5	2,75	3
Brazil	2,66	2,5	2,5	2,5	3	2,75	3
Bolivia	3,5	3,75	3,5	3,5	3	4	3
India	2,7	2,75	2,5	2,5	2,5	3	3,25
Egypt	2,78	2,75	2,5	3,5	2,5	3	2,5
China	2,84	2,75	2,5	3,25	3	3,25	2,5
Kazakhstan	3,01	3,25	2,75	3	3	3,25	2,75
Cambodia	3,23	3,25	3	3,25	3,5	3,5	3
Mauritania	3,32	3,5	3,5	3,5	2,5	3,5	3
Average	**2,54**	2,63	2,37	2,43	2,37	2,75	2,68

Tab. 5.68 Current overall risk of operating countries (BG)[270]

Drilling technology (focus and method)

BG focused its exploration operations more on offshore areas than on onshore regions. At the end of 2006 around 82% of the operations were based offshore (offshore and deepwater areas). The deepwater projects accounted for nearly one third of all activities in 2006. Most of the offshore projects were focused on the U.K. Continental Shelf (UKCS), Trinidad & Tobago, Tunisia, Italy as well as on China. Deepwater assets were based in Egypt, Brazil, Norway, Mauritania and India. Especially horizontal and multilateral wells have been drilled during development projects in the United Kingdom and Kazakhstan. Table 5.69 provides information about E&P projects of BG in 2006.

Exp./Dev. projects of BG Group (2006)	Total	General operator	Onshore area	Offshore area (less than 300m)	Deepwater area (more than 300m)	Deepwater operator
Alaska	1	0	1	0	0	0
Bolivia	7	4	7	0	0	0
Brazil	9	6	0	4	5	2
Trinidad & Tobago	6	5	1	5	0	0
Faroe Islands	2	0	0	0	2	0
Italy	1	1	1	0	0	0
Norway	8	2	0	2	6	0
United Kingdom	21	8	0	21	0	0
Algeria	1	1	1	0	0	0
Egypt	7	7	0	3	4	4
Israel	1	1	0	0	1	1
Libya	2	1	2	0	0	0
Oman	1	1	1	0	0	0
Palestinia	1	1	0	0	1	1

[270] Source: see http://www.globalinsight.com

Tunisia	3	3	0	3	0	0
Madagascar	1	0	0	0	1	0
Mauritania	5	0	0	1	4	0
Nigeria	2	2	0	0	2	2
Kazakhstan	1	1	1	0	0	0
China	1	1	0	1	0	0
India	2	0	0	2	0	0
Thailand	1	0	0	1	0	0
Cambodia	1	1	0	1	0	0
Sum	85	46	15	44	26	10

Tab. 5.69 E&P projects of BG Group (2006) [271]

Technical success rate

BG's average technical success rate between 2000 and 2005 concerning the gross exploratory wells drilled was 71%. The success rates in percent are given in figure 5.88.

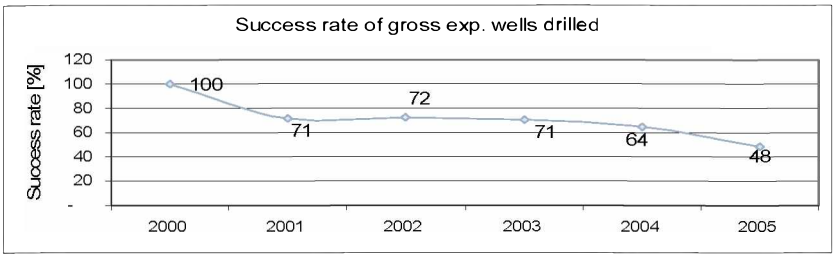

Fig. 5.88 Success rates of gross exploratory wells drilled (BG) [272]

Operatorship

The data provided in table 5.69 can be used to calculate the general as well as the deepwater operatorship. BG's general operatorship was 54% at the end of 2006. The deepwater operatorship accounted for 38%.

The results of the strategic analysis of the regional focus, the risk exposure as well as of the drilling technology used can be summarized in the morphological box which is described in table 5.70.

BG Group					
Exploration and appraisal (results in dark grey)					
Strategic view	Strategic indicator	Strategic behavior			
Regional	Regional focus	Exploration concentration in core regions	Development of new exploration regions	Near field exploration	
Risk	Risk exposure	Low	Middle	High	
Drilling technology	Technology focus	Unconventional (Polar, Deepwater, Fractured…)	Conventional onshore	Shallow offshore	Covering all
	Focus on method	Multilateral	Horizontal	Normal	

[271] Source: see http://www.pfcenergy.com

[272] Source: see Annual Reports (2000-2006)

	Technical success rate	≤ 25%	26% - 50%	51% - 75%	> 75%
	General operatorship (Asset based)	≤ 25%	26% - 50%	51% - 75%	> 75%
	Deepwater operatorship (Asset based)	≤ 25%	26% - 50%	51% -75%	> 75%

Tab. 5.70 Morphological box for exploration & appraisal (part 1) (BG)

5.6.3 Exploration and appraisal (part 2)

Seismic technology (focus and method)

BG Group acquired or initiated seismic surveys to develop new exploration regions. Seismic surveys were performed in the USA (Alaska), Brazil, Italy, Israel, Norway, on the Faroe Islands or in China. Especially 2 D as well as 3 D seismic methods were used.

Investment profile

The average exploration expenditures of BG per year were USD 477 million. The profile of exploration expenditures between 2000 and 2005 can be described as "increasing" in the morphological box. Detailed information can be looked up in figure 5.89.

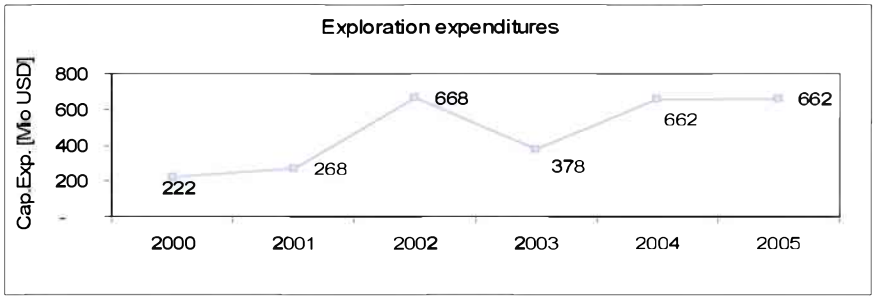

Fig. 5.89 Exploration expenditures (BG)[273]

Reserve replacement rate (2005)

The reserve replacement rate of BG in 2005 was 14%. The company's average reserve replacement rate between 2000 and 2005 was 92%.

The major acquisitions were performed in 2002 and 2004. In 2002 BG acquired the Indian company Enron Oil & Gas Limited for USD 486 million as well as a 30% interest in three oil and gas fields from British Petrol located offshore in India for USD 350 million. The strategy behind these acquisitions was the intention to develop a new core region in India. During 2004 BG acquired exploration and production assets in Canada from the company EL Paso for USD 346 million. The transaction led to a new entry in Canada.

Figure 5.90 describes the reserve replacement rate profile for BG which can be characterized by a "once increase" in the morphological box.

[273] Source: see http://www.herold.com

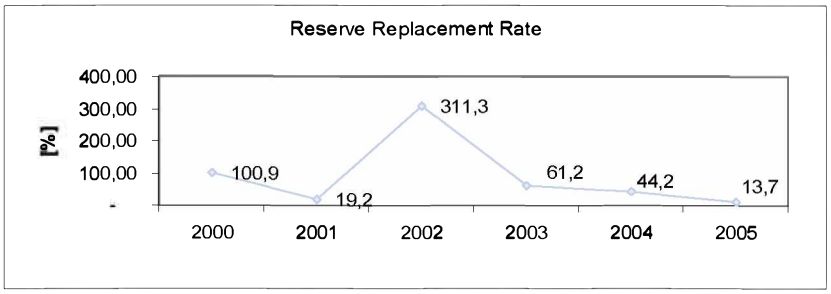

Fig. 5.90 Reserve replacement rates (BG)[274]

The results of the analysis of the 2nd part of the exploration and appraisal segment can be summarized in the morphological box introduced in table 5.71.

BG Group						
Exploration and appraisal (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Seismic technology	Regional focus	Core regions		Non core regions		
	Focus on method	2 D	3 D	4 D	All methods	
Investment	Investment profile					
Reserve replacement strategy	Reserve replacement rate 2005	≤ 50%	51% - 100%	101%-200%	201% - 300%	> 300%
	Annual reserve replacement profile					

Tab. 5.71 Morphological box for exploration & appraisal (part 2) (BG)

5.6.4 Development and production (part 1)

Regional focus

The main development operations were focused on the core regions. Most of the development activities were concentrated on the operating fields in the United Kingdom, on the operated Karachagank field in Kazakhstan, on the West Deep Marine (WDM) and Rosetta Concession in Egypt as well as on the operated Miskar field in Tunisia. In addition, BG is the operator of the largest production and drilling platform in Trinidad & Tobago and supplied one quarter of Thailand's gas demand at the end of 2005. India became a new core country in 2002 after several acquisitions which are introduced in the reserve replacement rate part. Since 2002, around USD 220 million have been invested to recover additional oil and gas in India.
There is no detailed information available concerning the amount and regions of development wells drilled.

[274] Source: see http://www.herold.com

EOR

BG used all types of possible stimulation methods in development projects. During 2002 BG operated a CO_2 injection program in the Karachaganak field of Kazakhstan. At the end of 2005 BG and the operator Nexen performed a water injection program with 16 wells in a field located in the British part of the North Sea. In addition, the company operated an infill drilling program in India and planned a six well infill drilling program for the operated Miskar field in Tunisia from 2006 to 2009.

Resource portfolio

The resource portfolio of BG is strongly conventional focused. There was no relevant information available concerning any activities of BG with unconventional resources.

Oil & gas production focus

The average gas production of BG between 2000 and 2005 accounted for 73% of the total production. Data about the gas production as % of the total production are provided in figure 5.91.

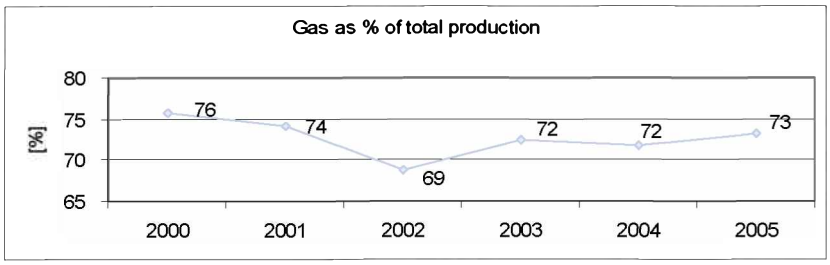

Fig. 5.91 Gas as % of total production (BG)[275]

Oil & gas reserves focus

The average gas reserves of BG accounted for 71% of the total proved reserves base. The gas reserves development in % between 2000 and 2005 is introduced in figure 5.92.

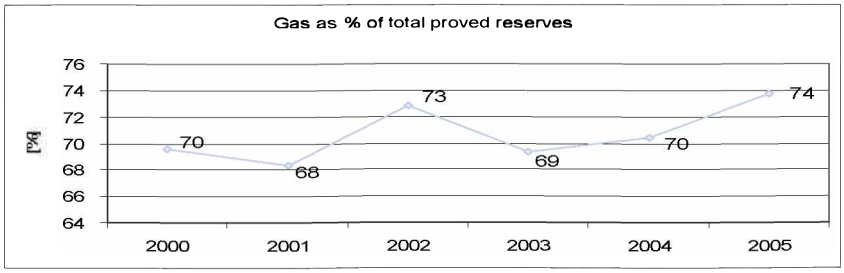

Fig. 5.92 Gas reserves as % of total proved reserves (BG)[276]

The results of the analysis of the regional focus, the used EOR technology as well as of the resource portfolio of the BG Group can be summarized in the morphological box which is introduced in table 5.72.

[275] Source: see http://www.herold.com
[276] Source: see http://www.herold.com

BG Group						
Development and production (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Regional	Regional focus	Development activity focused on core regions		Development activity focused on non-core regions		
EOR	Focus on EOR-method	CO_2 injection	Gas cycling	Water flooding	All of them	
	Operatorship	Always	In most cases	Seldom	Never	
Resource portfolio	Conventional focus*	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Oil & gas production focus [Gas as % of production]	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Oil & gas reserves focus [Gas as % of reserves]	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Non-conventional focus	Oil sands	Heavy oil	Tight gas	Coalbed methane	LPG

Tab. 5.72 Morphological box for development & production (part 1) (BG)

* Assumption

5.6.5 Development and production (part 2)

Focus on LNG

The LNG activities of BG are focused on Trinidad & Tobago, Egypt, Italy and on the USA. The company has an overall interest of 30% in all four trains of the Atlantic LNG plant located in Trinidad & Tobago. The production capacity of the Atlantic LNG plant is 15 million tons of LNG per year. BG has also a 35% operating interest in a LNG plant located in Egypt which is supplied by an own field. A BG operated LNG terminal in Brindisi, Italy should be completed in 2009. The LNG terminal is planned for a capacity of 6 million tons per year. In addition, BG owns three LNG vessels with a capacity of 145.000 m^3. The company imported 37% of the total US LNG demand at the end of 2005.

Focus on pipelines

BG operates and has interests in several pipeline systems. Domestically, the company has a 25% interest in the Interconnector Pipeline between Belgium and the U.K. as well as a 50% interest in the Central Area Transmission System (CATS) which is operated by British Petrol.

BG also controls gas distribution companies in Brazil (Companhia de Gas de Sao Paulo) and in Argentina (Metro GAS S.A.) as well as the largest gas distribution company of India. In addition, BG operates the Southern Cross Pipeline from Buenos Aires to Montevideo.

Downstream strategy

The BG Group is an independent E&P company and does not have a focus on refineries.

Upstream strategy

BG's average upstream production revenue as part of total sales and operating revenue accounted for 50% between 2000 and 2005. The calculation is based on data introduced in table 5.73.

Year	2000	2001	2002	2003	2004	2005
Total upstream production revenue [Mio USD]	1.903	2.081	2.346	2.951	3.952	5.582
Total sales & operating revenue [Mio USD]	7.213	3.843	3.937	5.901	7.493	10.308
Upstream production revenue as part of total sales & operating revenue [%]	26	54	60	50	53	54
Average [%]	**50**					

Tab. 5.73 Upstream revenue (BG)[277]

Investment profile

The average development expenditures of BG per year were USD 1.163 million. The profile can be characterized as a "once increase" in the morphological box. Data about the development expenditures between 2000 and 2005 are provided in figure 5.93.

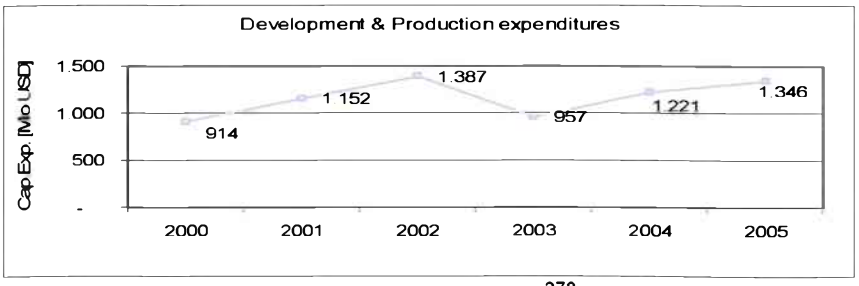

Fig. 5.93 Development and production expenditures (BG)[278]

Daily Boe production

BG does not report the daily Boe production per well or the number of producing wells which could be used to calculate the daily Boe production per well.

The results of the analysis of the midstream, downstream and upstream sector as well as of the investment and production profile are provided in table 5.74.

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[277] Source: see http://www.herold.com

[278] Source: see Annual Reports (2000-2006)

BG Group						
Development and production (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Midstream	Focus on LNG	No		Operating	Participating	
Midstream	Focus on pipelines	No		Operating	Participating	
Coordination strategy between upstream and downstream	Downstream strategy [Refining capacity/annual production]	No	< 33%	33% - 66%	67%-100%	> 100%
	Upstream strategy [Revenue of upstream as part of total sales and operating revenues]	< 10%	10% - 24%	25% - 50%	51% - 75%	> 75%
Investment	Investment profile					
Net production profile	Trend in daily Boe production per net producible well					

Tab. 5.74 Morphological box for development & production (part 2) (BG)

5.6.6 Acquisition

Acquiring reserves

Data about the amount of acquired reserves are only available between 2001 and 2004. During these years BG acquired an average of 78 MMBOE of reserves per year. Detailed data are provided in table 5.75.

Year	2000	2001	2002	2003	2004	2005
Total reserves acquired [MMBOE]	Not announced	136	111,3	1,5	64	Not announced
Average [MMBOE]	**78**					

Tab. 5.75 Total reserves acquired per year (BG)[279]

Regional focus

BG performed 36% of its acquisitions in core regions. Table 5.76 highlights every acquisition in a core region per year.

Year	Acquisition
2000	Faroes (1)
2001	**India (2)**
2002	**India (1)**
2003	Brazil (1)
2004	Norway (3), **Egypt (1), Trinidad (1),** Canada (1), Mauritania (2), Brazil (1)
2005	0

Tab. 5.76 Acquisitions in core and non core regions (BG)[280]

[279] Source: see http://www.herold.com

[280] Source: see Annual Reports (2000-2006)

Intensity strategy

The data from table 5.76 can be used to calculate an acquisition intensity of 2,33 (< 3) performed acquisitions per year.

Cost strategy

Data about acquisition costs are reported between 2002 and 2004. The average acquisition costs during these years were 9,6 USD per Boe acquired reserves. Detailed data about acquisition costs per year are introduced in figure 5.94.

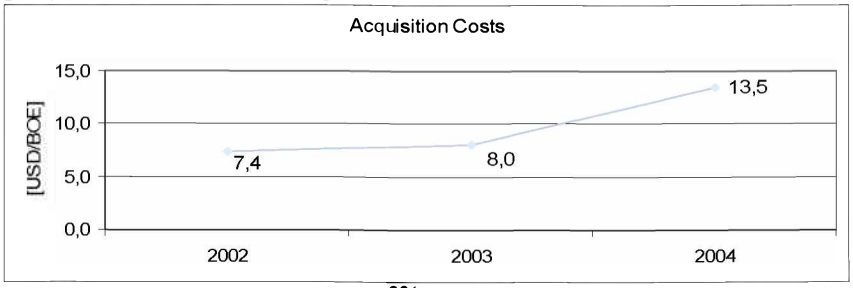


Fig. 5.94 Acquisition costs per year (BG)[281]

Focusing on acquisitions or farm ins

BG performed 24 farm ins and 14 acquisitions between 2000 and 2005. The acquisition rate accounted for 37% by dividing the number of acquisitions through the number of farm ins and acquisitions. The numbers of acquisitions and farm ins are listed up in table 5.77.

Year	2000	2001	2002	2003	2004	2005
Farm in	5	2	3	6	8	0
Acquisition	1	2	1	1	9	0
Acquisition rate as % of farm ins and acquisitions	37					

Tab. 5.77 Numbers of performed acquisitions and farm ins (BG)[282]

The results of the analysis of the acquisition segment for the BG Group can be summarized in table 5.78.

BG Group					
Acquisition (results in dark grey)					
Strategic view	Strategic indicator	Strategic behavior			
Reserve strategy	Acquiring reserves [MMBOE/year]	< 50	50 - 100	101 - 200	> 200
Regional	Regional focus* [% of acquisitions in core regions]	< 25%	25% - 50%	51% - 75%	> 75%

281 Source: see http://www.herold.com

282 Source: see Annual Reports (2000-2006)

Acquisition intensity	Intensity strategy* [Acquisitions/year]	0	< 3	3 - 5	> 5
Acquisition cost strategy	Cost strategy Acquisition costs [USD/BOE]	< 3	3 - 5	6 - 8	> 8
Acquisition vs. farm in	Focusing on acquisitions or farm ins* [Acquisition rate as %]	< 25%	25% - 50%	51% - 75%	> 75%

Tab. 5.78 Morphological box for acquisition (BG) * Assumption

5.6.7 Cooperation

Alliance

There was no information available concerning any involvements of BG in alliances.

Joint venture

During 2001 BG was part of a joint venture with Chevron and ExxonMobil which developed the so called Elgin fields in the British part of the North Sea. In the LNG sector, the so called LNG Export project (ELNG) in Egypt was initiated as a joint venture between BG, the Italian Company Edison International and the Egyptian General Petroleum Corporation. In addition, BG is the operator of the Karachagank field in Kazakhstan which is developed with the joint venture partners Chevron, Eni and Lukoil. During 2005 BG and the NOC of India (ONGC) initiated a joint venture to operate three offshore blocks in the East Coast of India.

Other partnership

BG has several gas and LNG sale contracts in its operating regions. Gas out of the operated Dolphin field in Trinidad & Tobago is sold to the NOC. Further on, the company has long term gas sale contracts with the Tunisian Gas Company which is supplied by the BG operated Miskar field. In addition, BG signed several contracts with LNG plants to supply regasification terminals in the USA. BG acquires 2,5 million tons of LNG per year from the company Nigeria LNG Limited. A letter of understanding was signed with the company Marathon Offshore Alpha Limited to acquire 3,4 million tons of LNG per year from a plant in Equatorial Guinea.

The results of the analysis of different kind of cooperations are provided in table 5.79.

BG Group						
Cooperation (results in dark grey)						
Strategic view	Strategy	Strategic behaviour				
	Alliance	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields

Cooperation strategy	Alliance partner	No	NOCs	States	Major IOCs	Service companies
	Joint venture	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Joint venture partner	No	NOCs	States	Major IOCs	Service companies
	Other partnership	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Other partner	No	NOCs	States	Major IOCs	Service companies

Tab. 5.79 Morphological box for cooperation (BG)

5.6.8 Human resources

The HR strategy of BG between 2000 and 2005 can be characterized by a strong decrease of staff as well as by a strong increase of the EBITDA per employee. The development of the number of employees as well as of the EBITDA per employee is described in figures 5.95 and 5.96.

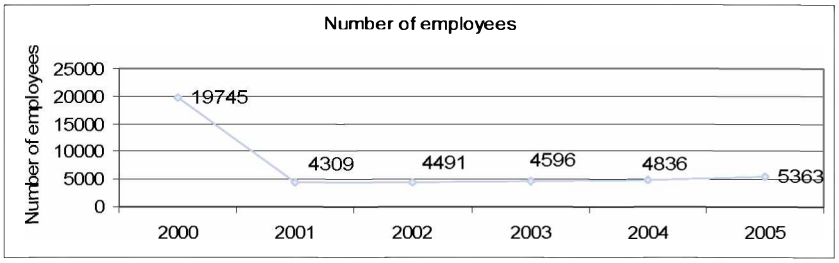


Fig. 5.95 Employee development (BG)[283]

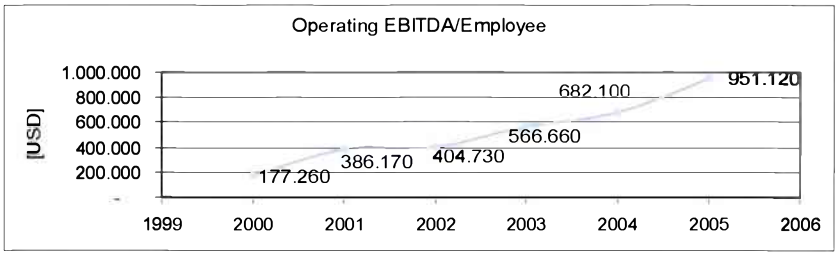


Fig. 5.96 EBITDA/employee development (BG)[284]

5.6.9 Energy portfolio

No information was available about any activities of BG in wind power, solar or in biomass sector.

The results of the analysis of the HR and energy portfolio segment are provided in table 5.80.

[283] Source: see Annual Reports (2000-2006)
[284] Source: see http://www.herold.com

BG Group					
HR & energy portfolio (results in dark grey)					
Strategic view	Strategy	Strategic behavior			
HR	HR strategy	Strong increase of staff	Slight increase of staff	Slight decrease of staff	Strong decrease of staff
		Strong increase of EBITDA/employee	Slight increase of EBITDA/employee	Slight decrease of EBITDA/employee	Strong decrease of EBITDA/employee
Energy portfolio	Alternative energy focus	No	Focus on wind power	Focus on solar energy	Focus on biomass

Tab. 5.80 Morphological box for HR & energy portfolio (BG)

5.7 Statoil ASA

5.7.1 General overview

Statoil ASA is a fully integrated Norwegian petroleum company. The headquarters are located in Stavanger, Norway. It has operations in 29 countries and is the major oil and gas producer on the Norwegian Continental Shelf (NCS). In addition, Statoil is one of the most important gas suppliers of Europe.

Detailed information about Statoil is available on pages A50 till A55 in the appendix. In order to get an overview of the performance of Statoil between 2000 and 2005, information about the reserve base, the production as well as about the financial situation is provided in figures 5.97, 5.98 and 5.99.

Figure 5.97 provides information about the total proved reserves as well as for the proved reserves of liquid hydrocarbons and natural gas. Proved reserves are given in million barrels of oil equivalent [MMBOE]. The company's main proved reserves are located in Norway.

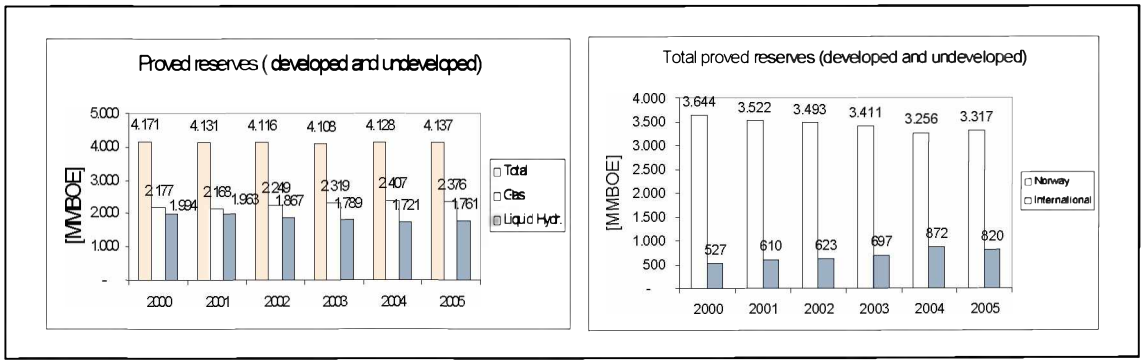


Fig. 5.97 Proved reserves base (Statoil)[285]

Figure 5.98 introduces information about the economic performance between 2000 and 2005 by looking at the EBIT, ROACE and cash flow. The total average daily production as well as the production data for liquid hydrocarbons and natural gas of Statoil ASA is introduced in figure 5.99. The units are given in thousands of barrels oil equivalent per day [MBOED]. The main production region is defined as the Norwegian Continental Shelf.

[285] Source: see Annual Reports (2000-2006)

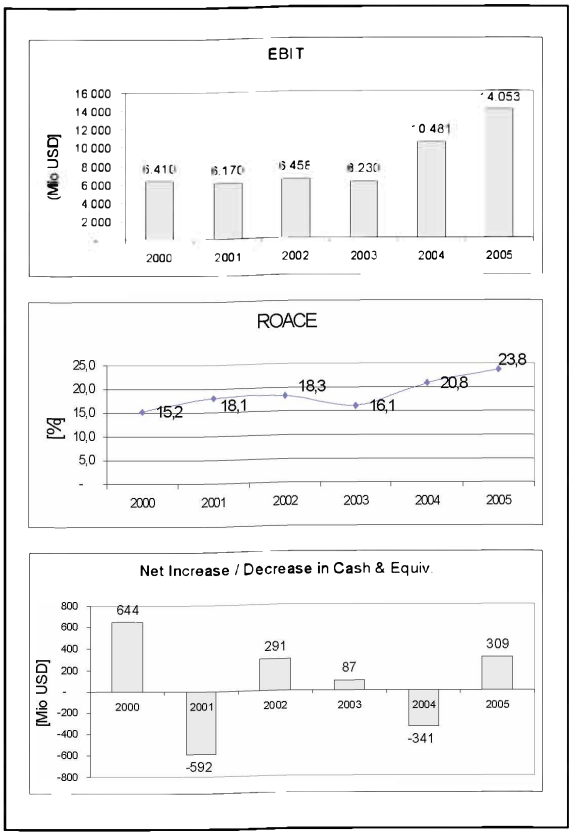


Fig. 5.98 Economic performance (Statoil)[286]

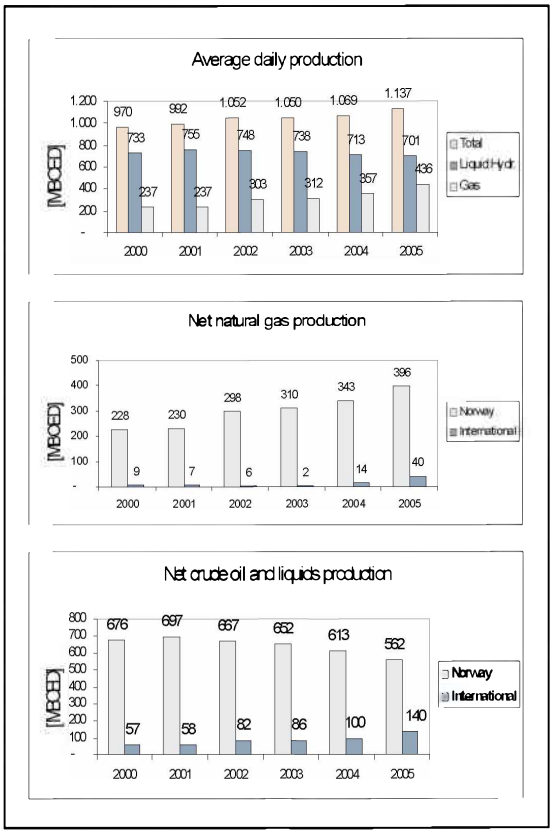


Fig. 5.99 Average daily production (Statoil)[287]

The worldwide E&P activities of Statoil ASA are introduced in figure 5.100.

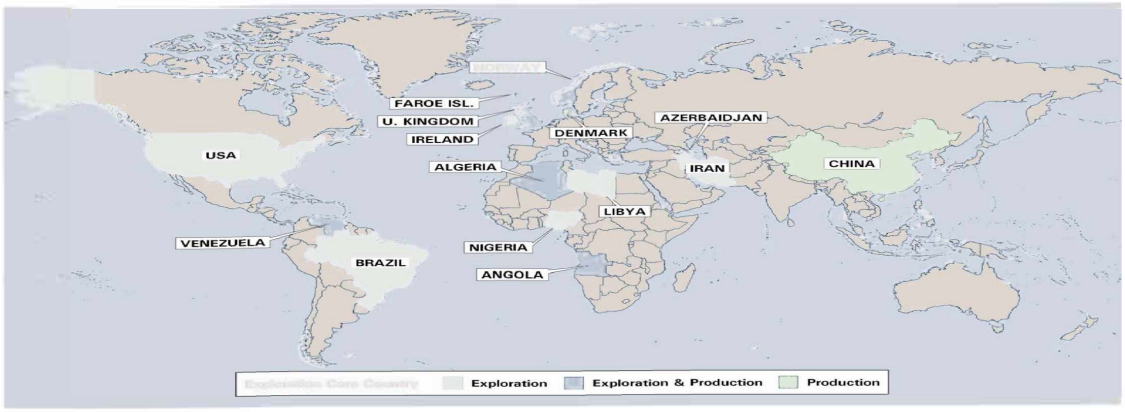


Fig. 5.100 E&P activities geographically (Statoil)

5.7.2 Exploration and appraisal

Regional focus

In general, the Norwegian Continental Shelf (NCS) is the domestic core area for Statoil.

[286] Source: see http://www.herold.com
[287] Source: see http://www.herold.com

Internationally, the major core regions are West Africa (Angola, Nigeria), North Africa (Algeria, Libya), the Caspian Area (Azerbaijan, Kazakhstan), Western Europe (United Kingdom, Ireland, Faroe Islands, Greenland) as well as Latin America with Venezuela and Brazil. Figures 5.101 and 5.102 provide the available information concerning the net and gross exploratory wells drilled.

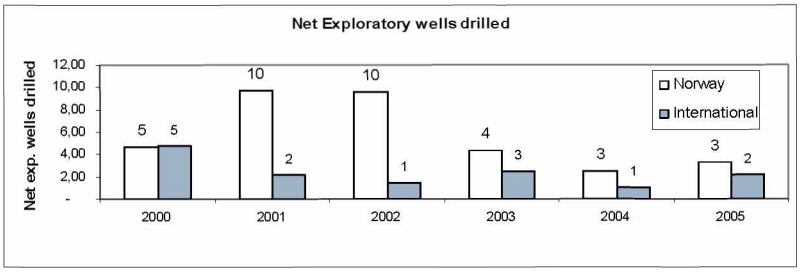


Fig. 5.101 Net exploratory wells drilled (Statoil)[288]

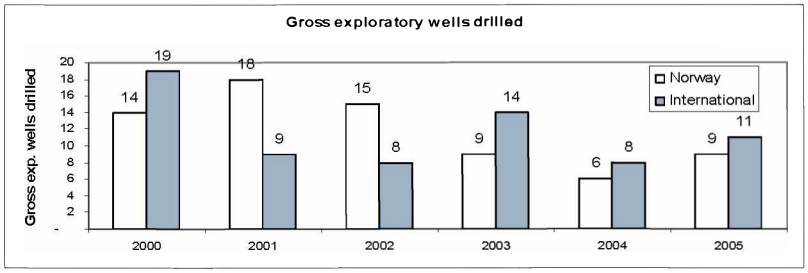


Fig. 5.102 Gross exploratory wells drilled (Statoil)[289]

Risk exposure

Norway as the domestic core operation country has a „negligible" defined overall risk value of 1,44 (between 1,25 and 1,74). By taking the other relevant operation regions into account the average risk value of 2,54 is defined by Global Insight as „medium" (between 2,5 and 2,99). As a consequence, the average overall risk of the company's operations can be classified as "middle" in the morphological box. The relevant operation countries are listed up in table 5.81.

	Current overall risk	Political [25%]	Econ. [25%]	Legal [15%]	Tax [15%]	Operational [10%]	Security [10%]
Norway	**1,44**	1,25	1,25	1	2	1,75	1,5
United Kingdom	1,46	1,25	1,5	1	1,25	1,25	2,5
Ireland	1,35	1,5	1,5	1	1	1,75	1
Greenland	1,43	1	2	1,25	1,25	1,5	1
Algeria	2,89	3	2,5	2,75	2,5	3,5	3,5
Libya	3,02	3	2,75	3,5	3,5	3	2
Angola	3,4	3,5	3,25	3,25	3,5	3,5	3,5
Nigeria	3,9	3,75	3,25	4,25	4	4,25	4,5
Kazakhstan	3,01	3,25	2,75	3	3	3,25	2,75
Azerbaijan	3,27	3,25	3	3,5	3	3,75	3,5
Brazil	2,66	2,5	2,5	2,5	3	2,75	3
Venezuela	3,71	3,75	3,75	3,75	3,25	4,25	3,5
USA	1,51	1,5	1,5	1	1	1,5	2,5
Average	**2,54**	2,50	2,42	2,44	2,48	2,77	2,67

Tab. 5.81 Current overall risk of operating countries (Statoil)[290]

[288] Source: see Annual Reports (2000-2006)
[289] Source: see Annual Reports (2000-2006)
[290] Source: see http://www.globalinsight.com

Drilling technology (focus and method)

In 2006 Statoil became the largest offshore drilling operator in the world in water depths greater than 100 meters. In addition, Statoil is the biggest operator on the Norwegian Continental Shelf. In 2003 Statoil shifted its major offshore exploration activity from Norway to the deepwater areas of Nigeria and Angola. It can also be seen on figure 5.102 that since 2003 most of the gross exploratory wells have been drilled internationally, outside of Norway. The 2nd main international offshore area is the Caspian region. Exploration operations in Greenland (Polar region) did not lead to the desired success.

In general, Statoil tries to use the best technology to identify hydrocarbons. Especially horizontal drilling methods are used to allow optimal drainage of the reservoirs. Table 5.82 provides information about E&P projects of Statoil in 2006. Nearly 96% of all these projects were performed in offshore and deepwater areas.

Exp./Dev. projects of Statoil ASA (2006)	Total	General operator	Onshore area	Offshore area (less than 300m)	Deepwater area (more than 300m)	Deepwater operator
Gulf of Mexico	13	0	0	0	13	0
Brazil	7	3	0	0	7	3
Venezuela	2	1	1	0	1	1
Faroe Islands	5	4	0	0	5	4
Ireland	3	1	0	0	3	1
Norway	74	46	0	39	35	26
United Kingdom	6	0	0	2	4	0
Algeria	3	1	3	0	0	0
Iran	1	1	0	1	0	0
Libya	2	2	2	0	0	0
Angola	9	0	0	0	9	0
Nigeria	5	2	0	0	5	1
Azerbaijan	3	0	0	2	1	0
China	1	1	0	1	0	0
Sum	134	62	6	45	83	36

Tab. 5.82 E&P projects of Statoil (2006) [291]

Technical success rate

Statoil achieved an average technical success rate of 68% between 2000 and 2005 concerning the net exploratory wells drilled. The technical success rates of net and gross exploratory wells drilled are identical. The success rates in percent are given in figure 5.103.

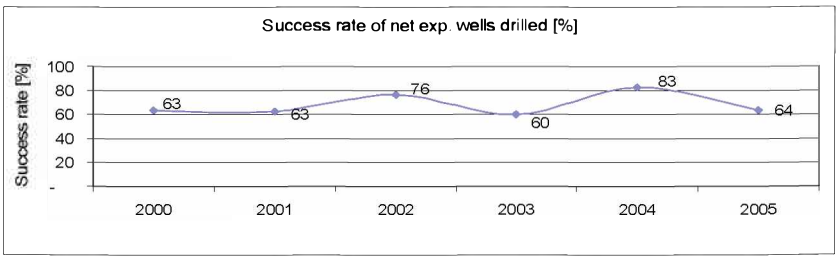


Fig. 5.103 Success rates of net exploratory wells drilled (Statoil) [292]

[291] Source: see http://www.pfcenergy.com

[292] Source: see Annual Reports (2000-2006)

Operatorship

The data provided in table 5.82 can be used to calculate the general as well as the deepwater operatorship. Statoil's general operatorship was 46% at the end of 2006. The deepwater operatorship accounted for 43%.

The results of the strategic analysis of the regional focus, the risk exposure as well as of the drilling technology are provided in the morphological box which is described in table 5.83.

Statoil ASA					
Exploration and appraisal (results in dark grey)					
Strategic view	Strategic indicator	Strategic behavior			
Regional	Regional focus	Exploration concentration in core regions	Development of new exploration regions	Near field exploration	
Risk	Risk exposure	Low	Middle	High	
Drilling technology	Technology focus	Unconventional (Polar, Deepwater, Fractured…)	Conventional onshore	Shallow offshore	Covering all
	Focus on method	Multilateral	Horizontal	Normal	
	Technical success rate	≤ 25%	26% - 50%	51% - 75%	> 75%
	General operatorship (Asset based)	≤ 25%	26% - 50%	51% - 75%	> 75%
	Deepwater operatorship (Asset based)	≤ 25%	26% - 50%	51% -75%	> 75%

Tab. 5.83 Morphological box for exploration & appraisal (part 1) (Statoil)

5.7.3 Exploration and appraisal (part 2)

Seismic technology (focus and method)

Statoil focused on seismic surveys on its core regions. The company operated and acquired several seismic data or programs in Norway, Azerbaijan, Angola, Algeria, on the Faroe Islands as well as in Brazil. All kind of possible seismic technologies (2 D, 3 D and 4 D) were used.

Investment profile

The average exploration expenditures of Statoil per year were USD 403 million between 2000 and 2005. The profile of exploration expenditures can be described as "increasing" in the morphological box. Detailed information is provided in figure 5.104.

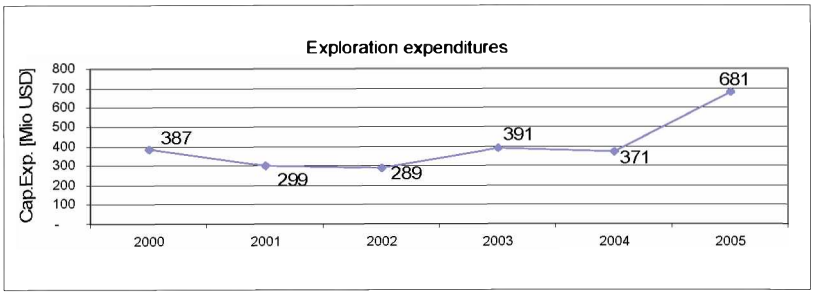


Fig. 5.104 Exploration expenditures (Statoil)[293]

Reserve replacement rate (2005)

Statoil achieved a reserve replacement rate of 73% in 2005. The company's average reserve replacement rate between 2000 and 2005 accounted for 62%.
In 2005 Statoil performed the largest acquisition in the company's history beside the acquisition of Norsk Hydro in 2007. Statoil acquired all the deepwater assets in the Gulf of Mexico from the company EnCana for USD 2 billion. The transaction included an average interest of 40% in 239 blocks as well as 234 MMBoe of proved reserves. The intention of this acquisition could be the development of a new core area in the Gulf of Mexico. Figure 5.105 describes the reserve replacement rate profile for Statoil ASA which can be described as "maintaining" in the morphological box.

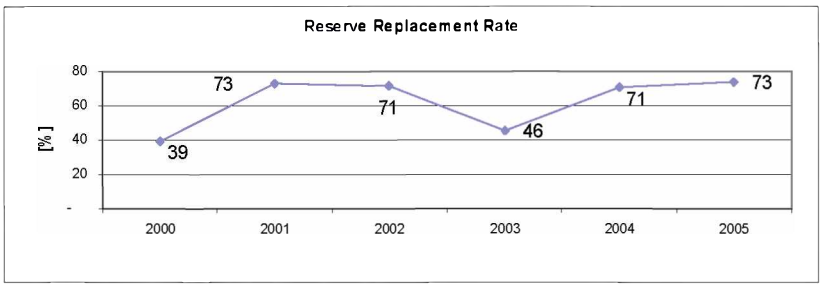
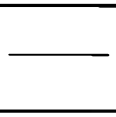
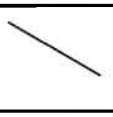
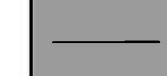


Fig. 5.105 Reserve replacement rates (Statoil)[294]

The results of the analysis of the 2nd part of the exploration and appraisal segment are introduced in the morphological box which is described in table 5.84.

Statoil ASA						
Exploration and appraisal (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Seismic technology	Regional focus	Core regions		Non core regions		
	Focus on method	2 D	3 D	4 D	All methods	
Investment	Investment profile					

293 Source: see http://www.herold.com
294 Source: see http://www.herold.com

Reserve replacement strategy	Reserve replacement rate 2005	≤ 50%	51% - 100%	101%-200%	201% - 300%	> 300%
	Annual reserve replacement profile					

Tab. 5.84 Morphological box for exploration & appraisal (part 2) (Statoil)

5.7.4 Development and production (part 1)

Regional focus

The major development operations were concentrated on Norway. In 2005 Statoil operated 24 developed fields on the NCS (Norwegian Continental Shelf). The operatorship included the famous Troll and Asgard platforms. 84% of the worldwide production was due to activities on the NCS. The main operated development projects internationally included three fields in the South Pars area of Iran and the offshore Shah Deniz field in Azerbaijan. In addition, Statoil held interests in 18 producing fields in Algeria, Angola, Nigeria, Venezuela, United Kingdom, Ireland and in the Gulf of Mexico at the end of 2005. Figure 5.106 introduces the available information concerning the net development wells drilled.

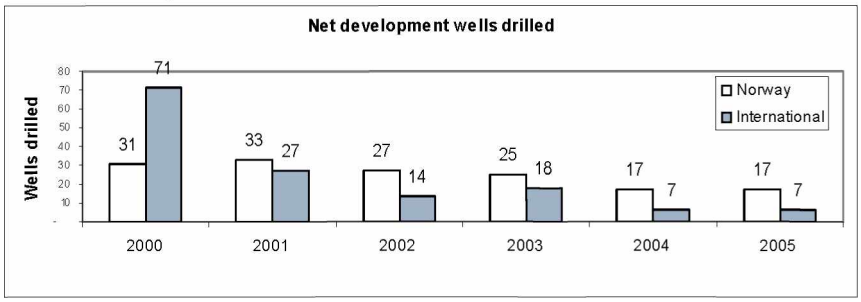


Fig. 5.106 Net development wells drilled (Statoil)[295]

EOR

Statoil is a worldwide leader in using enhanced oil recovery technologies. All types of EOR methods are performed. The company operated several development EOR projects on the NCS. One million tonnes of CO_2 is injected every year into the operating fields of the NCS. The CO_2 is transported via ships or pipelines to the mature fields. The so called Tordis EOR project which was planned by Statoil on the NCS in 2005 was the first field with subsea processing EOR technology. In addition, Statoil is the 2nd largest operator of gas and sub sea facilities after Petrobras (NOC of Brazil).

Resource portfolio

Information about two unconventional resource projects with Statoil participation was available. Statoil was part of the so called Sincor Heavy Oil Project in Venezuela which was operated by TOTAL. The field Snohvit operated by Statoil in the Barents Sea had estimated reserves of 150 MMbbls of condensate and LPG at the end of 2005.
In addition, Statoil controlled 40% of the Scandinavian LPG market in 2002.

[295] Source: see Annual Reports (2000-2006)

Oil & gas production focus

The average gas production of Statoil between 2000 and 2005 accounted for 30% of the total production. Data about the gas production as % of the total production are provided in figure 5.107.

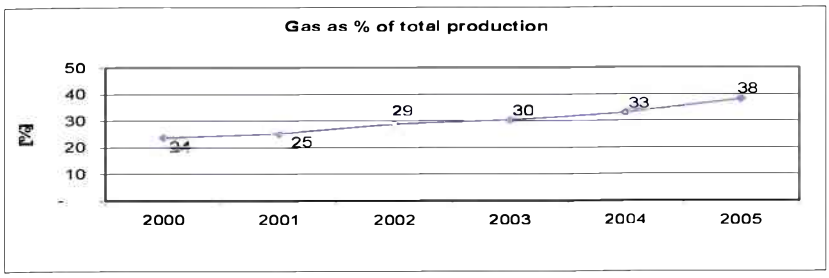


Fig. 5.107 Gas as % of total production (Statoil)[296]

Oil & gas reserves focus

The average gas reserves of Statoil accounted for 55% of the total proved reserves base. The gas reserves development in % between 2000 and 2005 is introduced in figure 5.108.

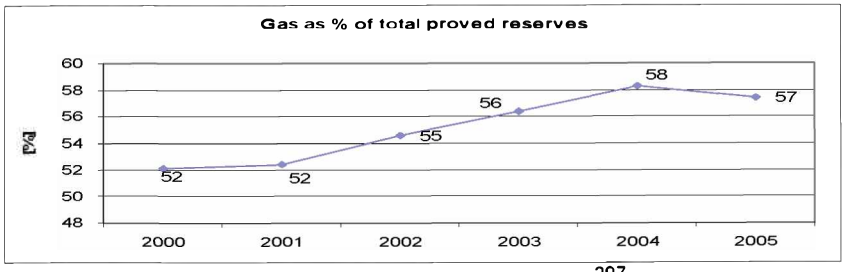


Fig. 5.108 Gas reserves as % of total proved reserves (Statoil)[297]

The results of the analysis of the regional focus, the used EOR technology as well as of the resource portfolio of Statoil can be summarized in the morphological box which is introduced in table 5.85.

Statoil ASA					
Development and production (results in dark grey)					
Strategic view	Strategic indicator	Strategic behavior			
Regional	Regional focus	Development activity focused on core regions		Development activity focused on non-core regions	
EOR	Focus on EOR-method	CO_2 injection	Gas cycling	Water flooding	All of them
	Operatorship	Always	In most cases	Seldom	Never

[296] Source: see http://www.herold.com
[297] Source: see http://www.herold.com

Resource portfolio	Conventional focus*	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Oil & gas production focus [Gas as % of production]	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Oil & gas reserves focus [Gas as % of reserves]	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Non-conventional focus	Oil sands	Heavy oil	Tight gas	Coalbed methane	LPG

Tab. 5.85 Morphological box for development & production (part 1) (Statoil)

* Assumption

5.7.5 Development and production (part 2)

Focus on LNG

Statoil is the operator of the LNG project Snohvit. The other partners are Gaz de France, Hess, Petoro, RWE DEA and TOTAL. Snohvit is the largest gas field in the Barents Sea with estimated reserves of 6,8 Tcf. The LNG train is constructed for a capacity of 4,2 million tonnes per year. The main markets for Snohvit which should be completed at the end of 2007 will be Europe and the USA. Total costs for this project including field development, pipeline and plant were nearly USD 10 billion which is 50% above the original estimate.

Focus on pipelines

Statoil is one of the largest suppliers of natural gas in Europe. The company operates a transportation network with a length of 6.600 km which connects offshore gas fields with plants onshore in Norway and further on with terminals in France, Belgium, Germany and the United Kingdom. Statoil is also the operator of the Troll Oil Pipeline which transports oil from the platform to the terminal in Mongstad, Norway. In addition, Statoil is a partner in the Baku Tbilisi Ceyhan pipeline project from Azerbaijan to Turkey with a 9% interest. It is operated by BP.

Downstream strategy

Statoil operates the refineries Mongstad and Kalundborg in Norway. Further on, the company has a 10% interest in the refinery Pernis. These refineries have a total average capacity of around 15,2 million tonnes of oil equivalent per year [MMTOE]. The average annual production between 2000 and 2005 accounted for 52,2 MMTOE. As a consequence, the volume based integration, refining capacity divided by annual production leads to a percentage value of 29%. The company's production potential is nearly three and a half times bigger than its refining capacities. Refining capacities and the integration volume calculation are listed up in table 5.86.

Year	2000	2001	2002	2003	2004	2005
Refining [MMTOE]						
Norway	15,3	14,5	13,6	15,7	15,1	16,9
Average refining capacity [MMTOE]	15,2					
Average production [MMTOE]	52,2					
Downstream strategy [Capacity/production] [%]	**29**					

Tab. 5.86 Integration volume calculation (Statoil)[298]

Upstream strategy

The average upstream production revenue as part of total sales and operating revenue accounted for 30%. The calculation is based on data provided in table 5.87.

Year	2000	2001	2002	2003	2004	2005
Total upstream production revenue [Mio USD]	9.069	8.107	7.957	9.826	12.477	18.128
Total sales & operating revenue [Mio USD]	26.026	25.652	30.649	35.222	45.446	60.722
Upstream production revenue as part of total sales & operating revenue [%]	35	32	26	28	27	30
Average [%]	**30**					

Tab. 5.87 Upstream revenue (Statoil)[299]

Investment profile

The average development expenditures of Statoil ASA per year were USD 2.611 million. The profile can be characterized as "increasing". The development expenditures between 2000 and 2005 are provided in figure 5.109.

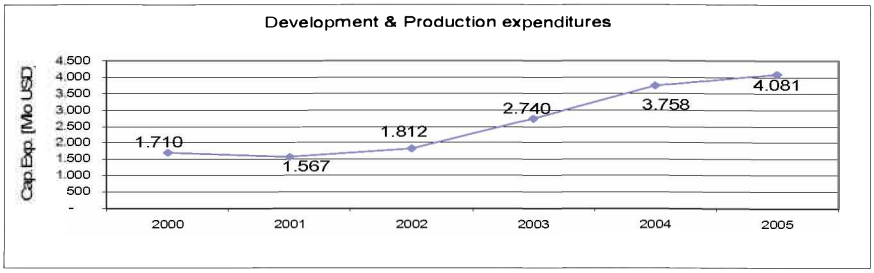


Fig. 5.109 Development and production expenditures (Statoil)[300]

Daily Boe production

The average daily Boe production per well of Statoil was 3.190 Boe between 2000 and 2005. The trend can be classified as "maintaining" in the morphological box. The daily Boe production profile is introduced in figure 5.110.

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298 Source: see Annual Reports (2000-2006)

299 Source: see http://www.herold.com

300 Source: see Annual Reports (2000-2006)

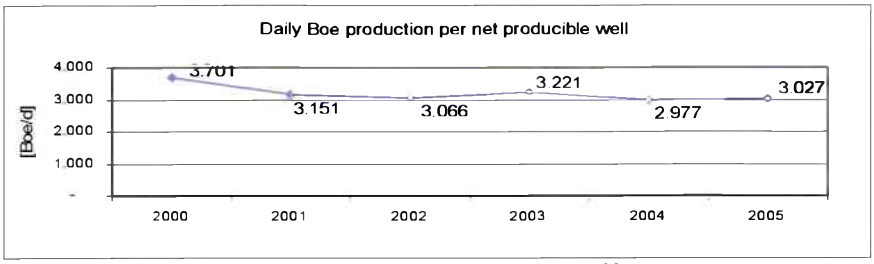

Fig. 5.110 Daily Boe production per net producible well (Statoil)[301]

The results of the analysis of the midstream, downstream and upstream sector as well as of the investment and production profile are introduced in table 5.88.

Statoil ASA						
Development and Production (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Midstream	Focus on LNG	No		Operating	Participating	
Midstream	Focus on pipelines	No		Operating	Participating	
Coordination strategy between upstream and downstream	Downstream strategy Volume based integration [Refining capacity/annual production]	No	< 33%	33% - 66%	67%-100%	> 100%
	Upstream strategy [Revenue of upstream as part of total sales and operating revenues]	< 10%	10% - 24%	25% - 50%	51% - 75%	> 75%
Investment	Investment profile	/	—	\	∪	∩
Net production profile	Trend in daily Boe production per net producible well	/	—	\	∪	∩

Tab. 5.88 Morphological box for development & production (part 2) (Statoil)

5.7.6 Acquisition

Acquiring reserves

Data about the amount of acquired reserves are only announced between 2002 and 2005. Statoil acquired an average of 164 MMBOE of reserves per year between 2002 and 2005. Detailed data are provided in table 5.89.

Year	2000	2001	2002	2003	2004	2005
Total reserves acquired [MMBOE]	Not announced	Not announced	9,8	323,5	89	234
Average [MMBOE]	164					

Tab. 5.89 Total reserves acquired per year (Statoil)[302]

[301] Source: see http://www.herold.com
[302] Source: see http://www.herold.com

Regional focus

Information about acquisitions per year is only provided between 2002 and 2005. Statoil performed 91% of its acquisitions in core regions. Table 5.90 highlights every acquisition in a core region per year between 2002 and 2005.

Year	Acquisition
2000	Not announced
2001	Not announced
2002	**Norway (1)**
2003	**Algeria (1), Norway (2)**
2004	**Brazil (1), Norway (2)**
2005	**Norway (2), U.K. (1),** USA (1)

Tab. 5.90 Acquisitions in core and non core regions (Statoil)[303]

Intensity strategy

The data from table 5.90 can be used to calculate an acquisition intensity of 2,75 (< 3) performed acquisitions per year.

Cost strategy

Data about acquisition costs are reported between 2003 and 2005. The average acquisitions costs during these years were 5,4 USD per Boe acquired reserves. Detailed data about acquisition costs per year are introduced in figure 5.111.

Fig. 5.111 Acquisition costs per year (Statoil)[304]

Focusing on acquisitions or farm ins

Statoil performed five farm ins and 11 acquisitions between 2002 and 2005. The acquisition rate accounted for 69% by dividing the number of acquisitions through the number of farm ins and acquisitions. The numbers of acquisitions and farm ins are listed up in table 5.91.

Year	2000	2001	2002	2003	2004	2005
Farm in	Not announced	Not announced	1	1	2	1
Acquisition	Not announced	Not announced	1	3	3	4
Acquisition rate as % of farm ins and acquisitions	**69**					

Tab. 5.91 Numbers of performed acquisitions and farm ins (Statoil)[305]

[303] Source: see http://www.herold.com
[304] Source: see http://www.herold.com
[305] Source: see http://www.herold.com

The results of the analysis of the acquisition segment for Statoil ASA are summarized in table 5.92.

Statoil ASA					
Acquisition (results in dark grey)					
Strategic view	Strategic indicator	Strategic behavior			
Reserve strategy	Acquiring reserves [MMBOE/year]	< 50	50 - 100	101 - 200	> 200
Regional	Regional focus [% of acquisitions in core regions]	< 25%	25% - 50%	51% - 75%	> 75%
Acquisition intensity	Intensity strategy [Acquisitions/year]	0	< 3	3 - 5	> 5
Acquisition cost strategy	Cost strategy Acquisition costs [USD/BOE]	< 3	3 - 5	6 - 8	> 8
Acquisition vs. farm in	Focusing on acquisitions or farm ins [Acquisition rate as %]	< 25%	25% - 50%	51% - 75%	> 75%

Tab. 5.92 Morphological box for acquisition (Statoil)

5.7.7 Cooperation

Alliance

There was no information available concerning any involvements of Statoil in alliances.

Joint venture

Statoil is the operator of the LNG joint venture project (Snohvit) in the Barents Sea. In addition, the company is part of the so called Sincor Heavy Oil joint venture in Venezuela which was initiated by TOTAL and PDVSA (NOC of Venezuela) in order to develop and produce extra heavy crude oil and upgrade to higher quality. In 2003 Statoil, BP and the Algerian State & Gas Company formed a joint venture to develop two projects. „In Salah" was the 3rd and „In Amenas" was the 4th largest gas development project in Algeria. In 2005 Statoil signed a memorandum of understanding for cooperation with the company KazMunayGaz (NOC of Kazakhstan). The companies wanted to start a joint venture for exploration and development activities around the Caspian area. During 2005 Statoil and ExxonMobil started a joint venture in the Gulf of Mexico in order to drill exploration wells.

Other partnership

In 2000 Statoil signed a cooperation agreement with the NOC of Iran for mapping exploration areas near the Strait of Hormuz in the Persian Gulf. During 2001 Statoil and Norsk Hydro as the operator started a gas development project in the North Sea near the Troll platform.
Statoil signed a LNG sale contract with the Spanish Company Iberdrola SA which wants to supply its regasification plant in Bilbao with LNG from Snohvit. In addition, another LNG sale contract was signed with the Cove Point regasification terminal in the USA.
In 2002 a gas sale contract was completed with Botas (NOC of Turkey) to sell around 6,6 billion scm of gas to Turkey out of the operated Shah Deniz field in Azerbaijan.

Since 2004, Statoil performs exploration projects together with Petrobras (NOC of Brazil). Statoil also tried to get in contact with the NOC of China concerning a development project in China. During 2004 an agreement was signed with Gazprom and Rosneft (NOC of Russia) to develop the Shotkam field in the Barents Sea.

The results of the analysis of different kind of cooperations are provided in table 5.93.

Statoil ASA						
Cooperation (results in dark grey)						
Strategic view	Strategy	Strategic behavior				
Cooperation strategy	Alliance	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Alliance partner	No	NOCs	States	Major IOCs	Service companies
	Joint venture	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Joint venture partner	No	NOCs	States	Major IOCs	Service companies
	Other partnership	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Other partner	No	NOCs	States	Major IOCs	Service companies

Tab. 5.93 Morphological box for cooperation (Statoil)

5.7.8 Human resources

The HR strategy of Statoil between 2000 and 2005 can be characterized by a strong increase of staff as well as by a slight increase of the EBITDA per employee. The development of the number of employees as well as of the EBITDA per employee is described in figures 5.112 and 5.113.

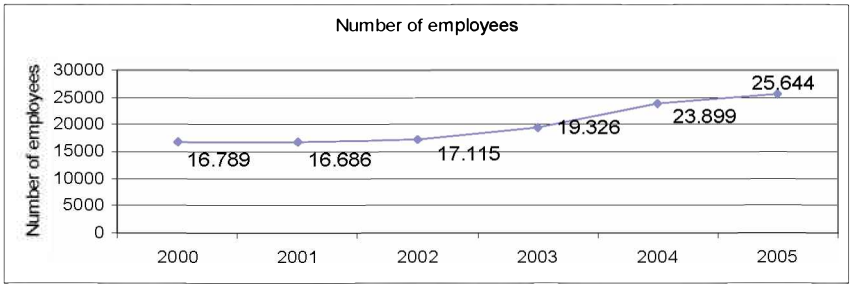

Fig. 5.112 Employee development (Statoil)[306]

[306] Source: see Annual Reports (2000-2006)

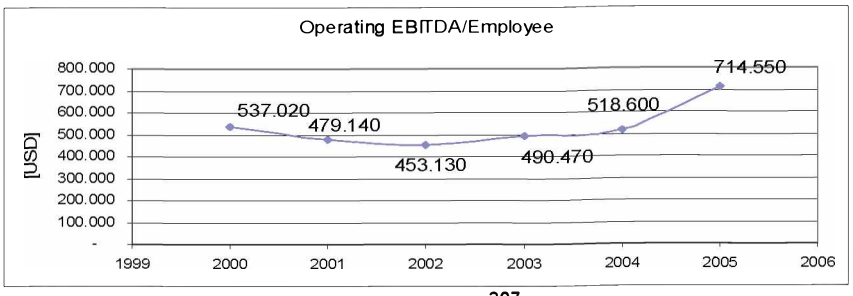

Fig. 5.113 EBITDA/employee development (Statoil)[307]

5.7.9 Energy portfolio

Statoil focused its bioenergy strategy on bio pellets. The company operates a pellet plant together with the company Norsk Skog. Statoil´s pellet market is concentrated on Norway, Denmark and Sweden. In 2003 Statoil became the largest supplier of wood pellets in Denmark after the acquisition of the company EcoNordic. At the end of 2005 Statoil produced around 191.000 tonnes of pellets per year. This indicates an increase of 537% compared to 2000.

The results of the analysis of the HR and energy portfolio segment are provided in table 5.94.

Statoil ASA					
HR & energy portfolio (results in dark grey)					
Strategic view	Strategy	Strategic behavior			
HR	HR strategy	Strong increase of staff	Slight increase of staff	Slight decrease of staff	Strong decrease of staff
		Strong increase of EBITDA/employee	Slight increase of EBITDA/employee	Slight decrease of EBITDA/employee	Strong decrease of EBITDA/employee
Energy portfolio	Alternative energy focus	No	Focus on wind power	Focus on solar energy	Focus on biomass

Tab. 5.94 Morphological box for HR & energy portfolio (Statoil)

[307] Source: see http://www.herold.com

5.8 Repsol YPF

5.8.1 General overview

Repsol YPF is an integrated oil and gas company. The company has oil and gas exploration and production interests in 24 countries. The Spanish company became after the acquisition of YPF the 3rd biggest producer of LPG in the world. The headquarters are located in Madrid, Spain and in Buenos Aires, Argentina.

Detailed information about Repsol can be looked up on pages A56 till A65 in the appendix. In order to get an overview of the performance of Repsol between 2000 and 2005, data about the reserve base, the production as well as about the financial situation are provided in figures 5.114, 5.115 and 5.116. Information about the total proved reserves as well as for the proved reserves of liquid hydrocarbons and natural gas is provided in figure 5.114. Proved reserves are given in million barrels of oil equivalent [MMBOE]. The company's main proved reserves region is Latin America with nearly 96% of the total reserves.

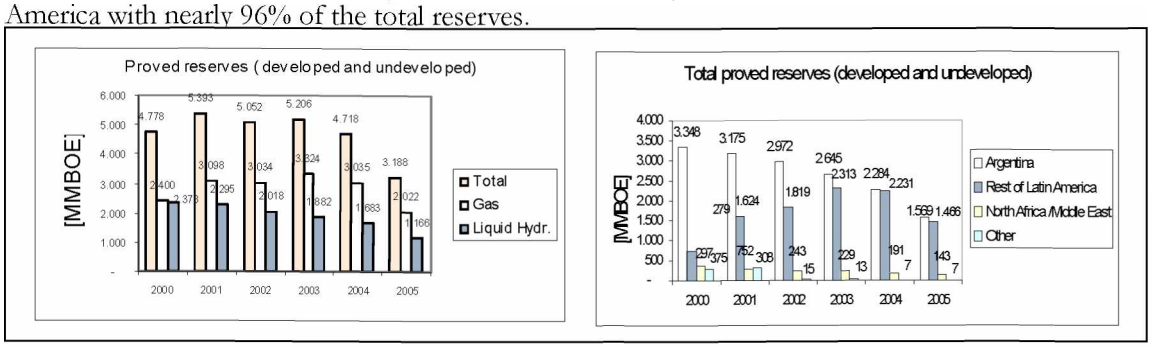

Fig. 5.114 Proved reserves base (Repsol)[308]

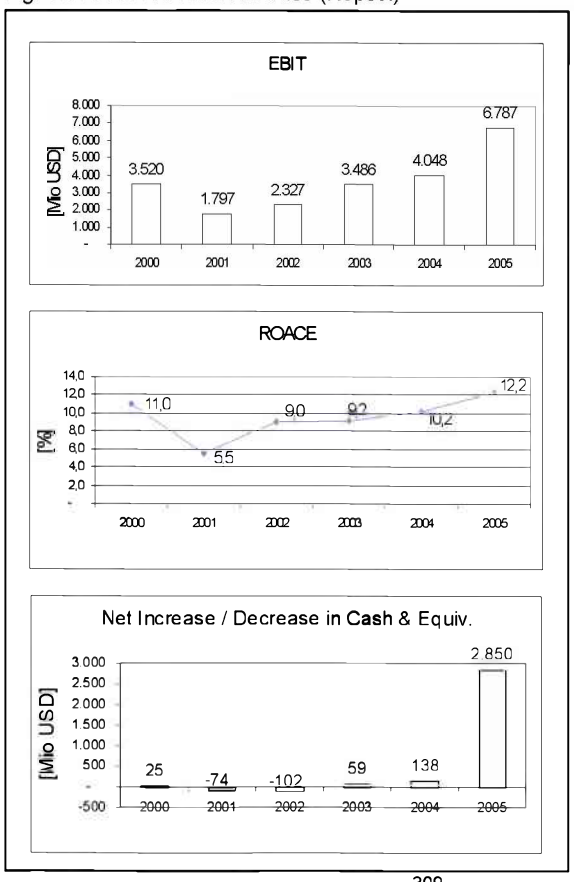

Fig. 5.115 Economic performance (Repsol)[309]

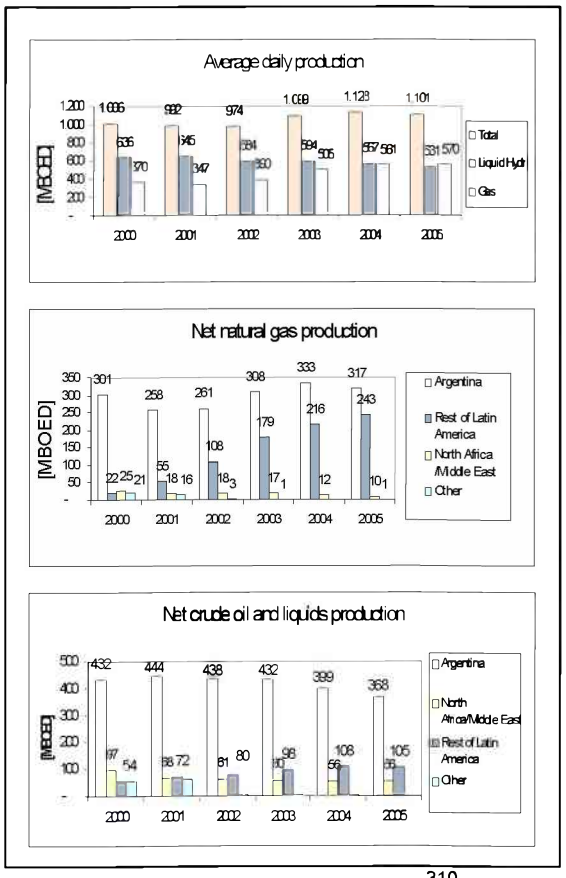

Fig. 5.116 Average daily production (Repsol)[310]

[308] Source: see Annual Reports (2000-2006)
[309] Source: see http://www.herold.com
[310] Source: see Annual Reports (2000-2006)

The worldwide E&P activities of Repsol YPF are introduced in figure 5.117.

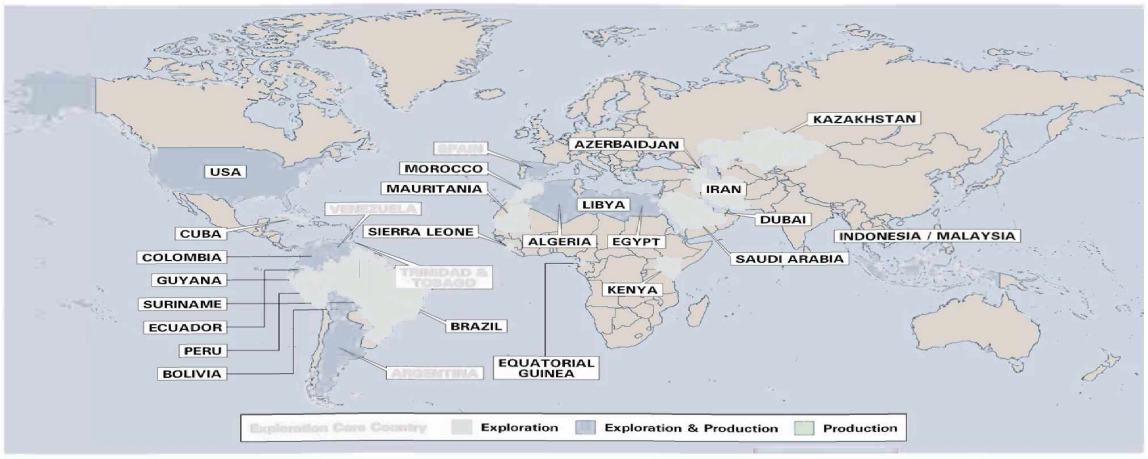

Fig. 5.117 E&P activities geographically (Repsol)

5.8.2 Exploration and appraisal (part 1)

Regional focus

The major exploration core activity is focused on Argentina. Other main exploration interests or operations in Latin America are based in Venezuela, Bolivia, Colombia and offshore Brazil. Spain is the domestic exploration region. Libya and Egypt are the main exploration regions in North Africa. Data about net exploratory wells are only available between 2002 and 2005. Detailed additional information about gross exploratory wells provides an overview of the drilling activities. Figure 5.118 and figure 5.119 introduce the available information concerning the net and gross exploratory wells drilled.

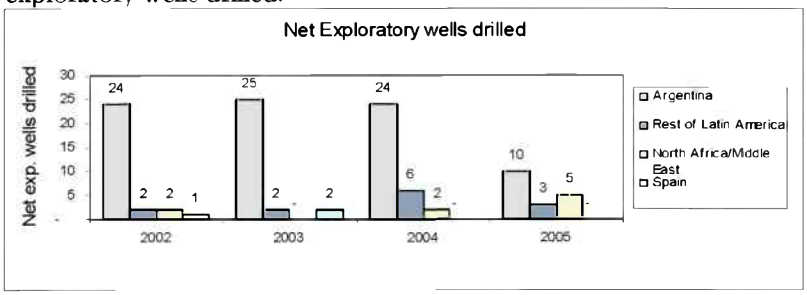

Fig. 5.118 Net exploratory wells drilled (Repsol)[311]

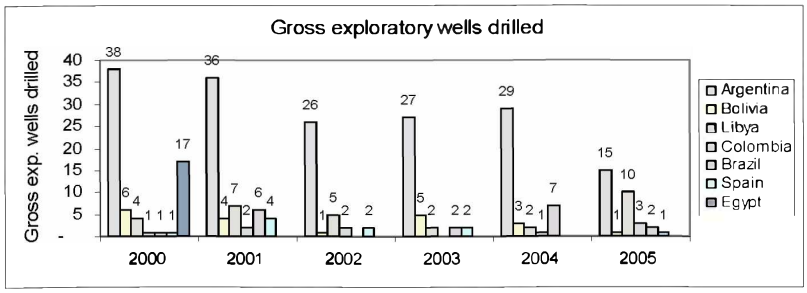

Fig. 5.119 Gross exploratory wells drilled (Repsol)[312]

311 Source: see Annual Reports (2000-2006)

312 Source: see Annual Reports (2000-2006)

Risk exposure

Argentina as the core exploration country has a „significant" defined risk value with 3,15 (between 3 and 3,49). By taking the other relevant operation regions into account the average risk value of 2,94 is defined as „medium" by Global Insight (between 2,5 and 2,99). 2,94 is close to the „significant" risk level and as a consequence the overall risk of the company's country operations can be defined as „high" in the morphological box. The relevant operation countries are listed up in table 5.95.

	Current overall risk	Political [25%]	Econ. [25%]	Legal [15%]	Tax [15%]	Operational [10%]	Security [10%]
Argentina	3,15	3,25	3,5	3,25	2,5	3,25	2,5
Venezuela	3,71	3,75	3,75	3,75	3,25	4,25	3,5
Trinidad & Tobago	2,28	2,5	1,75	2	2	2,75	3
Spain	1,62	1,5	1,5	1,5	1,5	1,75	2,25
Bolivia	3,5	3,75	3,5	3,5	3	4	3
Brazil	2,66	2,5	2,5	2,5	3	2,75	3
Colombia	3,08	3,25	2,5	3	2,5	3,75	4
Libya	3,02	3	2,75	3,5	3,5	3	2
Egypt*	2,79	2,75	2,5	3,5	2,5	3	2,5
Average	**2,94**	2,9	2,7	2,9	2,6	3,2	2,9

Tab. 5.95 Current overall risk of operating countries (Repsol)[313]

*Assets in Egypt were sold in 2001 to RWE DEA and Apache.

Drilling technology (focus and method)

Repsol performed the major exploration drilling operations onshore in Latin America and Libya, offshore in Brazil, in the Nile Delta of Egypt as well as domestically offshore Spain. At the end of 2005 the company had interests in 72 deepwater blocks in the Gulf of Mexico.

The company drilled horizontal wells especially in Latin America (Bolivia). Table 5.96 provides information about E&P projects of Repsol YPF in 2006. Nearly 57% of all these projects were performed onshore.

Exp./Dev. projects of Repsol YPF (2006)	Total	General operator	Onshore area	Offshore area (less than 300m)	Deepwater area (more than 300m)	Deepwater operator
Gulf of Mexico	8	2	0	0	8	2
Argentina	15	9	9	1	5	3
Bolivia	5	3	5	0	0	0
Brazil	8	2	0	0	8	2
Colombia	4	1	4	0	0	0
Cuba	1	1	0	0	1	0
Ecuador	3	1	3	0	0	0
Guyana	1	1	0	1	0	0
Mexico	1	1	1	0	0	0
Peru	5	4	5	0	0	0
Suriname	1	1	0	0	1	1
Trinidad & Tobago	7	2	0	7	0	0
Venezuela	5	3	4	1	0	0
Spain	8	8	2	5	1	1
Algeria	7	7	7	0	0	0
Iran	2	0	2	0	0	0
Libya	17	12	17	0	0	0
Morocco	2	1	1	0	1	1
Equatorial Guinea	2	0	0	1	1	0
Kenya	2	0	0	2	0	0
Mauritania	1	1	1	0	0	0
Sierra Leone	1	1	0	0	1	1
Kazakhstan	1	0	0	1	0	0
Sum	107	61	61	19	27	11

Tab. 5.96 E&P projects of Repsol YPF (2006)[314]

[313] Source: see http://www.globalinsight.com

[314] Source: see http://www.pfcenergy.com

Technical success rate

Repsol YPF achieved an average technical success rate of 34% between 2000 and 2005 concerning the gross exploratory wells drilled. The success rates in percent are given in figure 5.120.

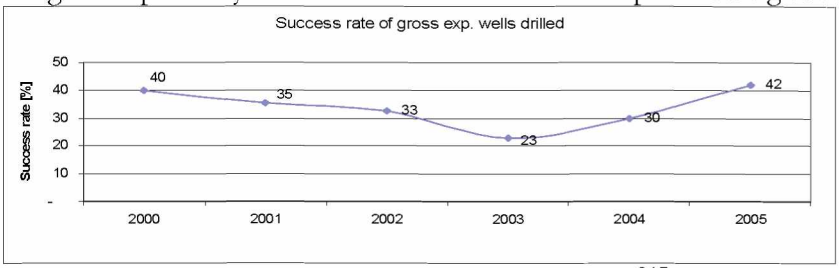

Fig. 5.120 Success rates of gross exploratory wells drilled (Repsol)[315]

Operatorship

The general operatorship as well as the deepwater operatorship can be calculated with the data provided in table 5.96. Repsol YPF has a general operatorship of 57% and a deepwater operatorship of 41% in its E&P projects during 2006.

The results of qualitative and quantitative analysis of the regional focus, the risk exposure, as well as of the drilling technology can be used for the first part of the exploration and appraisal segment in the morphological box which is described in table 5.97.

Repsol YPF					
Exploration and appraisal (results in dark grey)					
Strategic view	Strategic indicator	Strategic behavior			
Regional	Regional focus	Exploration concentration in core regions	Development of new exploration regions	Near field exploration	
Risk	Risk exposure	Low	Middle	High	
Drilling technology	Technology focus	Unconventional (Polar, Deepwater, Fractured…)	Conventional onshore	Shallow offshore	Covering all
	Focus on method	Multilateral	Horizontal	Normal	
	Technical success rate	≤ 25%	26% - 50%	51% - 75%	> 75%
	General operatorship (Asset based)	≤ 25%	26% - 50%	51% - 75%	> 75%
	Deepwater operatorship (Asset based)	≤ 25%	26% - 50%	51% -75%	> 75%

Tab. 5.97 Morphological box for exploration & appraisal (part 1) (Repsol)

[315] Source: see Annual Reports (2000-2006)

5.8.3 Exploration and appraisal (part 2)

Seismic technology (focus and method)

Repsol YPF concentrated seismic surveys on its core regions. Seismic programs were initiated in the deepwater areas of the Gulf of Mexico and Brazil as well as in Colombia, Peru, Libya, Algeria and Equatorial Guinea. Most common used seismic methods were 2 D as well as 3 D.

Investment profile

The average exploration expenditures of Repsol YPF per year were USD 297 million. Brazil accounted for 24%, Argentina for 15%, Libya for 14%, Algeria for 7% and the USA for 6% of the total exploration expenditures at the end of 2005. The profile of exploration expenditures between 2000 and 2005 can be described as "increasing" in the morphological box. Detailed information can be looked up in figure 5.121.

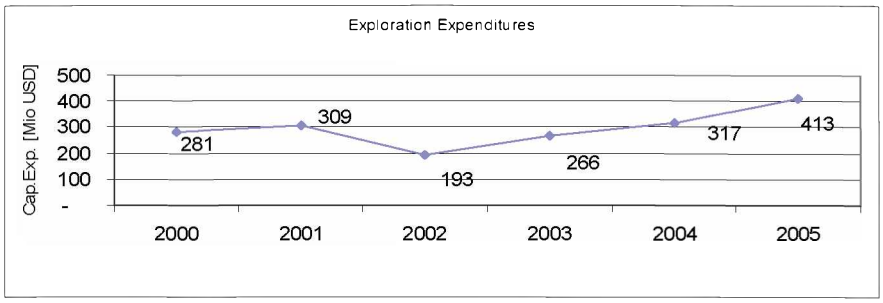

Fig. 5.121 Exploration expenditures (Repsol)[316]

Reserve replacement rate (2005)

The reserve replacement rate of Repsol YPF in 2005 was 22%. The company's average reserve replacement rate between 2000 and 2005 accounted for 125%.

The major acquisitions during the last 6 years were performed in 2001 and 2003. Repsol increased its reserves base by 733 million BOE through the acquisition of interests in the company Empresa Petrolera Andina (NOC of Bolivia) for USD 434 million. In 2003 Repsol increased its proved reserves by 482 million BOE through the acquisition of a 15% interest in five deepwater exploration blocks in the Gulf of Mexico and through the acquisition of a 50% interest in a Bolivian block.

Figure 5.122 describes the reserve replacement rate profile for Repsol YPF which can be characterized by a "decreasing" behavior pattern between 2000 and 2005 in the morphological box.

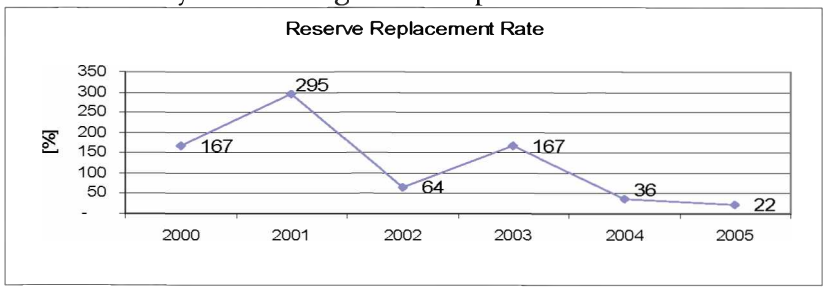

Fig. 5.122 Reserve replacement rates (Repsol)[317]

The results of the analysis of the 2nd part of the exploration and appraisal segment can be summarized in the morphological box introduced in table 5.98.

316 Source: see http://www.herold.com

317 Source: see http://www.herold.com

Repsol YPF						
Exploration and appraisal (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Seismic technology	Regional focus	Core regions		Non core regions		
	Focus on method	2 D	3 D	4 D	All methods	
Investment	Investment profile					
Reserve replacement strategy	Reserve replacement rate 2005	≤ 50%	51% - 100%	101%-200%	201% - 300%	> 300%
	Annual reserve replacement profile					

Tab. 5.98 Morphological box for exploration & appraisal (part 2) (Repsol)

5.8.4 Development and production (part 1)

Regional focus

The main development program was focused on South America during the last years. 49% of the total proved reserve base of Repsol was located in Argentina at the end of 2005. Development expenditures for enhanced oil recovery programs were especially focused on mature fields in Argentina. The major countries of development operations during 2005 have been Argentina with 65%, Trinidad & Tobago with 10%, Bolivia with 7% and Venezuela with 6% of the total development investment. Data about the number of development wells drilled per year are not available.

EOR

Most of the development expenditures during the last years were used for enhanced oil recovery methods. Repsol tried to improve the recovery factor out of mature fields in Argentina, Bolivia and Venezuela. The company operated several water as well as gas injection programs. In 2005 Repsol increased its proved reserves in Argentina by 7,1 million BOE through water injections.

Resource portfolio

Repsol is the 3rd biggest producer of LPG (liquefied petroleum gas) in the world. The company achieved this position through several acquisitions. The biggest acquisitions on the LPG sector have been YPF in Argentina, Lipigas Group in Chile as well as Shell GAS (LPG) in Portugal. In addition, Repsol owns tankers to transport LPG.

Oil & gas production focus

The average gas production of Repsol between 2000 and 2005 accounted for 43% of the total production. Data about the gas production as % of the total production are provided in figure 5.123.

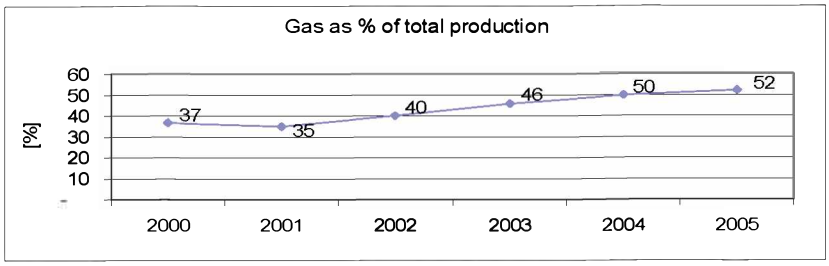

Fig. 5.123 Gas as % of total production (Repsol)[318]

Oil & gas reserves focus

The average gas reserves of Repsol accounted for 60% of the total proved reserves base. The gas reserves development in % between 2000 and 2005 is introduced in figure 5.124.

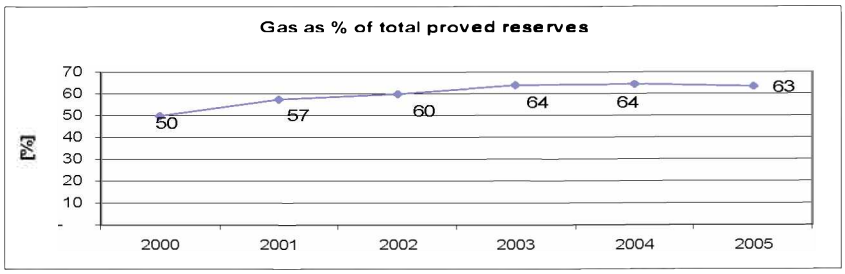

Fig. 5.124 Gas reserves as % of total proved reserves (Repsol)[319]

The results of the analysis of the regional focus, the used EOR technology as well as of the resource portfolio of Repsol can be summarized in the morphological box which is introduced in table 5.99.

Repsol YPF					
Development and production (results in dark grey)					
Strategic view	Strategic indicator	Strategic behavior			
Regional	Regional focus	Development activity focused on core regions		Development activity focused on non-core regions	
EOR	Focus on EOR-method	CO_2 injection	Gas cycling	Water flooding	All of them
	Operatorship	Always	In most cases	Seldom	Never

[318] Source: see http://www.herold.com

[319] Source: see http://www.herold.com

Resource portfolio	Conventional focus*	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Oil & gas production focus [Gas as % of production]	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Oil & gas reserves focus [Gas as % of reserves]	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Non-conventional focus	Oil sands	Heavy oil	Tight gas	Coalbed methane	LPG

Tab. 5.99 Morphological box for development & production (part 1) (Repsol) * Qualitative

5.8.5 Development and production (part 2)

Focus on LNG

Repsol´s LNG activities are focused on the Atlantic LNG plant in Trinidad & Tobago. The LNG plant is used to supply the domestic market as well as the USA and Europe. The company has a 20% interest in Train 1, a 25% interest in the Trains 2 and 3 as well as a 22% interest in Train 4. The total production capacity of the Atlantic LNG plant is 15 million tons of LNG per year.
In 2002 Repsol leased three LNG tankers with a capacity of 417.000 cubic meters. During 2005 Repsol came to an agreement with the company Irving Oil Limited to develop the first LNG regasification terminal in the East Coast of Canada. The agreement included the creation of a new company which should build and operate the terminal.

Focus on pipelines

Repsol has a 62% interest in the Spanish company CLH which operates nine tankers and pipelines with a length of 3.422 km. Repsol also operates a network of 1.800 km to transport refined products in South America. In Argentina, the company owns two crude oil pipelines with a length of 1.113 km which are connected with refineries operated by Repsol. In addition, the company has a 37% interest in the company Oldeval which operates 818 km of pipelines in South America. In Ecuador, Repsol has a 30% interest in a heavy crude oil pipeline with a length of 400 km to transport oil from the Amazonas to the Pacific.

Downstream strategy

Repsol YPF has a strong refining business segment. The company operates 10 refineries in Spain, Argentina and Peru. In addition, the company has interests in two refineries located in Brazil after a deal with the company Petrobras. Repsol is the biggest refiner in Argentina and Spain. 58% of the total Spanish crude oil is processed by the refineries of Repsol. In 2005 the refining and marketing segment accounted for nearly 44% of the total operating income.
The refineries of Repsol have a total average capacity of around 60,9 million tonnes of oil equivalent per year. The average annual production between 2000 and 2005 accounted for 52,4 million tonnes of oil equivalent. As a consequence, the volume based integration, refining capacity divided by annual production leads to a percentage value of 116%. The company could supply 86% of its total refining capacities by its own production. Refining capacities and the integration volume calculation are listed up in table 5.100.

Year	2000	2001	2002	2003	2004	2005
Refining [MBBLD]						
Spain	740	740	740	740	740	740
Argentina, Brazil	364	334	334	392	392	391
Other regions	102	102	160	102	102	102
Sum	1.206	1.176	1.234	1.234	1.234	1.233
Average refining capacity [MMTOE]	60,9					
Average production [MMTOE]	52,4					
Downstream strategy [Capacity/production] [%]	**116**					

Tab. 5.100 Integration volume calculation (Repsol)[320]

Upstream strategy

Repsol's average upstream production revenue as part of total sales and operating revenue accounted for 17% between 2000 and 2005. That's a typical value for a downstream focused company. The calculation is based on data introduced in table 5.101.

Year	2000	2001	2002	2003	2004	2005
Total upstream production revenue [Mio USD]	8.334	6.522	5.251	7.294	9.452	9.873
Total sales & operating revenue [Mio USD]	41.965	38.976	34.103	42.280	51.778	59.785
Upstream production revenue as part of total sales & operating revenue [%]	20	17	15	17	18	17
Average [%]	17					

Tab. 5.101 Upstream revenue (Repsol)[321]

Investment profile

The average development expenditures of Repsol per year were USD 1.125 million. The profile can be characterized as a "once decrease" in the morphological box. Data about the development expenditures between 2000 and 2005 are provided in figure 5.125.

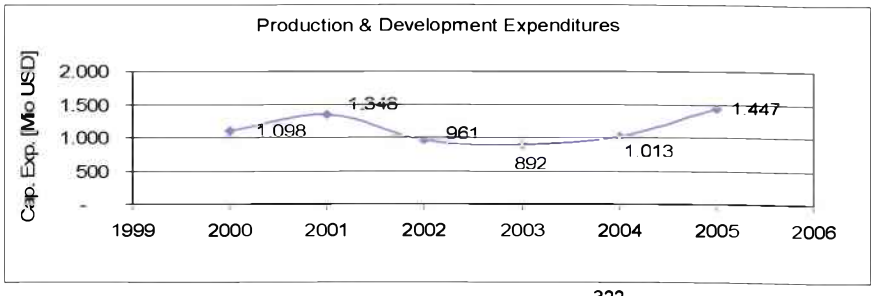

Fig. 5.125 Development and production expenditures (Repsol)[322]

[320] Source: see Annual Reports (2000-2006)
[321] Source: see http://www.herold.com
[322] Source: see Annual Reports (2000-2006)

Daily Boe production

Data about the daily Boe production per net producible well are only provided between 2003 and 2005 which is described in figure 5.126. The behavior pattern of this profile can be characterized as "decreasing" in the morphological box.

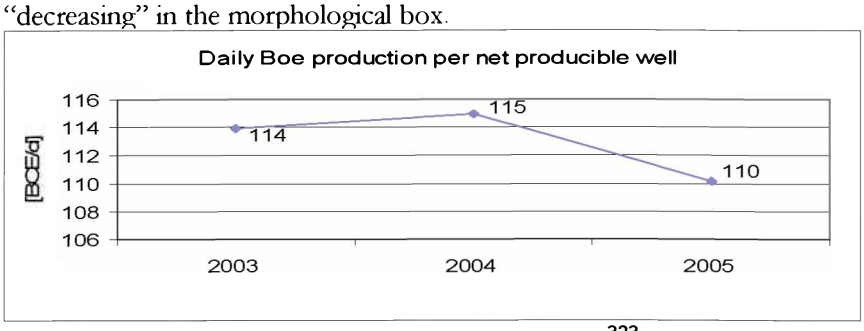

Fig. 5.126 Daily Boe production per net producible well (Repsol)[323]

The results of the analysis of the midstream, downstream and upstream sector as well as of the investment and production profile are provided in table 5.102.

Repsol YPF						
Development and production (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Midstream	Focus on LNG	No		Operating	Participating	
Midstream	Focus on pipelines	No		Operating	Participating	
Coordination strategy between upstream and downstream	Downstream strategy Volume based integration [Refining capacity/annual production]	No	< 33%	33% - 66%	67%-100%	> 100%
	Upstream strategy [Revenue of upstream as part of total sales and operating revenues]	< 10%	10% - 24%	25% - 50%	51% - 75%	> 75%
Investment	Investment profile					
Net production profile	Trend in daily Boe production per net producible well					

Tab. 5.102 Morphological box for development & production (part 2) (Repsol)

5.8.6 Acquisition

Acquiring reserves

Repsol YPF acquired an average of 271 MMBOE of reserves per year between 2000 and 2005. Detailed data are introduced in table 5.103.

[323] Source: see http://www.herold.com

Year	2000	2001	2002	2003	2004	2005
Total reserves acquired [MMBOE]	230,8	815,1	65,1	454,5	16,1	44,1
Average [MMBOE]	271					

Tab. 5.103 Total reserves acquired per year (Repsol)[324]

Regional focus

Repsol YPF performed 90% of its acquisitions in core regions. Table 5.104 highlights every acquisition in a core region per year.

Year	Acquisition
2000	**Chile (1), Venezuela (2),**
2001	**Bolivia (1)**
2002	**Peru (1)**
2003	**Gulf of Mexico (1), Bolivia (1)**
2004	Portugal (1)
2005	**Peru (1), Venezuela (1)**

Tab. 5.104 Acquisitions in core and non core regions (Repsol)[325]

Intensity strategy

The data from table 5.104 can be used to calculate an acquisition intensity of 1,66 (< 3) performed acquisitions per year.

Cost strategy

Repsol YPF performed acquisitions as it can be seen in table 5.104 in every year between 2000 and 2005. The average acquisition costs were 1,75 USD per Boe acquired reserves. The different acquisition costs per year are introduced in figure 5.127.

Fig. 5.127 Acquisition costs per year (Repsol)[326]

Focusing on acquisitions or farm ins

Data about the number of farm ins are only available between 2000 and 2004. Repsol performed 65 farm ins and eight acquisitions between 2000 and 2004. The acquisition rate between 2000 and 2004 accounted for 11% by dividing the number of acquisitions through the number of farm ins and acquisitions. The numbers of acquisitions and farm ins are listed up in table 5.105.

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[324] Source: see http://www.herold.com

[325] Source: see Annual Reports (2000-2006)

[326] Source: see http://www.herold.com

Year	2000	2001	2002	2003	2004	2005
Farm in	1	6	13	42	3	Not announced
Acquisition	3	1	1	2	1	2
Acquisition rate as % of farm ins and acquisitions	11					

Tab. 5.105 Numbers of performed acquisitions and farm ins (Repsol)[327]

The results of the analysis of the acquisition segment for Repsol YPF can be summarized in table 5.106.

Repsol YPF					
Acquisition (results in dark grey)					
Strategic view	Strategic indicator	Strategic behavior			
Reserve strategy	Acquiring reserves [MMBOE/year]	< 50	50 - 100	101 - 200	> 200
Regional	Regional focus* [% of acquisitions in core regions]	< 25%	25% - 50%	51% - 75%	> 75%
Acquisition intensity	Intensity strategy* [Acquisitions/year]	0	< 3	3 - 5	> 5
Acquisition cost strategy	Cost strategy Acquisition costs [USD/BOE]	< 3	3 - 5	6 - 8	> 8
Acquisition vs. farm in	Focusing on acquisitions or farm ins [Acquisition rate as %]	< 25%	25% - 50%	51% - 75%	> 75%

Tab. 5.106 Morphological box for acquisition (Repsol) * Assumption

5.8.7 Cooperation

Alliance

There was no information available concerning any involvements of Repsol in alliances.

Joint venture

Repsol is part of the Atlantic LNG plant joint venture in Trinidad & Tobago with BG and BP. In general, the company has excellent relationships with National Oil Companies in South America. Repsol started a joint venture with the company Cupet (NOC of Cuba) for developing deepwater assets. In addition, Repsol formed a joint venture gas company with SAMO (NOC of Bolivia). The Spanish company signed also several strategic agreements with PDVSA (NOC of Venezuela) to create a joint venture in a LNG project.
In 2004 Repsol signed a joint venture agreement with ENI and Saudi Aramco concerning a gas exploration project in Saudi Arabia. At the end of 2005 SONATRACH (NOC of Algeria) and Repsol signed a joint venture agreement to build and operate a LNG plant.

[327] Source: see http://www.herold.com

Other partnership

In 2000 Repsol and the NOC of Chile (ENAP) signed an agreement for exploration, production, refining and marketing activities in Chile. In addition, Repsol achieved an agreement with the BG Group and British Petrol to start a study for the production and sale of natural gas out of a Bolivian field. This field, called Margarita was operated by Repsol.
PDVSA (NOC of Venezuela) and Repsol have several gas sale contracts in Latin America.
In 2004 Repsol and the Algerian company GAS Natural SDG signed a partnership agreement for a LNG project which consists of the exploration, production and liquefaction of natural gas in Algeria.

The results of the analysis of different kind of cooperations are provided in table 5.107.

Repsol YPF						
Cooperation (results in dark grey)						
Strategic view	Strategy	Strategic behavior				
Cooperation strategy	Alliance	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Alliance partner	No	NOCs	States	Major IOCs	Service companies
	Joint venture	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Joint venture partner	No	NOCs	States	Major IOCs	Service companies
	Other partnership	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Other partner	No	NOCs	States	Major IOCs	Service companies

Tab. 5.107 Morphological box for cooperation (Repsol)

5.8.8 Human resources

The HR strategy of Repsol YPF between 2000 and 2005 can be characterized by a slight decrease of staff as well as by a slight increase of the EBITDA per employee. The development of the number of employees as well as of the EBITDA per employee is described in figures 5.128 and 5.129.

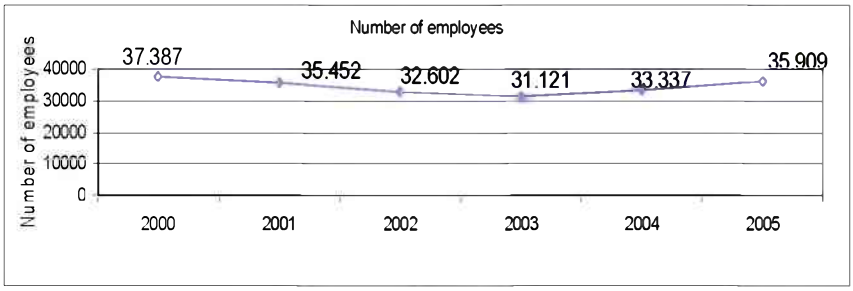


Fig. 5.128 Employee development (Repsol)[328]

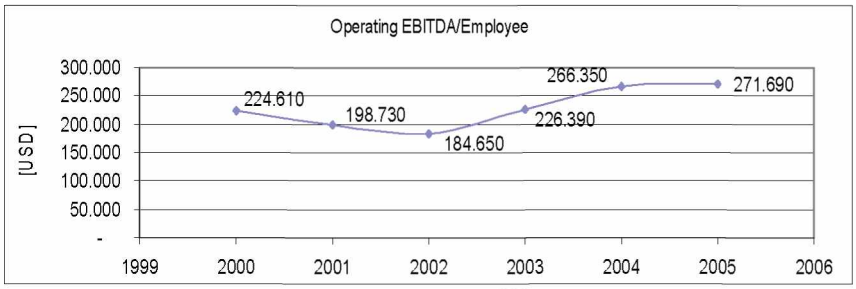


Fig. 5.129 EBITDA/employee development (Repsol)[329]

5.8.9 Energy portfolio

Repsol owns or has interests in 22 „Wind power production" companies which are listed up in the annual report of 2005. Detailed information is provided in the appendix on page A 65.

The results of the analysis of the HR and energy portfolio segment are provided in table 5.108.

Repsol YPF					
HR & energy portfolio (results in dark grey)					
Strategic view	Strategy	Strategic behavior			
HR	HR strategy	Strong increase of staff	Slight increase of staff	Slight decrease of staff	Strong decrease of staff
		Strong increase of EBITDA/employee	Slight increase of EBITDA/employee	Slight decrease of EBITDA/employee	Strong decrease of EBITDA/employee
Energy portfolio	Alternative energy focus	No	Focus on wind power	Focus on solar energy	Focus on biomass

Tab. 5.108 Morphological box for HR & energy portfolio (Repsol)

[328] Source: see Annual Reports (2000-2006)
[329] Source: see http://www.herold.com

5.9 OMV AG

5.9.1 General overview

OMV AG is an integrated oil and gas exploration company. The headquarters are located in Vienna, Austria. In order to get an overview of the performance of OMV between 2000 and 2005, data about the reserve base, the production as well as about the financial situation are provided in figures 5.130, 5.131 and 5.132.

Figure 5.130 provides information about the total proved reserves as well as for the proved reserves of liquid hydrocarbons and natural gas. Proved reserves are given in million barrels of oil equivalent [MMBOE]. The company's main proved reserves are located in Europe, Africa and in the Middle East.

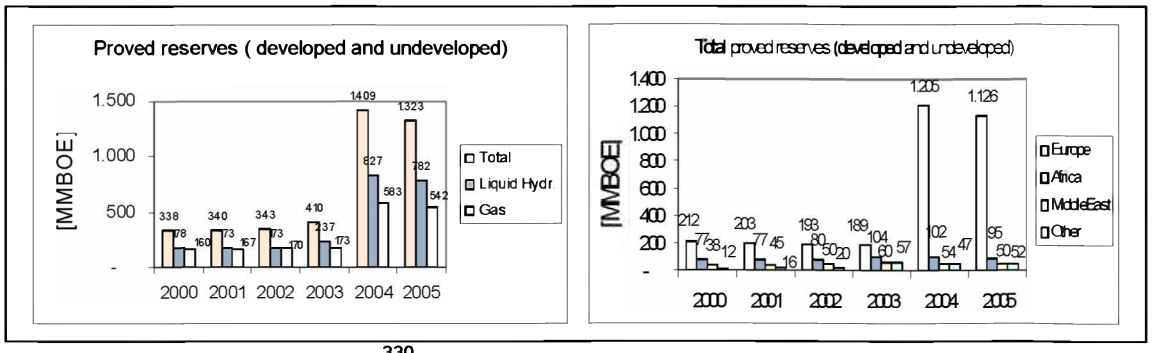


Fig. 5.130 Proved reserves base (OMV)[330]

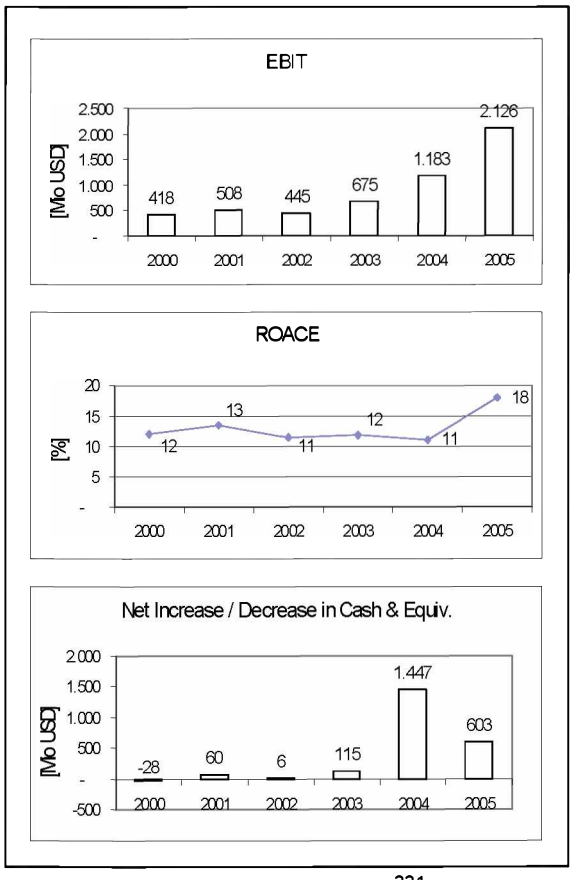


Fig. 5.131 Economic performance (OMV)[331]

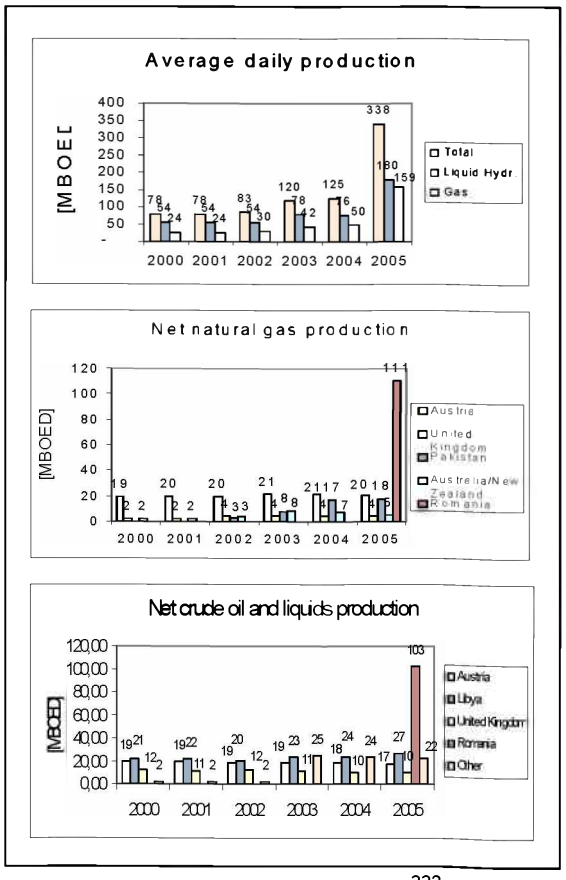


Fig. 5.132 Average daily production (OMV)[332]

330 Source: OMV AG

331 Source: see http://www.herold.com

332 Source: OMV AG

Figure 5.131 provides information about the economic performance between 2000 and 2005 by looking at the EBIT, ROACE and cash flow. The total average daily production as well as the production rate of liquid hydrocarbons and natural gas of OMV is introduced in figure 5.132. The units are given in thousands of barrels oil equivalent per day [MBOED]. The main production regions are Romania, Austria, Libya, Pakistan, United Kingdom as well as Australia and New Zealand.

The worldwide E&P activities of OMV AG are introduced in figure 5.133.

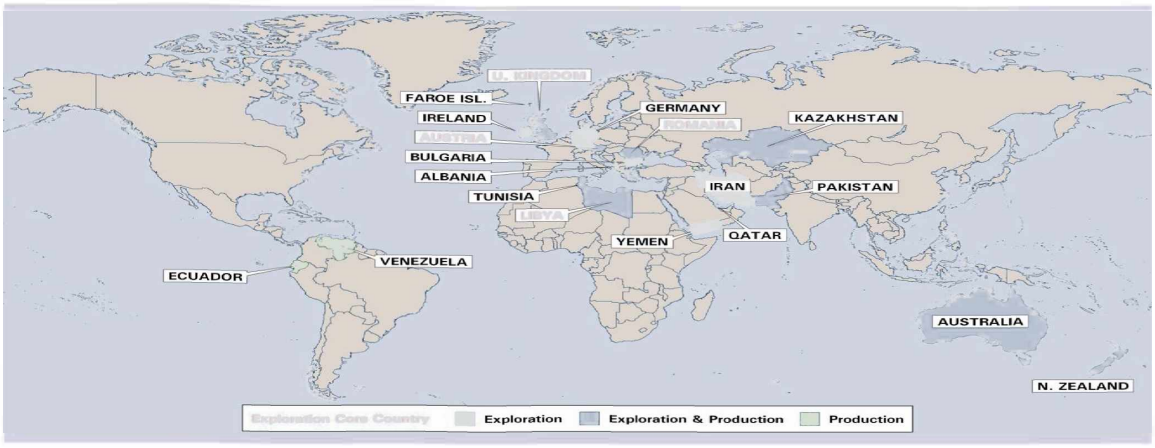


Fig. 5.133 E&P activities geographically (OMV)

5.9.2 Exploration and appraisal (part 1)

Regional focus

OMV AG has concentrated its exploration activities on the core countries defined as Austria, Australia, Libya and the United Kingdom. The main other exploration operations were located in Albania, Iran, Ireland and New Zealand. Figure 5.134 provides information concerning the gross exploratory wells drilled.

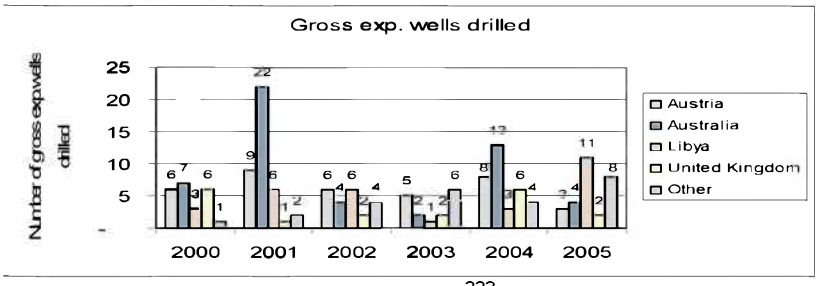


Fig. 5.134 Gross exploratory wells drilled (OMV)[333]

Risk exposure

By taking all relevant operation regions into account the average overall risk value of 2,61 is defined by Global Insight as „medium" (between 2,5 and 2,99). The relevant operating countries are listed up in table 5.109.
Sudan is also part of this table but in 2003 OMV sold its interests in two blocks for USD 115 million.

[333] Source: OMV AG

	Current overall risk	Political [25%]	Econ. [25%]	Legal [15%]	Tax [15%]	Operational [10%]	Security [10%]
Albania	3,31	3,25	3,25	3,5	3,25	3,5	3,25
Australia	1,51	1,5	1,25	1	1,5	1,5	2,5
Ecuador	3,64	4	3,75	3,75	3	3,75	3
Iran	3,62	3,25	3,75	3,75	4	3,75	3,25
Ireland	1,35	1,5	1,5	1	1	1,75	1
Libya	3,02	3	2,75	3,5	3,5	3	2
New Zealand	1,44	1,25	1,75	1	1,75	1,25	1,25
Pakistan	3,53	3,75	3	3,5	3,5	3,5	4,25
Qatar	1,86	2	1,5	2,25	1,5	2	2
Sudan	4,16	3,75	4,25	4,5	4	4,5	4,25
Tunisia	2,19	2,25	1,75	2,5	2,5	2,25	2
United Kingdom	1,46	1,25	1,5	1	1,25	1,25	2,5
Venezuela	2,93	3	2,75	3,25	3	3,5	1,75
Yemen	3,46	2,75	3,25	4	4	3,5	3,75
Austria	1,48	1,75	1,5	1	1,5	1,5	1,25
Romania	2,39	2,5	2,5	2,5	2,25	2,25	2
Kazakhstan	3,01	3,25	2,75	3	3	3,25	2,75
Average	**2,61**	2,59	2,51	2,65	2,62	2,71	2,51

Tab. 5.109 Current overall risk of operating countries (OMV)[334]

Drilling technology (focus and method)

The major conventional onshore exploration operations were concentrated on Austria, Albania, Romania, Libya, Tunisia, Yemen, Iran and Pakistan. Offshore exploration operations were focused on Bulgaria, the United Kingdom, the Faroe Islands, Ireland, Australia as well as on New Zealand. Especially horizontal wells were drilled in development projects. Six horizontal production wells were planned for a development program in Kazakhstan 2007.
Table 5.110 provides information about E&P projects of OMV in 2006. Nearly 50% of all these projects were performed onshore.

Exp./Dev. projects of OMV AG (2006)	Total	General operator	Onshore area	Offshore area (less than 300m)	Deepwater area (more than 300m)	Deepwater operator
Albania	2	2	1	1	0	0
Austria	3	3	3	0	0	0
Bulgaria	1	1	0	0	1	0
Ireland	2	0	0	0	2	0
United Kingdom	13	1	0	8	5	0
Egypt	1	1	0	1	0	0
Iran	1	1	1	0	0	0
Libya	13	0	13	0	0	0
Tunisia	2	2	1	1	0	0
Yemen	2	2	2	0	0	0
Kazakhstan	4	4	4	0	0	0
Australia	4	3	0	4	0	0
New Zealand	5	1	0	5	0	0
Pakistan	4	1	3	0	1	0
Sum	57	22	28	20	9	0

Tab. 5.110 E&P projects of OMV AG (2006) [335]

[334] Source: see http://www.globalinsight.com
[335] Source: see http://www.pfcenergy.com

Technical success rate

The average technical success rate of OMV between 2000 and 2005 concerning the gross exploratory wells drilled was 53%. The success rates in percent are given in figure 5.135.

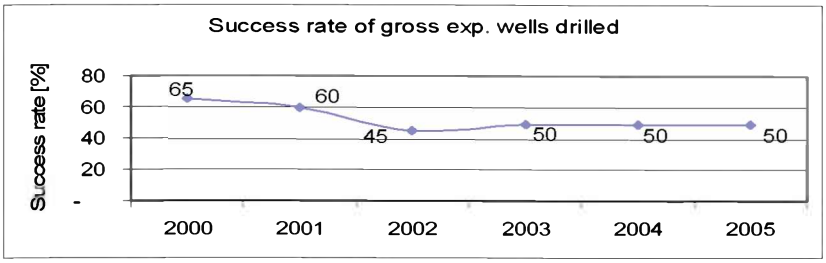


Fig. 5.135 Success rates of gross exploratory wells drilled (OMV)[336]

Operatorship

The data provided in table 5.110 can be used to calculate the general operatorship as well as the deepwater operatorship. OMV AG has a general operatorship of 39% and a deepwater operatorship of zero %.

The results of the strategic analysis of the regional focus, the risk exposure as well as of the drilling technology used are introduced in the first part of the exploration and appraisal segment in the morphological box which is described in table 5.111.

OMV AG					
Exploration and appraisal (results in dark grey)					
Strategic view	Strategic indicator	Strategic behavior			
Regional	Regional focus	Exploration concentration in core regions	Development of new exploration regions	Near field exploration	
Risk	Risk exposure	Low	Middle	High	
Drilling technology	Technology focus	Unconventional (Polar, Deepwater, Fractured…)	Conventional onshore	Shallow offshore	Covering all
	Focus on method	Multilateral	Horizontal	Normal	
	Technical success rate	≤ 25%	26% - 50%	51% - 75%	> 75%
	General operatorship (Asset based)	≤ 25%	26% - 50%	51% - 75%	> 75%
	Deepwater operatorship* (Asset based)	≤ 25%	26% - 50%	51% -75%	> 75%

Tab. 5.111 Morphological box for exploration & appraisal (part 1) (OMV) * 0%

[336] Source: OMV AG

5.9.3 Exploration and appraisal (part 2)

Seismic technology (focus and method)

OMV AG performed seismic surveys in its core countries like Austria, United Kingdom, Libya, Tunisia, Yemen, Australia or Pakistan. Especially 2 D as well as 3 D seismic surveys were initiated.

Investment profile

The average exploration expenditures of OMV AG per year were USD 98 million. The profile of exploration expenditures between 2000 and 2005 can be described as "increasing" in the morphological box. Detailed information is provided in figure 5.136.

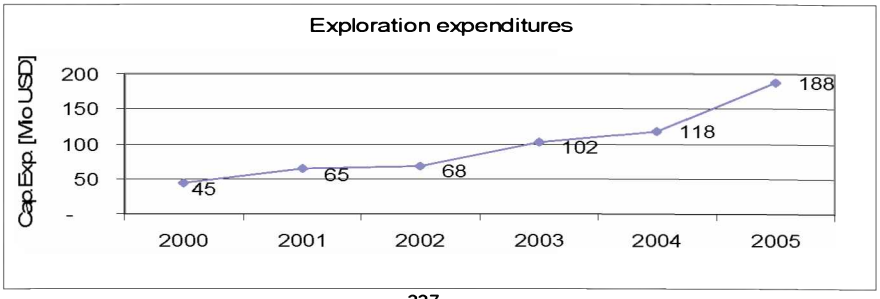


Fig. 5.136 Exploration expenditures (OMV)[337]

Reserve replacement rate (2005)

The reserve replacement rate of OMV AG in 2005 was 22%. The company's average reserve replacement rate between 2000 and 2005 accounted for 434%. During 2003 OMV increased its proved reserve base by 77 million BOE through the acquisition of the international assets of the company Preussag Energy GmbH for EURO 300 million. The acquired assets were based in Albania, Ecuador, Qatar, Tunisia, Venezuela, New Zealand and Yemen. The biggest acquisition in the company's history was performed in 2004. OMV AG acquired 51% of the Romanian Company Petrom. The Petrom acquisition included around 300 oil & gas fields which increased the company's proved reserves by nearly 1 billion BOE. The assets were based in Romania, around the Black Sea as well as in Kazakhstan.

Figure 5.137 describes the reserve replacement rate profile for OMV AG which can be characterized by a "once increase" in the morphological box.

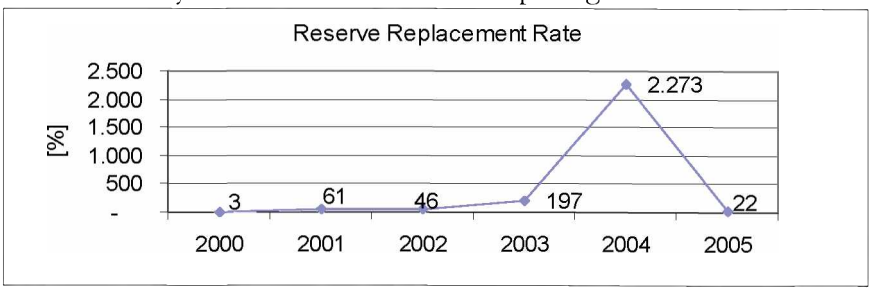


Fig. 5.137 Reserve replacement rates (OMV)[338]

The results of the analysis of the 2nd part of the exploration and appraisal segment are summarized in the morphological box introduced in table 5.112.

[337] Source: see http://www.herold.com

[338] Source: see http://www.herold.com

OMV AG						
Exploration and appraisal (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Seismic technology	Regional focus	Core regions		Non core regions		
	Focus on method	2 D	3 D	4 D	All methods	
Investment	Investment profile					
Reserve replacement strategy	Reserve replacement rate 2005	≤ 50%	51% - 100%	101%-200%	201% - 300%	> 300%
	Annual reserve replacement profile					

Tab. 5.112 Morphological box for exploration & appraisal (part 2) (OMV)

5.9.4 Development and production (part 1)

Regional focus

Development operations were focused especially on Australia, Libya, Austria and on the United Kingdom. Most of the other development programs were initiated in Ecuador, Tunisia and Pakistan.

Figure 5.138 introduces the main regions of gross development wells drilled.

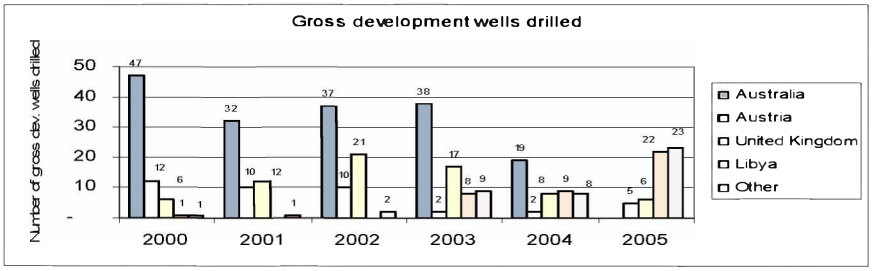


Fig. 5.138 Gross development wells drilled (OMV)[339]

EOR

OMV AG used all types of possible stimulation methods. Water injection programs were initiated in the operated fields of Austria and Romania. In addition, OMV performed gas injection projects in Austria. During 2005 OMV was part of a water injection program for the so called Schiehallion field located in the British part of the North Sea. It was operated by British Petrol.

In Tunisia, OMV operated an infill drilling program at the end of 2005 for the so called Ashtart field.

[339] Source: OMV AG

Resource portfolio

The resource portfolio is strongly conventional focused. Minor fields in Romania contain tight gas reserves.

Oil & gas production focus

The average gas production of OMV AG between 2000 and 2005 accounted for 36% of the total production. Data about the gas production as % of the total production are provided in figure 5.139.

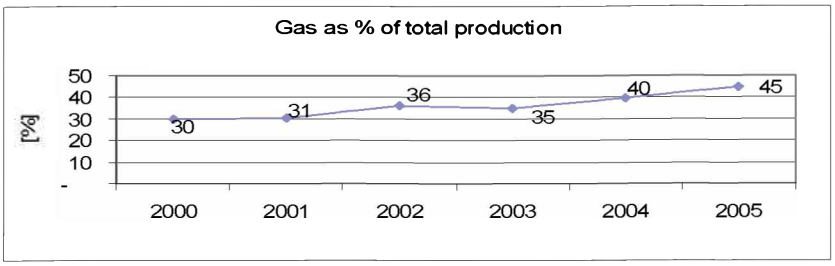


Fig. 5.139 Gas as % of total production (OMV)[340]

Oil & gas reserves focus

The average gas reserves of OMV accounted for 45% of the total proved reserves base. The gas reserves development in % between 2000 and 2005 is introduced in figure 5.140.

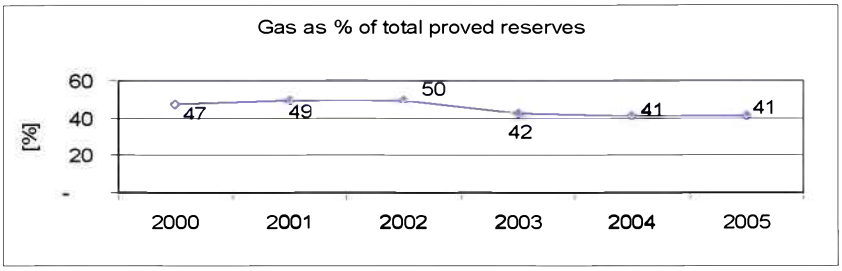


Fig. 5.140 Gas reserves as % of total proved reserves (OMV)[341]

The results of the analysis of the regional focus, the used EOR technology as well as of the resource portfolio of OMV AG can be summarized in the morphological box of table 5.113.

OMV AG			
Development and production (results in dark grey)			
Strategic view	Strategic indicator	Strategic behavior	
Regional	Regional focus	Development activity focused on core regions	Development activity focused on non-core regions

[340] Source: see http://www.herold.com
[341] Source: see http://www.herold.com

EOR	Focus on EOR-method	CO_2 injection	Gas cycling	Water flooding	All of them	
	Operatorship	Always	In most cases	Seldom	Never	
Resource portfolio	Conventional focus*	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Oil & gas production focus [Gas as % of production]	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Oil & gas reserves focus [Gas as % of reserves]	≤ 25%	26% - 50%	51% - 75%	> 75%	
	Non-conventional focus	Oil sands	Heavy oil	Tight gas	Coalbed methane	LPG

Tab. 5.113 Morphological box for development & production (part 1) (OMV) * Assumption

5.9.5 Development and production (part 2)

Focus on pipelines

OMV operates a large pipeline system in Austria. This pipeline network includes the WAG, HAG & Penta West from East to West as well as the TAG & SOL from North to South. In addition, OMV signed a joint venture agreement with Botas, Bulgarez, Transgas and MOL in order to initiate the so called Nabucco pipeline project. The pipeline which will have a length of 3.300 km is used to transport gas from the Caspian Area to Europe. Total costs for this project which should be finished in 2011 are estimated to be EURO 4,6 billion.

Downstream strategy

OMV AG has a 100% interest in the refineries Schwechat in Austria and Burghausen located in Germany. In addition, the company owns after the Petrom acquisition a 51% interest in the refineries of Arpechim and Petrobrazi situated in Romania. All refineries have a total average capacity of around 15,9 million tonnes of oil equivalent per year [MMTOE]. The average annual production between 2000 and 2005 accounted for 6,8 MMTOE. As a consequence, the volume based integration, refining capacity divided by annual production leads to a percentage value of 232%. The company could supply 43% of its total refining capacities by its own production. Refining capacities and the integration volume calculation are introduced in table 5.114.

Year	2000	2001	2002	2003	2004	2005
Refining [BBLD]						
Schwechat (AUT)	200.000	200.000	200.000	192.000	192.000	192.000
Burghausen (GER)	70.000	70.000	70.000	68.000	68.000	68.000
Arpechim (ROM)	-	-	-	-	70.000	70.000
Petrobrazi (ROM)	-	-	-	-	90.000	90.000
Sum	270.000	270.000	270.000	260.000	420.000	420.000
Average refining capacity [MMTOE]	15,9					
Average production [MMTOE]	6,8					
Downstream strategy [Capacity/production] [%]	**232,3**					

Tab. 5.114 Integration volume calculation (OMV)[342]

Upstream strategy

The average upstream production revenue as part of total sales and operating revenue accounted for 8% between 2000 and 2005. This value can indicate that OMV is downstream focused. The calculation is based on data provided in table 5.115.

Year	2000	2001	2002	2003	2004	2005
Total upstream production revenue [Mio USD]	881	686	694	979	1.228	1.705
Total sales & operating revenue [Mio USD]	8.516	8.630	8.681	11.371	16.606	24.711
Upstream production revenue as part of total sales & operating revenue [%]	10	8	8	9	7	7
Average [%]	**8**					

Tab. 5.115 Upstream revenue (OMV)[343]

Investment profile

The average development expenditures of OMV AG per year were USD 205 million. The profile can be characterized as "increasing" in the morphological box. The development expenditures between 2000 and 2005 are provided in figure 5.141.

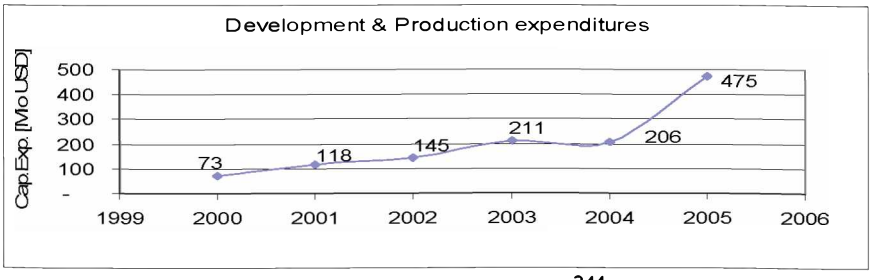


Fig. 5.141 Development and production expenditures (OMV)[344]

[342] Source: see http://www.herold.com
[343] Source: see http://www.herold.com
[344] Source: see http://www.herold.com

Daily Boe production

The average daily Boe production per well of OMV was 75 Boe between 2000 and 2005. The profile can be classified as "decreasing" in the morphological box. The daily Boe production profile is introduced in figure 5.142. A consequence of the Petrom acquisition in 2004 was a strong reduction in the daily Boe production per net producible well which can be seen in the illustration.

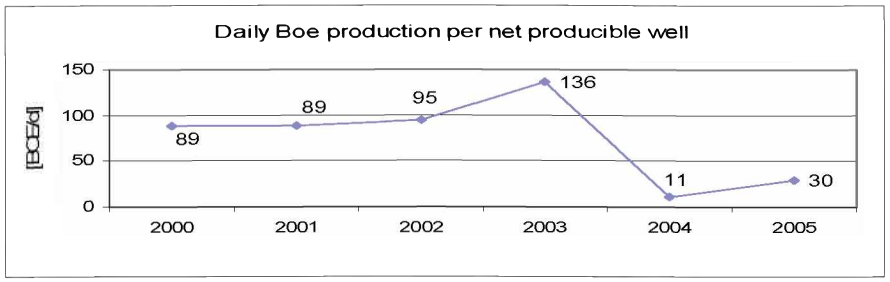


Fig. 5.142 Daily Boe production per net producible well (OMV) [345]

The results of the analysis of the midstream, downstream and upstream sector as well as of the investment and production profile are provided in table 5.116.

OMV AG						
Development and production (results in dark grey)						
Strategic view	Strategic indicator	Strategic behavior				
Midstream	Focus on LNG	No		Operating	Participating	
Midstream	Focus on pipelines	No		Operating	Participating	
Coordination strategy between upstream and downstream	Downstream strategy Volume based integration [Refining capacity/annual production]	No	< 33%	33% - 66%	67%-100%	> 100%
	Upstream strategy [Revenue of upstream as part of total sales and operating revenues]	< 10%	10% - 24%	25% - 50%	51% - 75%	> 75%
Investment	Investment profile	⟋	—	⟍	∪	∩
Net production profile	Trend in daily Boe production per net producible well	⟋	—	⟍	∪	∩

Tab. 5.116 Morphological box for development & production (part 2) (OMV)

5.9.6 Acquisition

Acquiring reserves

Data about acquired reserves are announced between 2002 and 2005. OMV AG acquired annually an average of 278 MMBOE of reserves from 2002 to 2005. Detailed data are provided in table 5.117.

[345] Source: OMV AG

Year	2000	2001	2002	2003	2004	2005
Total reserves acquired [MMBOE]	Not announced	Not announced	6	81	1.025	0
Average [MMBOE]	278					

Tab. 5.117 Total reserves acquired per year (OMV)[346]

Regional focus

The main acquisitions were focused on the Preussag GmbH in 2003 and on the Romanian company Petrom in 2004. The Petrom acquisition extended the core region in South/East Europe (Romania and around the Caspian Area). The Preussag acquisition increased the position in North Africa & Middle East and opened a new area in Latin America (Venezuela, Ecuador). As a consequence, it can be defined in the morphological box that OMV AG performed more than 75% of its acquisitions in core regions.

Intensity strategy

Because of the fact that OMV performed one acquisition in 2003 and the other one in 2004, the acquisition intensity of the company in the morphological box can be characterized as less than one annually acquisition during the last years.

Cost strategy

Data about acquisition costs are provided between 2002 and 2004. The average acquisition costs were 3,3 USD per Boe acquired reserves. The different acquisition costs per year are introduced in figure 5.143.

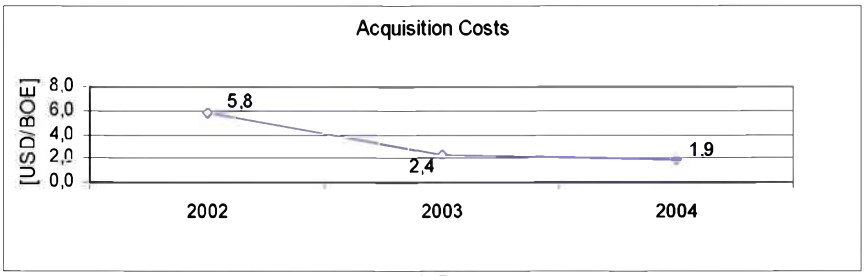


Fig. 5.143 Acquisition costs per year (OMV)[347]

Focusing on acquisitions or farm ins

Information about the numbers of farm ins and acquisitions are available between 2003 and 2005. OMV performed two farm ins in Australia and Germany as well as two acquisitions (Preussag, Petrom) between 2003 and 2005. The acquisition rate accounted for 50% by dividing the number of acquisitions through the numbers of farm ins and acquisitions.

The results of the analysis of the acquisition segment for OMV AG are summarized in table 5.118.

[346] Source: see http://www.herold.com
[347] Source: see http://www.herold.com

OMV AG					
Acquisition (results in dark grey)					
Strategic view	Strategic indicator	Strategic behavior			
Reserve strategy	Acquiring reserves [MMBOE/year]	< 50	50 - 100	101 - 200	> 200
Regional	Regional focus* [% of acquisitions in core regions]	< 25%	25% - 50%	51% - 75%	> 75%
Acquisition intensity	Intensity strategy* [Acquisitions/year]	0	< 3	3 - 5	> 5
Acquisition cost strategy	Cost strategy Acquisition costs [USD/BOE]	< 3	3 - 5	6 - 8	> 8
Acquisition vs. farm in	Focusing on acquisitions or farm ins [Acquisition rate as %]	< 25%	25% - 50%	51% - 75%	> 75%

Tab. 5.118 Morphological box for acquisition (OMV) * Assumption

5.9.7 Cooperation

Alliance

There was no information available concerning any involvements of OMV in alliances.

Joint venture

In 2001 OMV signed a four year exploration contract with the NOC of Iran for an onshore operating block called Mehr. Joint venture partners were the NOC, Repsol and Sipetrol.
In Libya, OMV was a partner in a joint venture development project which covered several blocks of the Murzuq field. Part of this joint venture was the NOC, Hydro, TOTAL and Repsol. During 2005 OMV started also a joint venture in Australia with Tap Oil and Nippon Oil for an exploration offshore project.

Other partnership

In 2003 OMV (40%) and Repsol (60%) signed an agreement with the NOC of Libya for the exploration of six blocks located on- and offshore. In addition, OMV was a partner in an ultra deepwater exploration project located offshore Pakistan with TOTAL as the operator and the NOC's Marigas & OGDCL.
In 2004 a development and exploration agreement was signed with the government of Albania concerning an offshore block. In the United Kingdom, OMV participated in several development and exploration projects with major oil companies like Shell, Statoil, BP and Chevron. During 2005 OMV achieved an E&P agreement with the Republic of Yemen. At the end of 2005 a gas sale agreement was signed with the Russian company Gazexport Ltd.

The results of the analysis of different kind of cooperations are summarized in table 5.119.

OMV AG						
Cooperation (results in dark grey)						
Strategic view	Strategy	Strategic behavior				
Cooperation strategy	Alliance	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Alliance partner	No	NOCs	States	Major IOCs	Service companies
	Joint venture	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Joint venture partner	No	NOCs	States	Major IOCs	Service companies
	Other partnership	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Other partner	No	NOCs	States	Major IOCs	Service companies

Tab. 5.119 Morphological box for cooperation (OMV)

5.9.8 Human resources

The HR strategy of OMV AG between 2000 and 2005 can be characterized by a strong increase of staff as well as by a strong decrease of the EBITDA per employee. The development of the number of employees as well as of the EBITDA per employee is described in figures 5.144 and 5.145.

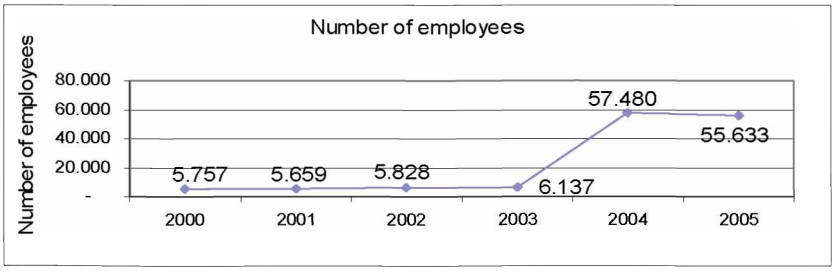


Fig. 5.144 Employee development (OMV)[348]

[348] Source: see Annual Reports (2000-2006)

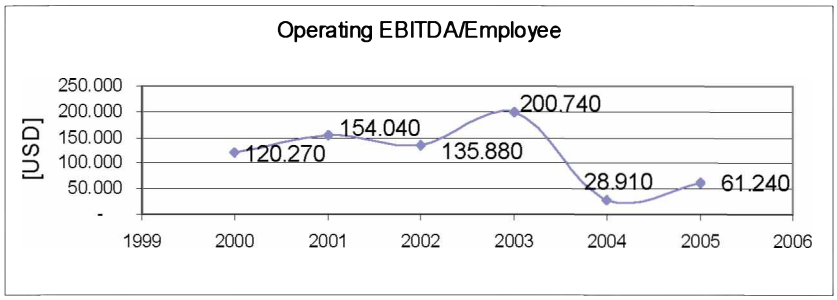


Fig. 5.145 EBITDA/employee development (OMV)[349]

5.9.9 Energy portfolio

No information was available about any investments of OMV in wind power, solar or in biomass.

The results of the analysis of the HR and energy portfolio segment are provided in table 5.120.

OMV AG					
HR & energy portfolio (results in dark grey)					
Strategic view	Strategy	Strategic behavior			
HR	HR strategy	Strong increase of staff	Slight increase of staff	Slight decrease of staff	Strong decrease of staff
		Strong increase of EBITDA/employee	Slight increase of EBITDA/employee	Slight decrease of EBITDA/employee	Strong decrease of EBITDA/employee
Energy portfolio	Alternative energy focus	No	Focus on wind power	Focus on solar energy	Focus on biomass

Tab. 5.120 Morphological box for HR & energy portfolio (OMV)

[349] Source: see http://www.herold.com

6 Conclusion

A strategic conclusion of the analyzed E&P companies can be performed by summarizing the strategic behavior patterns of all companies into one morphological box. In order to work with this overall morphological box for all companies it is important to differentiate the E&P companies according to their performance levels. In that way, a classification of the defined E&P companies as "good" or "weak" performers is useful in order to watch out for possible strategic trends or behaviors of these two performance groups in the morphological box. The performance differentiation of the analyzed E&P companies is described in chapter 6.1.

6.1 Ranking of E&P companies

The classification of E&P companies into "good" and "weak" performers can be achieved by identifying relevant indicators. The indicators which are described in table 6.1 are the result of a brainstorming process with the supervisors of the diploma thesis, Dr. Posch and Dr. Iro at the strategic department of OMV E&P GmbH. Indicators which cover the financial part are defined as the EBIT/BOE production, EBIT/employee, ROACE and lifting costs/BOE production. Technical indicators are defined as reserves additions and remaining life time. The reserves additions can be calculated by the following way:

Reserves additions [MMBOE] = [Reserves (2005) + Production (2001 till 2005)] - [Reserves (2000)]

The remaining life time can be defined as the division of the reserves through the production. All indicators which are described in table 6.1 are based on data of 2005. The average ranking which is introduced in the last row of the table can be calculated by ordering every company from the best (1) to the weakest (9) by looking at every indicator in each row. The average ranking is defined as the average performance from (1) to (9) of each company in each row. As a consequence, the company with the smallest average ranking value can be classified as the best company (1).

General company comparison									
Indicators	E&P companies								
	1	2	3	4	5	6	7	8	9
EBIT/BOE production [USD/BOE]	36,65	24,47	33,77	25,86	24,58	38,11	18,34	17,19	16,84
EBIT/employee [USD/employee]	909.567	837.964	548.003	1.499.021	1.180.303	172.251	191.731	42.589	189.006
ROACE [%]	33,76	24,26	23,76	22,93	18,66	22,68	14,0	18,03	12,21
Lifting costs/ BOE production [USD/BOE]	9,3	3,3	3,5	9,5	7,5	9,4	9,2	12,8	7,3
Reserves additions [MMBOE]	1.478	1.647	1.906	1.757	1.328	753	679	1.257	347
Remaining life time [Reserves/production]	13,61	11,89	9,94	13,02	15,46	10,32	9,0	10,7	7,61
Average Ranking	3,0	3,3	3,5	3,6	**3,83**	5,6	7,0	7,3	7,6
	„Good" performance					„Weak" performance			

Tab. 6.1 Ranking of E&P companies

By looking at the average ranking range of table 6.1 it can be observed that there is clear leap in the ranking scale at the value 3,83. As a consequence, this value can be used as a border line in order to define two different performance groups. In that way, Occidental Petroleum, British Gas, Statoil ASA, Apache Corporation and Anadarko Corporation can be classified as "good" performers. The other companies of the strategic analysis, Marathon Oil, Amerada Hess, OMV AG and Repsol YPF are defined as "weak" performers.

6.2 Morphological box for all E&P companies

A classification of the defined E&P companies into "good" and "weak" performers as described in chapter 6.1. is useful in order to identify a possible strategic trend of the analyzed E&P companies in the morphological box. In general, a visualization method has to be found to get an overview of the different E&P companies in the morphological box. Companies which are part of the "good" performance group are shown with blue numbers and "weak" performers have red numbers in the overall morphological box. The number of each company also defines its performance ranking. The results of the strategic analysis of OMV AG are given in grey boxes. The different signs of E&P companies in the morphological box can be described by the following way:

"Good" performers:	"Weak" performers:
Occidental Petr.	**Marathon Oil** 6
British Gas	**Amerada Hess** 7
Statoil ASA	**OMV AG** 8
Apache Corp.	**Repsol YPF** 9
Anadarko Corp.	

The results of the analysis of different strategic behaviors of these E&P companies are provided in chapter 5. The specific analysis of each company is used to perform a possible strategic conclusion for all defined E&P companies. Each segment of the morphological box has to be analyzed. The first part of the morphological box covers the strategic behavior of every E&P company concerning the exploration and appraisal segment as described in tables 6.2 and 6.3.

Exploration and appraisal (overall)

In general, E&P companies seem to have more success when they are strongly upstream focused. Focus players like Occidental Petroleum, British Gas, Apache and Anadarko Corporation which show a good performance do not have a downstream business. The other focus players like OMV AG, Amerada Hess and Marathon Oil which are integrated companies are ranked on the last places as it can be seen in table 6.1.

The integrated- as well as the upstream focused companies concentrated its exploration activities on core regions. By looking at the average risk levels of the companies countries activities it can be observed that Occidental Petroleum as the best performer as well as Repsol YPF as the weakest performer operate in high risk regions.

The drilling technology part of the morphological box indicates that Occidental Petroleum and British Gas, which are on the first places of the performance ranking use multilateral and horizontal drilling techniques. All E&P companies except OMV AG seem to have technical competences in drilling horizontal wells. The technical success rate does not define a company as "good" or "weak" performer because Occidental's average technical success rate is below 50%. Further on, "good" performance companies have a high asset based operatorship, as described in table 6.2, which indicates a clear upstream focused strategy and more experience in planning exploration projects.

Exploration and appraisal					
Strategic view	Strategic indicator	Strategic behavior			
Regional	Regional focus	Exploration concentration in core regions 1 3 4 5 6 7 8	Development of new exploration regions 2	Near field exploration	
Risk	Risk exposure	Low 4 6	Middle 3 5 7	High 1 9	
Drilling technology	Technology focus	Unconventional (Polar, Deepwater, Fractured…)	Conventional onshore 3 5 8	Shallow offshore 4 9	Covering all 2 3 5 7 6
	Focus on method	Multilateral 1 2	Horizontal 1 2 3 4 5 6 7 9	Normal	
	Technical success rate	≤ 25%	26% - 50% 1 4 7 9	51% - 75% 3 5 8	> 75%
	General operatorship (Asset based)	≤ 25%	26% - 50% 3 7	51% - 75% 1 2 5 9 6	> 75% 4
	Deepwater operatorship (Asset based)	≤ 25% 3 4	26% - 50% 2 3 6 7 9	51% -75% 5	> 75%

Tab. 6.2 Exploration & appraisal (overall)

It can be seen in table 6.3 that all analyzed E&P companies focus on seismic surveys on their core regions. Just BG Group also tries to develop new exploration regions.
The integrated companies as well as the upstream focused companies increased the exploration expenditures every year. There is no specific USD range in exploration expenditures per year which defines a company as a "good" or a "weak" performer because Occidental Petroleum which is ranked on the first place as well as OMV AG, Marathon Oil and Amerada Hess spent less than USD 400 million for exploration at the end of 2005. All other described E&P companies had exploration expenditures which passed USD 400 million per year. Anadarko Corporation is the leader in this category with exploration expenditures of USD 722 million at the end of 2005.
By looking at the reserve replacement rate strategy it can be observed that "good" performance companies like Occidental Petroleum, Statoil ASA and Anadarko Corporation can be characterized by a constant reserve replacement rate profile.

Exploration and appraisal						
Strategic view	Strategic indicator	Strategic behavior				
Seismic technology	Regional focus	Core regions		Non core regions		
	Focus on method		3 D	4 D	All methods	
Investment	Investment profile					
Reserve replace-ment strategy	Reserve replacement rate 2005	≤ 50%	51% - 100%	101%-200%	201% - 300%	> 300%
	Annual reserve replacement profile					

Tab. 6.3 Exploration & appraisal (overall)

Development and production (overall)

The strategic conclusion of the development and production segment is based on the morphological boxes of tables 6.4 and 6.5.

Generally, upstream focused- as well as integrated companies try to use all possible EOR methods in their core regions. Companies like Statoil ASA or Occidental Petroleum are even defined as industry leaders in using stimulation techniques like CO_2 injection. All analyzed E&P companies operate EOR projects in most cases.

It can be seen in the resource portfolio part of table 6.4 that the reserves contingent of most of the "good" performance companies is strongly conventional focused. The only exceptions are Anadarko Corporation which has technological skills in developing unconventional resources like tight gas or coalbed methane and Statoil ASA which has interests in the LPG sector. In addition, the relative gas reserves base of upstream focused companies seems to be larger than of the integrated ones. All analyzed E&P companies except Amerada Hess and BG Group have minor or some interests in unconventional resources.

The results of the strategic analysis out of the regional focus, used EOR technology as well as out of the resource portfolio view are provided in table 6.4.

Development and production						
Strategic view	Strategic indicator	Strategic behavior				
Regional	Regional focus	Development activity focused on core regions 1 2 3 4 5 6 7 9			Development activity focused on non-core regions	
EOR	Focus on EOR-method	CO_2 injection	Gas cycling	Water flooding	All of them 1 2 3 4 5 6 7 9	
	Operatorship	Always 1	In most cases 2 3 4 5 6 7 9	Seldom	Never	
Resource portfolio	Conventional focus*	≤ 25%	26% - 50% 5	51% - 75% 3 6 9	> 75% 1 2 4 7	
	Oil & gas production focus [Gas as % of production]	≤ 25% 1	26% - 50% 2 4 6 7 9	51% - 75% 3 5	> 75%	
	Oil & gas reserves focus [Gas as % of reserves]	≤ 25% 1	26% - 50% 6 7	51% - 75% 2 3 4 5 9	> 75%	
	Non-conventional focus	Oil sands	Heavy oil 1 3 6	Tight gas 1 2 6	Coalbed methane 4 5 6	LPG 3 6 9

Tab. 6.4 Development & production (overall) *Qualitative

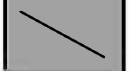
By looking at the midstream segment which is described in table 6.5 it can be seen that integrated companies as well as independent companies are investing in the LNG sector. The only exceptions are OMV AG as well as Apache Corporation and Occidental Petroleum. Especially BG Group has a strong integrated gas position with a portfolio of LNG liquefaction and regasification assets as well as control of LNG shipping.

The coordination strategy part between upstream and downstream in the morphological box shows that Statoil ASA is the only analyzed E&P company with a "good" performance which has interests in refineries. The refining capacities of Marathon Oil, Repsol YPF and OMV AG are even higher than their production potentials.

It can also be observed that the independent companies have significantly higher upstream revenues than the integrated ones. The average upstream revenues as part of total sales and operating revenues is below 30% for all integrated companies. It accounts 11% for Marathon Oil, 17% for Repsol YPF, 24% for Amerada Hess and 30% for Statoil ASA. OMV´s average upstream revenue as part of total sales and operating revenues is the smallest one with just 8%.

The results of the analysis of different investment profiles of E&P companies can be interpreted that all companies except Repsol YPF and BG Group increased the development and production expenditures steadily during the last years.

The last part of the development and production focused morphological box shows that Repsol YPF and OMV AG are the only companies which can be characterized by a downwards trend in the daily Boe production per net producible well.
Occidental Petroleum, Statoil ASA as well as Apache Corporation could maintain the net production per well. Anadarko Corporation is the only company which could increase the daily Boe production per net producible well.
Table 6.5 provides information about the specific strategic results for E&P companies concerning the midstream, downstream, upstream and investment part of the development and production segment.

Development and production						
Strategic view	Strategic indicator	Strategic behavior				
Midstream	Focus on LNG	No		Operating	Participating	
Midstream	Focus on pipelines	No		Operating	Participating	
Coordination strategy between upstream and downstream	Downstream strategy Volume based integration [Refining capacity/annual production]	No	< 33%	33% - 66%	67%-100%	> 100%
	Upstream strategy [Revenue of upstream as part of total sales and operating revenues]	< 10%	10% - 24%	25% - 50%	51% - 75%	> 75%
Investment	Investment profile					
Net production profile	Trend in daily Boe production per net producible well					

Tab. 6.5 Development & production (overall)

Acquisition

By looking at the acquisition segment of the morphological box it can be observed that the average amount of acquired reserves per year does not define a company as "good" or "weak" performer because BG Group which is ranked on the second place acquires less than 100 MMBOE per year and Occidental Petroleum which is ranked on the first place acquires more than 200 MMBOE per year. Repsol YPF as well as OMV AG are the only integrated companies which follow the same strategy as Occidental Petroleum in this case.
Integrated- as well as independent companies focused on acquisitions on their core regions.
All analyzed E&P companies perform an average of less than three acquisitions per year. The only exception is Anadarko Corporation which has the biggest acquisition intensity per year.
By looking at the acquisition costs it can be observed that especially the best performers, Occidental Petroleum and British Gas, seem to deal with the highest acquisition costs.

Repsol YPF is part of companies which acquire the largest amount of reserves per year and has to deal with the lowest acquisition costs per BOE acquired reserves.
The results of the specific strategic analysis of the acquisition segment are provided in table 6.6 for all E&P companies.

Acquisition					
Strategic view	Strategic indicator	Strategic behavior			
Reserve strategy	Acquiring reserves [MMBOE/year]	< 50	50 – 100	101 – 200	> 200
Regional	Regional focus [% of acquisitions in core regions]	< 25%	25% - 50%	51% - 75%	> 75%
Acquisition intensity	Intensity strategy [Acquisitions/year]	0	< 3	3 – 5	> 5
Acquisition cost strategy	Cost strategy Acquisition costs [USD/BOE]	< 3	3 – 5	6 – 8	> 8

Tab. 6.6 Acquisition (overall)

Cooperation

By looking at the cooperation segment of the morphological box it can be observed that Occidental Petroleum and Anadarko Corporation as well as Marathon Oil and Amerada Hess use alliances for development projects. Partners in these projects can be NOCs or states. Marathon Oil and Amerada Hess as "weak" performance companies also try to get in contact with major international oil companies too. For example, Marathon and Hess are part of the so called Oasis Consortium with ConocoPhillips and the NOC of Libya for performing development projects. Anadarko even formed an own company with the NOC of Algeria to get access to the country's resources. Apache has a marketing alliance with a service company.
Cooperations which are classified as joint ventures could be observed for all analyzed companies except for Marathon Oil. Partners in development projects are NOCs as well as major international oil companies. Amerada Hess has a joint venture with PDVSA (NOC of Venezuela) concerning a refinery. Joint venture partners in LNG projects are also NOCs or major international oil companies.
Specific behavior patterns for cooperations which are not defined as joint ventures or strategic alliances have to be looked up individually for each company in chapter 5 because an overall strategic trend can not be identified.
The results of the strategic analysis of the cooperation segment are introduced in table 6.7.

Cooperation						
Strategic view	Strategy	Strategic behavior				
Cooperation strategy	Alliance	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Alliance partner	No	NOCs	States	Major IOCs	Service companies
	Joint venture	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Joint venture partner	No	NOCs	States	Major IOCs	Service companies
	Other partnership	No	Refineries	LNG projects	Oil/gas sale contracts	Development fields
	Other partner	No	NOCs	States	Major IOCs	Service companies

Tab. 6.7 Cooperation (overall)

Human resources and energy portfolio

By looking at table 6.8 it can be observed that all companies except OMV AG could increase its EBITDA/employee between 2000 and 2005. Staff increased or decreased in all other companies but the operating EBITDA/employee trend was not downwards. A special status has Apache Corporation because the company reached a strong expansion in EBITDA/employee even with a strong increase in staff. BG Group could achieve a strong increase of EBITDA/employee through a strong decrease of staff. Marathon Oil is the only company of the "weak" performance group which could increase its EBITDA/employee massively through a slight decrease of staff.
Concerning the energy portfolio segment it can be seen that just the regional majors like Repsol YPF and Statoil ASA extended the energy portfolio with alternative energies like wind or biomass.

Table 6.8 describes the results of the strategic analysis of the HR and energy portfolio segment for all defined E&P companies.

HR & energy portfolio					
Strategic view	Strategy	Strategic behavior			
HR	HR strategy	Strong increase of staff	Slight increase of staff	Slight decrease of staff	Strong decrease of staff
		Strong increase of EBITDA/employee	Slight increase of EBITDA/employee	Slight decrease of EBITDA/employee	Strong decrease of EBITDA/employee
Energy portfolio	Alternative energy focus	No	Focus on wind power	Focus on solar energy	Focus on biomass

Tab. 6.8 HR & energy portfolio (overall)

6.3 Summary and conclusion for OMV AG

The last part of the diploma thesis provides a summary of the overall morphological boxes and deals with the identification and derivation of possible strategic conclusions for OMV AG. These conclusions are based on observations and interpretations of qualitative and quantitative information of this thesis.

By looking at the exploration & appraisal segment of the morphological box it can be observed that OMV AG as well as the "good" performance companies focus their exploration activities on core regions with a medium risk level. A success factor of Occidental Petroleum seems to be that the company operates in high risk countries.
The analysis of the drilling technology part of the morphological box shows that having experiences in the utilization of horizontal and multilateral drilling techniques is a significant success factor in the E&P business. It can be seen in the morphological box that OMV AG is the only company which prefers just normal drilling operations. Nevertheless the average technical success rate accounts for 53% which is in the range of the "good" performers.
Further on, a high percent value concerning the operatorship seems to be another important success indicator for an E&P company. For example, the asset based operatorship of Apache Corporation accounted for 83% at the end of 2006 in comparison to OMV AG with 39%.
The analysis of the seismic technology part of the morphological box provides the information that all E&P companies including OMV AG prefer the application of 2 D as well as 3 D seismic methods in their core regions. The only exceptions are Statoil ASA and Apache Corporation which use all kind of seismic technologies. Investing in 4 D seismics can serve as an additional success factor for Apache Corporation.
In addition, it can be observed that OMV AG as well as the "good" performance companies increase the investments for exploration and appraisal steadily during the last years. By looking at the exploration expenditures of each company in 2005, OMV AG takes the last place in this ranking with exploration expenditures of USD 188 million in comparison to Anadarko Corporation with exploration expenditures of USD 722 million.
By analyzing the development and production segment of the morphological box it can be summarized that OMV AG uses the same strategy as successful E&P companies by operating all kind of possible stimulation methods in core regions.

Further on, the results of the resource strategy analysis in the morphological box can be interpreted that a success factor of Occidental Petroleum and British Gas seems to be a strong conventional resource base. OMV AG also follows this resource strategy.
The analysis of the oil and gas reserves focus of E&P companies leads to the general conclusion that the gas reserves base of "good" performance companies seems to be larger (greater than 50% of total proved reserves) than of the "weak" performance companies. On the other side, the only exception is Occidental Petroleum which follows a strongly oil focused reserves strategy. The average gas reserves of Occidental Petroleum accounted for 18% of the total proved reserves in comparison to OMV AG with 41%.
Concerning the unconventional resource portfolio it can be summarized that successful companies like Occidental as well as BG Group have minor or no interests in these kind of resources as well as OMV AG.
By analyzing the midstream segment of the morphological box it can be observed that until 2005 all companies except OMV AG and the independent companies Apache Corporation and Occidental are interested in the LNG sector. OMV AG could expand its strong integrated position in the Middle and South East of Europe by investing in the LNG sector which can open new markets. Concerning the pipeline sector of the midstream segment it can be summarized that all successful E&P companies operate pipelines as well as OMV AG.
The analysis of the coordination strategy part of the morphological box provides the conclusion that all E&P companies of the "good" performance group, except Statoil ASA, just perform upstream operations. OMV AG as well as Marathon Oil and Repsol YPF produce less than they could refine. Further on, the average upstream revenues as part of total sales and operating revenues of the "good" performers are significantly higher than of the other companies. It accounts for more or equal to 50% for all successful E&P companies. The only exception is Statoil which achieved an average value of 30% in this category. The upstream revenue as part of the total sales and operating revenues for OMV AG accounted for 8% which is the smallest one of all analyzed E&P companies.
In general, most of the companies of the "good" performance group increased the development expenditures steadily during the last years. OMV AG also followed this successful strategy but with the lowest financial effort of all companies of the peer group. At the end of 2005, Apache spent USD 3.358 million for development and production activities in comparison to OMV AG with USD 475 million. By taking the relative value of development and production expenditures divided by BOE production, Apache spent nearly USD 21 per BOE production in comparison to OMV AG with USD 3,8 of development and production expenditures per BOE production in 2005.
It has to be considered that the Petrom acquisition in 2004 was the biggest transaction in the history of OMV AG. This transaction increased the reserves base and the daily production but the net production per well was reduced significantly. The daily BOE production per net producible well was reduced by nearly 92% from 136 BOE/d in 2003 to 11 BOE/d in 2004. It can be the consequence because of producing out of mature fields in Romania. Companies of the "good" performance group could maintain or even increase the daily BOE production per well.
By looking at the acquisition segment of the morphological box it can be observed that Occidental Petroleum as the best performer of the peer group as well as OMV AG acquired an average of more than 200 MMBOE of reserves per year. In addition, successful E&P companies perform less than three acquisitions per year. These acquisitions are focused on core regions. OMV AG also shows this strategic behavior pattern and has to deal with lower acquisition costs per BOE in comparison to Occidental Petroleum or British Gas.
The results of the analysis of the cooperation part of the morphological box can be interpreted that the development of strategic alliances seems to be a success factor for an E&P company. Occidental Petroleum, Apache and Anadarko Corporation formed alliances with states, NOCs or service companies in comparison to OMV AG which does not report any involvements in alliances. A general success factor is the initiation of joint ventures for field development projects with NOCs or major international oil companies. OMV AG also follows this strategic trend together with other successful E&P companies.

A success factor of British Gas in the LNG sector seems to be the development of joint ventures together with NOCs and major international companies.
By looking at the "other partnership" segment of the cooperation part it can be observed that OMV AG follows the international trend of E&P companies of the "good" performance group which try to form partnerships for development projects or in combination with oil or gas sale contracts with NOCs, states and major international oil companies.
The analysis of the HR strategy of different companies leads to the conclusion that OMV AG is the only company which can be characterized by a downwards EBITDA/employee trend. Statoil ASA and Apache Corporation also showed a strong increase of staff like OMV AG but the EBITDA/employee profiles can be classified as increasing.
The decreasing of the EBITDA/employee profile of OMV AG can also be a consequence of the Petrom acquisition. In addition, it has to be mentioned that OMV AG has the largest staff of all described companies. At the end of 2005, OMV AG had 49.919 employees in comparison to Repsol YPF with 35.909 employees, Marathon Oil with 27.756 employees, Statoil ASA with 25.644 employees and Amerada Hess with 11.610 employees. The success factor of Occidental Petroleum and British Gas can be that both companies achieved a strong increase of EBITDA/employee by a reduction of staff. All analyzed companies which are part of the "good" performance group, except Statoil, had less than 10.000 employees at the end of 2005.
Finally, the last part of the morphological box covers alternative energies which seem to be economic interesting just for regional majors like Statoil ASA and Repsol YPF and not for a focus player like OMV AG.
Summarized, the significant success factors between 2000 and 2005 in the E&P business were having a focus on upstream operations, using horizontal and multilateral drilling techniques, a high asset based operatorship, performing all kind of seismic technologies, a strong conventional resource base, investing in the LNG sector as well as initiating joint ventures and alliances with NOCs and major international oil companies.

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Apache Corporation (2000-2006)
2000:
http://investor.apachecorp.com/sec.cfm?DocType=Annual&Year=2000
2001:
http://investor.apachecorp.com/sec.cfm?DocType=Annual&Year=2001
2002:
http://investor.apachecorp.com/sec.cfm?DocType=Annual&Year=2002
2003:
http://investor.apachecorp.com/sec.cfm?DocType=Annual&Year=2003
2004:
http://investor.apachecorp.com/sec.cfm?DocType=Annual&Year=2004
2005:
http://investor.apachecorp.com/sec.cfm?DocType=Annual&Year=2005
2006:
http://investor.apachecorp.com/sec.cfm?DocType=Annual&Year=2006

Occidental Petroleum (2000-2005)
2000:
http://www.oxy.com/PUBLICATIONS/Annual_reports/AR%202000.pdf
2001:
http://www.oxy.com/PUBLICATIONS/Annual_reports/10ka_2001.pdf
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http://www.oxy.com/PUBLICATIONS/Annual_reports/10K_2002.pdf
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2004:
http://www.oxy.com/PUBLICATIONS/Annual_reports/AR_2004.pdf
http://www.oxy.com/2004_AnnualReport/united_states.htm
2005:
http://www.oxy.com/PUBLICATIONS/Annual_reports/10K_2005.pdf
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BG Group (2000-2005)
2000:
http://ir.bg-group.com/bgir/stor/ar_and_accounts_00_images.pdf

2001:
http://ir.bg-group.com/bgir/stor/ar_and_accounts_01_images.pdf
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2003:
http://www.investis.com/bgir/reports/ar2003/report2003.pdf
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2005:
http://www.investis.com/bgir/report/ar2005/ar2005.pdf

Statoil ASA (2000-2005)

2000:
http://www.statoil.com/inf/svg02304.nsf?opendatabase&lang=en&app=2000year
2001:
http://www.statoil.com/inf/svg02304.nsf?opendatabase&lang=en&app=2001year
http://www.statoil.com/fin/NR303094.nsf/Attachments/20F_dokumentet.pdf/$FILE/20F_dokumentet.pdf
2002:
http://www.statoil.com/FIN/NR303094.nsf/Attachments/20F-2002.pdf/$FILE/20F-2002.pdf
http://www.statoil.com/inf/SVG02304.nsf?opendatabase&lang=en&artid=629E2DC8DFB81A19C1256CF60039523F&app=2002year&cat=
2003:
http://www.statoil.com/FIN/NR303094.nsf/Attachments/20F2003/$FILE/20F_2003.pdf
http://www.statoil.com/INF/SVG02304.nsf/Attachments/Chapter9.pdf/$FILE/2003_Annual.pdf
2004:
http://www.statoil.com/statoilcom/svg00990.nsf/Attachments/20F2004/$FILE/20_f_report_2004.pdf
http://www.statoil.com/statoilcom/svg00990.nsf//Attachments/Aarsrapport+2004/$FILE/2004_Annual.pdf
2005:
http://www.statoil.com/INF/SVG03636.NSF/images/bilder2005/$FILE/2005_Annual_en.pdf
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Repsol YPF (2000-2005)

2000:
http://www.repsolypf.com/imagenes/es_en/informe20F__2391_tcm11-49778.pdf
2001:
http://www.repsolypf.com/imagenes/es_en/informe2001%2E20f__18693_tcm11-49870.pdf
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http://www.repsolypf.com/imagenes/es_en/AnnualReport2002_eng__45212_tcm11-49767.pdf
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http://www.repsolypf.com/imagenes/es_en/InfAnual2003_eng__70297_tcm11-49771.pdf
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http://www.repsolypf.com/imagenes/es_en/20F_2004_Definitvo_Repsol_YPF__111761_tcm11-13746.pdf
http://www.repsolypf.com/imagenes/es_en/InfAnual_Ingles_04__106876_tcm11-49716.pdf
2005:
http://www.repsolypf.com/imagenes/es_en/Informe_Anual_2005_eng__169669_tcm11-228803.pdf
http://www.repsolypf.com/imagenes/es_en/Informe_20-F__171071_tcm11-232554.pdf

APPENDIX

The Appendix consists of detailed analysis of defined E&P companies concerning Exploration & Appraisal, Development & Production, Acquisition, Cooperation, HR and Energy Portfolio.

Amerada Hess

Hess Corporation is a global integrated energy company with the business areas exploration & production as well as refining & marketing. The headquarters of the company are located in New York City. The company operates in the United States, United Kingdom, Norway, Denmark, Equatorial Guinea, Gabon, Libya, Algeria, Azerbaijan, Russia, Malaysia, Thailand and Indonesia. The four core areas are the United States, North Sea, North/West Africa and South/East Asia.

Exploration and Appraisal

The major core areas for exploration are the Gulf of Mexico, West Africa as well as South/East Asia. During 2001, Amerada Hess tried to explore its new fields in Equatorial Guinea, which were acquired through the Triton Energy acquisition. In 2001 Amerada Hess drilled its first exploration well offshore in Equatorial Guinea. (A.R.2001)

In Equatorial Guinea, Amerada Hess increased its position by discovering the Ebano, Akom and Abang fields during 2002. The company held a working interest of 85%. During 2002 Hess used its experience in the Gulf of Mexico by drilling a well in the so called Green Canyon block. The company held an interest of 28% of this block. The well which had a hydrocarbon potential was drilled to a total measured depth of 2.100 m. (A.R.2002)

Amerada Hess increased the exploration activities in the Gulf of Mexico during the year 2003. A successful appraisal drilling well in the Green Canyon block as well as a discovery well in the Mississippi Canyon block were the highlights of this year. (A.R.2003)

The exploration activities of 2004 were mainly focused on deepwater Gulf of Mexico, on the North-Eastern of Thailand and on Malaysia.
In 2005 Amerada Hess added new exploration areas to their portfolio. The method of acquisition was used to get new exploration assets in Libya, Egypt, Brazil and around the Caspian Area. (A.R.2005)

Technology strategy

In 2000, Hess signed an exploration agreement with Petronas (NOC of Brazil) for a block in Algeria. The contract included a 2 D seismic survey. (A.R.2000)

During 2002, Amerada Hess and its partners initiated 2 D and 3 D seismic survey for a block located on the Faroe Islands. A 3 D seismic survey was also initiated for a block in Brunei.

In 2003 a 3 D seismic survey was finished for an operating deepwater block located in Malaysia. (A.R.2003)

During 2004, Amerada Hess tried to explore new potential hydrocarbon areas in Algeria. The Corporation Company held a 60% interest of a block. Seismic methods were used to identify an adequate potential. (A.R.2004)

Development and Production

The Corporation produces crude oil and natural gas in the United States, Europe, Equatorial Guinea, Gabon, Indonesia, Thailand, Azerbaijan, Algeria and Colombia. Amerada Hess' US operations are located offshore in the Gulf of Mexico and onshore in Texas, Louisiana and North Dakota.

During 2000, 26% of the global crude and natural gas liquids production and 43% of its natural gas production was due to activities in the USA.
The main production area in Europe is the United Kingdom since the company got its first U.K. license in 1964. In 2000, Amerada Hess produced 48% of its worldwide oil and natural gas liquids and 44% of its natural gas in the U.K. (A.R.2000)

In 2001, the production activities were focused on the USA, United Kingdom, Denmark, Norway, Gabon, Faroe Islands, Colombia and Indonesia.
Amerada set its first step in Indonesia by acquiring operations of the company Anadarko.
Die difference between 2000 and 2001 was the increase of natural gas production in the USA by 9% in relation to the overall production. During 2001, 42% of worldwide liquids production and 36% of its natural gas production came from activities in the U.K. This indicates a significant decrease in comparison to 2000. (A.R.2001)

During 2002, Amerada Hess increased the production to 451.000 BOED. The company could not reach the desired target of 460.000 BOED. The reason was the natural decline of mature fields in the USA and the reduced production from the Ceiba field in Equatorial Guinea. The major production countries of Amerada Hess have been the USA and U.K. for the last years. In 2002, Amerada Hess increased the operation activities in West Africa, Equatorial Guinea and Colombia. Together, these areas had a portion of 23% of the total oil segment of the company. The North Sea countries with Norway, United Kingdom and Denmark delivered 15% of the total oil production. (A.R.2002)

In 2003 the production rate decreased by 17% compared to 2002. Most of the reduction was due to sale of assets in the North Sea and the Gulf of Mexico because of high cost reasons. Another important point was the poor performance of mature fields in the United States. (A.R.2003)

In 2004 around 342.000 BOED were produced. Compared to 2003, the production rate declined by 8%. The reasons were natural declines of mature fields and sales of interests. The main production areas have been deepwater Gulf of Mexico, onshore in West Texas and North Dakota as well as the United Kingdom, the Norwegian sector of the North Sea and Equatorial Guinea. During 2004, 23% of the Corporation's crude oil and natural gas liquids production as well as 30% of its natural gas production were due to activities in the United States. The second important core region stayed the United Kingdom. In 2004, 30% of the company's crude oil and 47% of its natural gas production were from operations in the U.K. (A.R.2004)

In 2005, Amerada Hess produced 335.000 barrels of oil equivalent per day. This indicates a production decrease of 4% compared to the year before. The main reason for the decline was the impact of the Hurricanes Katrina and Rita. A lot of production facilities were damaged. The USA stayed the main core region for Amerada Hess. 23% of the Corporation's crude oil production as well as 25% of its natural gas production was from U.S. operations. The main domestic areas have been the Gulf of Mexico and onshore North Dakota, Texas and Louisiana. The second major core area is the North Sea. 47% of the company's crude oil and natural gas liquids production as wells as 50% of the natural gas production were from European activities during 2005. Especially the United Kingdom plays a major role in the strategic considerations. During 2005, 23% of the Corporation's crude oil and natural gas liquids production as well as 41% of its natural gas production came from operations in England.
The main production countries of Amerada Hess in Africa are Equatorial Guinea, Algeria, Gabon, Libya and Egypt. 27% of the Corporation's crude oil and natural gas liquids production was due to activities from this continent.
Amerada Hess also tries to develop a new core area in Asia with the countries Thailand, Malaysia and Indonesia. During 2005, 3% of the company's crude oil and natural gas liquids production as well as 24% of its natural gas production were due to activities on this continent. Around 57.000 Mcf of natural gas was produced from an offshore gas field in Thailand. Natural gas production averaged 25.000 Mcf per day in Indonesia.
The Joint Development Area between Thailand and Malaysia where Amerada holds a 50% interest produced around 51.000 Mcf of natural gas per day in 2005.

At the end of 2006, a 15% interest in a heavy oil discovery located in the Gulf of Mexico was sold to Petrobras. (A.R.2005)

Technology

The Norwegian North Sea is a major core region for Hess. The company operated enhanced oil recovery methods, especially so called waterflood projects with initial water injection to increase the production in their fields.
During 2002, Hess tried to develop the Ceiba field in Equatorial Guinea which is under control of the company since the acquisition of Triton energy. Hess operates the field with an 85% working interest. The method of water injection was used to produce at a lower rate but for a longer time. (A.R.2002)

Onshore USA stayed a core area for Amerada Hess in 2003. The company is a leading oil producer in North Dakota. A major problem of these mature fields is to maintain the production at a constant level over years. The Corporation Company uses a combination of horizontal drilling and stimulation methods to work against the decrease of production rates. By this way, the production rates could be hold at a constant level of 22.000 BOED for the last five years in Dakota.
Another important production area in the United States is the Seminole San Andres Unit in West Texas. Amerada Hess is an industry leader in using the carbon dioxide injection technology to increase the oil recovery.
Internationally, Amerada Hess tried to stimulate its field Ceiba in Equatorial Guinea to increase the production rate. The method of water injection could increase the production out of this field from 25.000 net barrels per day in 2003 compared to 22.000 net barrels per day in 2002. Anadarko performed water injection programs with the company GEPetrol (NOC of Equatorial Guinea).
Enhanced oil recovery methods were also used in Norwegian North Sea. Especially water injection is a common used technique.
During the last three years, Amerada Hess used enhanced oil recovery methods especially in North Dakota, West Texas and in the North Sea. The common used techniques were carbon dioxide as well as water injection. (A.R.2005)

Supply chain strategy

Amerada Hess and Petroleos de Venezuela (PDVSA) have a joint venture in the downstream sector. The HOVENSO refinery is owned 50% by the Corporation and 50% by Petroleos de Venezuela, S.A. (PDVSA). The HOVENSA refinery is situated in the Caribbean on the Virgin Islands. It is one of the largest refineries in the world. This strategic location is used for crude oil imports and product shipment. Two-thirds of its crude oil comes from Venezuela. The refinery has a processing capacity of 495.000 barrels per day and a 140.000 barrel per day fluid catalytic cracking unit.
The refinery is used to supply the joint venture partners in the East Coast of the United States. In 2001 a new cooking unit was installed which can process 580.000 barrels per day. This unit allows handling of heavy crude oil.
Amerada also has a refinery in New Jersey at Port Reading. The fluid catalytic cracking unit can process around 65.000 barrels per day and supplies the northeast markets with gasoline.

The company is also investing in LNG projects. Hess formed a joint venture company called HESS LNG which develops LNG terminals. Hess has a 50% ownership in this company. Since 2005, the company is planning a LNG terminal at the Fall River in Massachusetts
In addition, Hess holds a 3% interest in the Snovhit LNG plant operated by Statoil.

Since 2000, Amerada Hess holds a 3% interest in an oil field in Azerbaijan. The company tried to expand its position in the former Soviet Union by investing in the Baku Tbilisi Ceyhan pipeline (BTC) (2,7%). It will transport crude oil from Azerbaijan to the port of Ceyhan in Turkey. BP is the operator of this project. In 2005, the first tanker loaded at Ceyhan which was two years behind the original target.

Hess holds also a 2,7% interest in the Azeri Chirag Guneshli (ACG) development project in the Caspian Area. The project included two crude oil pipelines operated by BP which were used to transport the crude oil from the Black Sea to the BTC pipeline. (A.R.2005)

Acquisitions

During 2000, the Corporation Company acquired a 49% interest in three producing fields in Algeria from the National Algerian Oil Company.
Amerada Hess also acquired a 2% interest in three fields in Azerbaijan.
In 2000, Amerada Hess acquired 34,2% of the Hamish field in the U.K. to become stronger in this special core area. (A.R.2000)

In 2001, Hess acquired 100% of the company Triton Energy Limited for USD 2,7 billion. Triton Energy was an international E&P company. This acquisition increased the reserves by 20%. The Triton acquisition opened new production opportunities in West Africa, Columbia, Equatorial Guinea as well as Thailand and Malaysia.
In addition, Hess acquired all the exploration and production assets of the exploration company LLOG for USD 750 million. The properties with estimated proved reserves of 60 MMBoe were located in the Gulf of Mexico shelf and onshore Louisiana. (A.R.2001)

During 2002, Amerada Hess tried to increase its interests in the large natural gas fields in the so called Joint Development Area between Malaysia and Thailand. The interest was expanded from 25% to 50% through an exchange of the Corporation's interest in oil fields of Colombia which were acquired in 2001 as part of the Triton acquisition.
Further on, Amerada Hess invested in the Premier Oil plc. Company and held a 25% interest in 2002. During 2003, the corporation exchanged its 25% equity investment in Premier Oil plc. for a 23% interest in a block located in Indonesia.
Amerada Hess tried to expand its position in the Gulf of Mexico by exchanging a 14% interest in a U.K. field for increasing its interest in the Liano Field in the Gulf of Mexico up to 50%. (A.R.2003)

In 2005, Amerada Hess acquired a 65% interest in Trabant Holding International. This company owns 100% of the Samara Nafta E&P company which operates in the Volga-Ural region in Russia. Amerada Hess invested around USD 400 million in Russia. During 2005, the net production per day was 6.000 barrels.
The second new entry region was the Arab Republic of Egypt during 2005. The Corporation Company acquired a 55% interest from the company Apache in the deepwater area of the West Med block for USD 413 million. Amerada got the operatorship for this natural gas containing block too.

Libya was the next entry for Amerada Hess in 2005. In the early 1960's Marathon Oil, Shell, Continental and Amerada Corp. formed the Oasis Group to explore for oil in Libya.
The companies had to leave Libya in 1987 because of political disturbances between Libya and the USA. After re-entering into Libya the Corporation Company holds now together with the so called Oasis Group an 8% interest in the Waha concession. The members of the Oasis Group try to develop a new Libyan core region in North Africa by working together.
Another important African country for Amerada Hess is Equatorial Guinea. The company has interests in two production sharing contracts offshore. The block contains the Okume complex and the Ceiba field where the company is already operator with an 85% interest. The Ceiba field produced around 30.000 barrels per day in 2005.

Domestically, Amerada Hess is the main oil and gas producer in North Dakota. The company tried to strengthen its position by acquiring 260 km² in the Wilson Basin. (A.R.2005)

Cooperations

Amerada Hess tries to get in contact with new resources by doing acquisitions or planning corporations.
In 2000, Amerada Hess increased its equity interests in an oil field in Azerbaijan from 2% to 3% via a deal with Ramco Energy.
One of the main core areas in the United States is the Gulf of Mexico. In the Gulf of Mexico, the company held interests in 291 blocks as well as interests over 4.000 blocks which were discovered with 3 D seismic in 2001. (A.R.2001)

During 2002, Hess tried to redevelop a field in Algeria. The project was operated be Sona Hess. That's a joint venture operating company between Amerada Hess and Sonatrach.
The target was to use the experience of both companies to expand the production in this field. Total costs were estimated to be USD 500 million.
In 2002, Amerada Hess tried to get in contact with National Oil Companies to use their resources. In that way, a production sharing agreement was signed with the government of Brunei for a deepwater offshore block, where the company held a 15% interest. The block ranges from water depth of 1.200 m to 2.200 m. During 2002, Amerada Hess (25%) and British Gas (75%) as the operator jointly developed the so called Atlantic Field in the British part of the North Sea. (A.R.2002)

The Gulf of Mexico stayed a major core area for Amerada Hess in 2003. The Corporation Company had interests in 376 exploration blocks in the Gulf of Mexico. 260 blocks (70% of total) were operated by the company.
The downstream sector with the HOVENSA refinery on the Virgin Islands plays a major role in the strategic considerations of Amerada Hess. Two third of the crude oil is delivered from Venezuela. At the beginning of 2003, the crude oil deliveries were interrupted because of political disturbances in Venezuela. The Corporation Company tried to get closely into contact with the NOC of Venezuela to achieve a contracted quantity of crude oil each year.
During 2003, Amerada Hess was part of a water injection program in the Norwegian North Sea. It was operated by BP. (A.R.2003)

In 2004, Hess formed a 50% owned joint venture called Hess LNG in order to pursue investments in terminals and related supply, trading and marketing opportunities. The joint venture has been pursuing the development of a LNG terminal project in Massachusetts. Lots of permits were required to go on with the project. The terminal was planned to be operational in 2010. In addition, Hess holds a 3,6 % interest in the Snovhit LNG project, located in Norway. Statoil is the operator of the project. (A.R.2004)

In 2005, Amerada Hess has joined the Oasis Group to develop a new core region in Libya. American companies had to leave Libya in 1987.
Now they try to use their new exploration opportunities by working together in the Oasis Group. Marathon Oil is also part of this group.
The partners had to pay USD 1,3 billion for re-entry and around USD 530 million for non defined investments over the last two decades. The Waha Concession was operated by the NOC of Libya after the American companies left Libya in 1986.
Another important North African country is Algeria. The company tries to stay in contact with the National Algerian Oil Company. In that way, Amerada Hess has a 49% interest in three Algerian oil fields. 51% are owned by the NOC. During 2005, around 25.000 barrels per day were produced from these fields.

South/East Asia became a strong core area for Amerada Hess. In 2005 a gas sale agreement was signed with authorities of Thailand. The company has a 25% non operating interest in the Pailin offshore gas field in Thailand.
Another gas sale agreement was signed for the operating Phu Horm field located in Thailand. The gas sale agreement provides for the delivery of 500 Bcf from the field for the next 15 years.
Further on, the Corporation Company has a 51% interest in the so called Joint Development Area between Thailand and Malaysia. Petronas (50%) and Amerada Hess (50%) worked together in several development projects.

Domestically, the Gulf of Mexico stayed a major offshore region for Amerada Hess. In 2005 the company held interests in 355 exploration blocks. 260 blocks (73% of total) were operated by the company. (A.R.2005)

Organization

The headquarters of the Corporation Company are located in New York.

Operating offices for exploration and production:

- Houston, Texas
- London, England
- Oslo, Norway
- Copenhagen, Denmark
- Libreville, Gabon

Operating office for refining and marketing:

- New Jersey

In 2002, an additional operating office was installed in Malabo, Equatorial Guinea.

Marathon Oil

Marathon Oil is an integrated energy company with the business areas exploration, production, integrated gas, refining, marketing and transportation. The main exploration and production areas are the USA, U.K., Ireland, Norway as well as the non-OECD countries Angola, Equatorial Guinea, Gabon and Libya. Marathon's strategy is to add new production to their existing core regions in North Europe, West Africa and North America. Since 2005, Marathon is the owner (100%) of the Marathon Ashland Petroleum Company. Because of this fact, it is the fourth largest US based integrated energy company with its headquarters located in Houston, Texas. (A.R.2005)

Exploration and Appraisal

The main areas of onshore drilling projects in 2001 were Alaska, New Mexico, Oklahoma, Texas, Wyoming, British Columbia and Alberta. Several horizontal wells were drilled in Texas. In 2001 core areas of deepwater exploration were the Gulf of Mexico, offshore West Africa and Nova Scotia (Canada). During 2001, Marathon drilled successfully six wells in Alaska. Two exploration wells discovered natural gas at the Ninilchik Prospect on Alaska's Kenai Peninsula.

The company is a major technology leader in the area of deepwater drilling. In 2001, Marathon announced the Ozona Deep oil discovery in the Gulf of Mexico. The company was the operator with 68%.

The well was drilled to a total measured depth of 8.125 m. During 2001, Marathon was the partner in 145 blocks in the Gulf of Mexico. 110 blocks are situated in the deepwater area. This indicates that Marathon has a lot of experience in this special exploration segment. (A.R.2001)

In 2002 the exploration projects were especially focused on Equatorial Guinea, Norway, United Kingdom, Angola as well as on deepwater projects in the Gulf of Mexico, Nova Scotia and on offshore Central Africa. The onshore areas in the United States with Texas, Wyoming, Alaska, New Mexico and Oklahoma stayed the same. During the year, the company drilled 19 gross (12 net) exploratory wells in the USA. 12 gross (8 net) wells had a hydrocarbon potential. (A.R.2002)

In 2003, Marathon expanded its offshore exploration activities with nine new discoveries (out of 13 exploration wells) in Norway, Angola, Equatorial Guinea and the Gulf of Mexico. In that way, Marathon became stronger in their core areas in West Africa with Equatorial Guinea and in the North Sea with Norway. Marathon's US strategy stayed the same. Around 57% of Marathon's worldwide hydrocarbon liquid production and 63% of its worldwide natural gas production was due to activities in the USA. The company drilled 21 gross (11 net) exploratory wells of which 15 gross (9 net) wells had a hydrocarbon potential. During 2003, around 43% of Marathon's worldwide hydrocarbon liquid was produced outside of the USA. Internationally, the company drilled 54 gross (36 net) exploratory wells of which 47 gross (32 net) had a hydrocarbon potential. (A.R.2003)

During 2004, six new discoveries were made in Angola, Gulf of Mexico, Norway and Equatorial Guinea. In the USA, around 35 gross (17 net) exploratory wells were drilled. 22 gross (10 net) wells had a hydrocarbon potential. In other areas, outside of the USA 21 gross (16 net) exploratory wells were drilled of which 13 gross (10 net) were a success. In the USA, the Gulf of Mexico stayed a major core area for Marathon. The company had interest in 123 blocks. 94 blocks were situated in the deepwater area. (A.R.2004)

During 2005, the company had eight significant discoveries. In the area of deepwater drilling the company had its 12th discovery in offshore Angola. The USA stayed a major core area for Marathon. The company drilled 33 gross (21 net) exploratory wells of which 29 gross (18 net) wells had a hydrocarbon potential. Internationally, Marathon drilled 12 gross (6 net) exploratory wells of which 11 gross (5 net) wells were successful. In the core region of the Gulf of Mexico, the company had interests in 129 blocks. 75% out of them were in the deepwater area. (A.R.2005)

Technology

In 2001, Marathon started several development operations onshore in the USA. A horizontal drilling program was initiated in Texas. The development activities in Oklahoma included a massive 3 D seismic survey. Internationally, Marathon acquired 3 D seismic surveys for two blocks in Angola. (A.R.2001)

In 2003, Marathon acquired 3 D seismic data for two operating blocks in Canada. (A.R.2003)

During 2005, Marathon and the operator Chevron acquired one 4 D seismic survey for a field in the Gulf of Mexico. The survey was initiated to plan future development activities for this field. (A.R.2005)

Development and Production

Marathon's oil and gas production is concentrated on the USA, Norway, UK and on Ireland. In 2001, Marathon produced around 88% of its total worldwide BOE in these areas. Further production activities can be observed in Gabon, the Gulf of Mexico and the Netherlands. In 2001 the company sold its Canadian heavy oil interests because of cost reasons.

The target of the acquisition of Pennaco Energy in 2001 was the expansion of the coalbed natural gas reserves. The resource base lies in the Powder River Basin of Wyoming. (A.R.2001)

In 2002, around 79 net MMcfd of coalbed natural gas was produced compared to 47 net MMcfd in 2001. In 2005, Marathon tried to sell its Powder River acreage because of poor results. The reserves fell from 210 Bcf to 153 Bcf. Marathon also produced tight gas from deep formations in Texas. Gross resources of 320 Bcf have been identified. In 2002, Marathon produced worldwide around 412.000 BOED in nine countries.

Besides the core production countries the production portfolio was expanded by Australia and Equatorial Guinea. Marathon produced 60% of its hydrocarbon liquid and 61% of its worldwide natural gas production in the United States. This indicates a clear US-strategy. Especially the Gulf of Mexico is very important for the company. 93% of the production out of this area came from the deepwater region. (A.R.2002)

In the year 2003, Marathon produced around 389.000 BOED. During 2003, Marathon expanded its core area in West Africa with an ultra deepwater discovery in Angola. One of the major development activities international during 2003 was the expansion of the Alba field in Equatorial Guinea. Five new development wells were drilled and completed. As a result of this expansion the condensate production had grown from 18.000 to 30.000 bpd at the end of 2003. The company tried to develop the oil and gas fields on Sakhalin Island in Russia. The reason for these activities was to develop a new core area in Russia. (A.R.2003)

In 2004, Marathon focused its production activities on its four core areas in USA, Europe, West Africa and Russia. The main area in the USA was again the Gulf of Mexico. 48% of the company's worldwide liquid and 63% of the worldwide natural gas production came from the USA. The main focus in Europe was on the offshore fields in the North Sea. 26% of Marathon's worldwide production came from Europe. During 2004, the production rate from platforms in the Gulf of Mexico declined because of significant damages by the hurricane Ivan. Marathon held interests in nine producing fields and 11 platforms in the Gulf of Mexico. Seven platforms were operated by Marathon. (A.R.2004)

In 2005, the USA stayed a major production area of Marathon. Around 40% of its worldwide net liquid production and 62% of its natural gas production came from U.S. activities. During 2005, Marathon held interests in eight producing fields and seven platforms in the Gulf of Mexico. Four platforms were operated by Marathon.

In West Africa, a condensate expansion project was completed in 2005. Marathon owns as an operator 63% of the Alba field offshore in Equatorial Guinea and 52% of a liquefied gas processing plant.

The condensate production in Equatorial Guinea increased from 15.000 gross bbl per day to 67.000 gross bbl per day. The liquefied petroleum gas (LPG) production increased from 3.000 gross bbl per day to 19.000 gross bbl per day.

Around 130 MMcfd dry gas is supplied as feedgas to the Atlantic Methanol Production Company LLC (AMPCO) after the condensate and the LPG are removed. Marathon owns 45% of AMPCO. The dry gas is used to produce methanol. Approximately 1,052.000 gross metric tons (473.000 net metric tons) were sold in 2005 to customers in Europe and the U.S. (A.R.2005)

Technology strategy

In 2000, Marathon was a partner in a water injection drilling program in the United Kingdom. Marathon's primary interest in the British part of the North Sea is the Brae complex, where the company is an operator. The North Brae field and the East Brae fields are gas condensate reservoirs. In this specific reservoir the gas cycling technique is used. Using this technique gas is injected into the reservoir to maintain the pressure, to increase the sweep efficiency and the condensate liquid recovery. (A.R.2001)
In 2003, Marathon reached a world record by producing natural gas from a water depth of 2.200 meter in the ultra deepwater area of the Gulf of Mexico. The company operates and holds 50% interest in the Camden Hills field, located in the Mississippi Canyon. During 2003, Marathon drilled 12 new production and gas injection wells in the operated Alba Field located in Equatorial Guinea. (A.R.2003)

Supply chain strategy

Since 2001, Marathon is the main holder of the Marathon Ashland Petroleum Company (MAP). It uses this company for refining, marketing and transportation reasons through the Mid-west and South-eastern of the USA. MAP plays a key role in Marathon's company downstream strategy. The company operates a system of pipelines and terminals to provide crude oil to its refineries. MAP is the owner of seven refineries with a total capacity of 974.000 bpd in 2005. (A.R.2001)

In 2002 the MAP's net purchases of U.S. produced crude oil for refinery input was about 433.000 bpd. Around 44.000 bpd came from Marathon itself. The major sources of crude oil processed have been Canada (114.000 bpd), the Middle East (215.000 bpd) and other foreign countries (359.000 bpd). This crude oil was acquired from foreign national oil companies. The difference between 2002 and 2005 was the increased import from Canada by 14.000 bpd and from the Middle East by 69.000 bpd. The MAP refineries are connected via pipelines to maximize the operating efficiency. The transportation system that connects refineries allows the movement of intermediate products to optimize the production of higher margin products. For example light cycle oil may be transported from Texas City to Robinson where excess desulphurization capacity is available. (A.R.2005)

Further on, MAP has interests in pipelines with a total length of around 10.000 km and holds 47% of the Louisiana Offshore Oil Port (LOOP). The LOOP is the only deepwater port of the USA. Marathon itself is the partner in two crude oil and two natural gas pipelines systems in the Gulf of Mexico. Further on, Marathon owns and operates crude oil gathering lines with a length of 350 km and crude oil trunk lines of 3.670 km. The company has a 34% interest in a gas processing plant in Louisiana. After the successful exploration in Alaska, Marathon and a partner formed the Kenai Kachemak Pipeline Company, LLC, to transport natural gas from the Ninilchik Unit to the southern pipeline system. Marathon became the operator of this pipeline. (A.R.2001)
In the North Sea of the United Kingdom, Marathon Oil holds a 41,6% interest in the Brae group which owns a 50% interest in the Scottish Area Gas Evacuation ("SAGE") system. This system provides pipeline transportation between the Brae field to the gas processing terminal at St.Fergus (North-East of Scotland).

Because of the growing gas market in the South of the UK, Marathon is planning a natural gas pipeline project with regional companies in Norway and the UK. The project start of the Bacton Pipeline should be in 2007. By this way Marathon wants to use its existing North Sea infrastructure (Brae, Heimdal). (A.R.2005)
In the LNG sector the company has a 30% ownership in an Alaska LNG plant (operated by ConocoPhillips). Further on, Marathon holds interests in two LNG tankers to transport LNG to customers in Japan. Marathon has a long term contract with two of Japan's largest utility companies. The contract was extended till 2009. LNG delivery was 63 gross Bcf (19 net Bcf) in 2005.
Marathon is also the operator of a LNG project (Bioko) in Equatorial Guinea. The LNG plant is expected to be completed at the end of 2007. To fill the gap in the gas chain, Marathon is working on a project with other partners to build a re-gasification plant near Tijuana in Mexico. The project consists of a LNG offloading terminal and a natural gas pipeline infrastructure. At the end the plant should process 750 MMcfd. (A.R.2005)

Acquisitions

The acquisition of Pennaco Energy (100%) in North America increased the natural gas reserves of Marathon by 42 MMBOE. The acquisition is used to develop a new core area of coalbed natural gas production in Wyoming. Cash payments for this acquisition were USD 506 million. The acquisition brought new technologies in coalbed methane production. Marathon has the third largest position in the Powder River Basin. In the European core area Marathon got five new licences in the Norwegian Sector of North Sea (Brae and Heimdal areas). Marathon's strategy in Norway is to develop gas reserves to make profit out of the increasing gas demand in the United Kingdom.

In 2001, Marathon also wanted to develop a core area in West Africa. The company used the strategy of acquisition to realize this target. The existing production facilities included two offshore platforms, five wells and an onshore condensate stabilization plant. With this equipment, the company achieved volumes of 22.000 bpd of condensate and 130 MMcfd of gas. In West Africa, Marathon acquired certain interests from the CMS Energy Corporation for USD 1,6 billion. The acquisition increased the company's proved reserves by 249 MMBOE. With this transaction the company got a 43% interest in an onshore liquefied petroleum gas processing plant as well as a 52% working interest in the Alba fields of Equatorial Guinea. Additionally, Marathon obtained a 45% interest in an onshore methanol production plant through an equity method investee. (A.R.2001)

In 2002 the company went on with its strategy in Norway. Marathon obtained interests in three more licences through further acquisitions.

The company established an office in Stavanger after getting the operatorship for one of these licences from the Norwegian government. The company Globex Energy Inc. was acquired 100% by Marathon for USD 155 million. The transaction increased the proved reserves of Marathon by 38 MMBOE. Globex also owned working interests in the Alba field and a 9% interest in the onshore liquefied petroleum gas processing plant. The acquisition of Globex was also the first step of Marathon in Australia. The company acquired a 13% working interest of a field and three exploration blocks offshore in Western Australia. (A.R.2002)

In 2003, Marathon set the first step of developing a new core area in Russia. The company acquired 100% of the Khanty Mansiyek Oil Corporation in Western Siberia for 252 Million Dollars cash payments. Net production per day was 14.500 barrels. During 2003 the company tried to expand its position in offshore Norway. Three new product licences were acquired in Norway, which is a major core area of Marathon. The company was the operator of two of the licences and hold a 40% working interest in the third. (A.R.2003)

In 2004, Marathon increased its position in the Norwegian sector of the North Sea by acquiring four new exploration licences. The company holds now 16 licences in this area. (A.R.2004)

In 2005, Marathon acquired the 38% minority interest of the company Ashland which is part of the Marathon Ashland Petroleum Company. The company operates in the downstream business. Cash payments were USD 506 million for this acquisition. Marathon was moving to Russia in 2003 by acquiring the Khanty Mansiyek Oil Corporation (KMOC).
The company wanted to develop a new core area but could not increase the production rate. In 2006, KMOC was sold to Lukoil for USD 787 million. (A.R.2005)

Cooperations

Generally, the company is an operator in most of its projects in the Gulf of Mexico. Marathon has core competences in the segment of deepwater drilling. The major discovery of its worldwide activities in 2001 was in the Gulf of Mexico. The company was the operator with 68% in the Ozona Deep Oil field. The well was drilled to a total measured depth of 8.125 m.

In 2001, Marathon was the partner in 145 blocks in the Gulf of Mexico. 110 blocks were situated in the deepwater area. (A.R.2001)

In 2002, Marathon was the operator of seven platforms in the Gulf of Mexico and held interests in 10 producing fields as well as 10 platforms. This area continued to be a core region of Marathon. Most of the production out of this area (93%) came from the deepwater region. Further activities of Marathon in Europe were focused on the North Sea and on Ireland. Marathon was the operator in the Brae field which is situated in the British part of the North Sea. The company held an interest of 42%. The companies BP, ENI, Nippon and Talisman were the partners in a development project initiated in 2002. In Ireland the company held a 100% interest in the Kinsale fields, located in the Irish Celtic Sea. The company was also operator in its core area of West Africa. It held a 56% working interest in the Marin fields, situated in Gabon. Besides, a 44 km pipeline was build to connect the field with a pipeline system. (A.R.2002)

In the year 2003, the Gulf of Mexico stayed a core area for Marathon. The company had interests in 149 blocks, including 90 in the deepwater area. During the year 2003, Marathon held interests in 10 producing fields and 17 platforms, of which seven platforms were operated by the company itself. The Ninilchik Unit located in Alaska which was discovered in 2002 started production at the end of 2003. The partner of this project which was operated by Marathon was Chevron. (A.R.2003)

During 2004, Marathon and Syntroleum Corporation constructed a gas to liquids (GTL) plant at the port of Catoosa in Oklahoma. This project was sponsored by the U.S. Department of National Energy. The plant is used to convert natural gas into a finished fuel. Marathon wants to become a technology leader in the future research of GTL technology. In 2004, Marathon and its partner the National Oil Company of Equatorial Guinea began to construct a LNG plant on Bioko Island that will initially deliver on offtake of 3,4 million tons per year (460 MMcfd). The idea of this project is to use Marathon's gas reserves from the Alba Field (estimated to be 4,4 Tcf). Generally, Marathon tries to get in contact with NOCs to get access to resources. (A.R.2004)

During 2005, Marathon reached an agreement with the National Oil Corporation of Libya. Marathon returned to their exploration areas after 19 years of absence. Marathon holds 16% of a concession which produces approximately 350.000 gross BOED. Libya should become a new core area for Marathon. The company is a member of the Oasis Group which consists of Conoco Phillips and Amerada Hess. These companies operated the Waha concession from the mid-1950's until 1986. The U.S. companies had to stop production because of political tensions between the USA and Libya. Now the Oasis Group extended their old licences after re-entering into Libya for additional 25 years. In the USA, Marathon held capacity rights on the Elba Island regasification terminal in Georgia. To use the full capacity, Marathon came to an agreement with BP Energy. The company will supply Marathon with 58 Bcf of natural gas as LNG per year. The contract ends in five years. In the Gulf of Mexico, Marathon and Chevron (operator) developed the Perseus Field which was discovered in 2003. In addition, Marathon held a 50% interest in the Petronius platform (operated by Chevron) which is one of the tallest free standing structures in the world.
During 2005, Marathon held interests in eight producing fields and seven platforms in the Gulf of Mexico. Four platforms were operated by Marathon. (A.R.2005)

Anadarko Petroleum Corporation (APC)

Anadarko Petroleum Corporation is an independent oil and gas exploration company. The main operation areas are focused on the United States (deepwater Gulf of Mexico, Texas, Louisiana and Alaska) as well as on Canada and Algeria. The company has also a participation in activities in Qatar, Oman, Tunisia, Congo, Gabon, Egypt, Venezuela and Australia. The headquarters are located in Houston, Texas.

Exploration and Appraisal

The main exploration core areas are the USA, Canada and Algeria. Further on, the company has exploration projects in Brazil, Tunisia, West Africa, at the North Atlantic Margin, in the former Soviet Union with the Black Sea as well as in Australia.

The drilling activities between 2000 and 2005 were focused on known oil and gas fields onshore and offshore in USA, Canada and Algeria.

In 2000, 122 wells were drilled worldwide for exploration. 58 wells were drilled onshore in the USA, eight wells in Alaska, eight wells in the Gulf of Mexico, 43 wells in Canada and five wells in other international locations. (A.R.2001)

Generally, the main drilling operations are focused on the USA. The operation areas in the USA are divided in the lower 48 states, the GOM and Alaska. During 2001, the total drilling activity resulted into 673 gas wells, 148 oil wells as well as 34 dry wells which were drilled onshore in the USA. The success rate was 96% by a sum of 855 wells drilled. Especially in East Texas and North Louisiana, Anadarko tried to explore the so called Bossier Play with tight gas reservoirs. The Bossier Play consists of multiple fields and multiple pay zones. Horizontal drilling methods are used to produce efficiently out of the formation. In 2001, the company drilled 175 wells in this area. 23 were exploratory wells of which 19 had a hydrocarbon potential.

The exploration activity of Anadarko in Alaska is focused on the so called North Slope. The main area for Anadarko in the North Slope is the Alpine field. This field is the largest onshore oil discovery in the USA since years. The company has a working interest of 22%. Anadarko and ConocoPhillips (78%) as the operator made the first discoveries in the National Petroleum Reserve-Alaska during this year. In 2001, Anadarko had a total participation in six drilling wells. Two wells were located in the Central Arctic.

During 2001, Anadarko also tried to expand its position in the Gulf of Mexico. The Gulf of Mexico is the main offshore exploration area for Anadarko in the USA. About 7% of the company's proved reserves were located in this region at the end of 2001. The company drilled 19 wells during the year in this region. The drilling process resulted into 11 gas wells, two oil wells and six dry holes. This indicates a success rate of 68%. The company also tried to expand its deepwater operation program during 2001. Anadarko held around 105 lease blocks in the deepwater area.

Canada became a core area for Anadarko after the acquisition of the companies RME and the Berkley Petroleum Corporation in 2001. These acquisitions increased the reserves of Anadarko in Canada. The main Canadian exploration areas are the provinces Alberta, British Colombia as well as Saskatchewan. Especially heavy crude oil reservoirs are located in these provinces. During 2001, the company drilled as an operator seven exploratory wells and as a non operator five wildcat wells in Canada.

Algeria is the main core area for Anadarko in Africa. Since 1989 the company has drilled 61 productive wells (12 exploration and 49 development wells). In 2001, Anadarko increased its position in Algeria through a participation in 19 wells. 18 wells were oil wells and one was dry. This indicates a success rate of 95%.

Latin America is a new area for Anadarko. It was a consequence of the RME acquisition. Anadarko has a 45% interest in a block in Venezuela. During 2001, Anadarko and the operator performed 19 new wells completions and 50 well reactivations.

Anadarko also tried to develop a certain position in the Middle East in 2001. Anadarko was the operator of the Hafar field in Oman. The company had a 100% interest in this field. Anadarko tried to explore the field by drilling a horizontal well during 2001.

Australia plays a minor role in the exploration portfolio of Anadarko. The company had certain agreements in three licences in the Timor Sea and in the Northwest Shelf of Australia. At the end of 2001, Anadarko drilled one well in each licence area but all the wells were dry. (A.R.2002)

The drilling program of 2002 was focused on the USA, Canada and Algeria. The exploration program included 114 wells. 48 wells were drilled onshore in the USA, 6 wells in Alaska, 7 wells offshore in the Gulf of Mexico, 46 wells in Canada, three wells in Algeria and four wells in other areas.

The United States continued to be a major exploration core area for Anadarko. In 2002, the total drilling program resulted into 392 gas wells, 98 oil wells and 24 dry holes by a sum of 514 wells. This indicates a success rate of 95%. The total number of wells which were drilled was reduced by 40% compared to the year before. The company tried to reduce exploration and development costs in the USA by using a so called re-entering strategy. The costs for re-entering into a well are about 40% less than drilling a new well. To use the strategy practically, 33 wells were re-entered and completed in 2002. The highlight of the exploration activities of Anadarko in 2002 was focused on the Bossier Play. Anadarko went on with its drilling activity in the so called Bossier Play situated in East Texas and North-Louisiana. 14 rigs drilled around 83 wells with a success rate of 93% in 2002.

During 2002, Anadarko had a participation in six drilling wells in the North Slope. Two wells were located in the Central Arctic. The first well which was operated by Anadarko in the North Slope did not reach the desired target. It was abandoned because of its low permeability.

The Gulf of Mexico continued to be an important exploration area for Anadarko in 2002. 8% of the company's proved reserves were located in this region at the end of 2002. During the year, Anadarko had a participation in 23 wells. Seven wells were located in the deepwater area. The drilling program resulted into nine gas wells, nine oil wells and five dry ones. This indicates a drilling success of 78%.

During 2002, Anadarko became one of the most active drillers in Canada. The company had a participation in 46 wells with a success rate of 83%. Anadarko was the operator of 26 rigs. 10 rigs were used for drilling exploratory wells during this year.

Algeria stayed a major exploration area for Anadarko in 2002. The company participated in 34 wells with a success rate of 88%. The major Algerian field for Anadarko is the Hassi Berkine field. During 2002, three exploration wells were drilled in this field. One was successful.

Anadarko also drilled one exploration well in West Africa. The well which was not commercial was drilled on an offshore block in the Republic of Congo. (A.R.2003)

The drilling program of Anadarko in 2003 was focused on the USA, Canada and Algeria. Around 147 exploration wells were drilled worldwide. 36 wells were drilled onshore USA, one well in Alaska, seven wells offshore in the Gulf of Mexico, 92 wells in Canada, six wells in Algeria and five wells in other international areas. (A.R.2004)

In 2003, Anadarko went on with its intensive drilling program in the United States. The total drilling activity resulted into 430 gas wells, 219 oil wells and 37 dry holes. This indicates a success rate of 95%. One of the reasons for the massive drilling activity is the fact that 56% of the company's proved reserves were located onshore in the USA at the end of 2003. One of the main drilling areas in the USA stayed the Bossier Play. It is the largest onshore gas area for Anadarko.

The field is located in East Texas and North Louisiana. The company drilled 142 wells with 20 rigs in this field. The success rate was 98%. Central Texas and Gulf Coast also stayed major exploration areas for Anadarko in 2003. These formation areas are characterized by multiple pay zones.

In that way, horizontal drilling methods were used to explore all the zones efficiently. 62 wells with a success rate of 95% exploit these multiple zones. Other drilling activities of this year were focused on the Permian Basin (126 wells), Ozona field in Texas (42 wells) and on Oklahoma with 37 wells. The company went on with its re-entering strategy in old wells. About 28 wells were re-entered and completed during 2003.

The company's exploration activity in Alaska was focused on the North Slope like in 2002. The company had a participation in two exploration wells. One well was located in the National Petroleum Reserve - Alaska (NPR-A) and one in the Collin River Unit. There was no information available about the results.

Beside the operation in the North Slope, the company was also active in the Gulf of Mexico. A successful deepwater appraisal well was drilled in 2003 at the K2 field on the Green Canyon block. It is near to the Marco Polo platform. The company is the operator of this platform and held a working interest as a non operator of 52,2% in the K2 field. The target is to use K2 as a subsea tieback to the Marco Polo platform. Further on, the company made four new natural gas discoveries in the Eastern Gulf of Mexico.

Canada remained a major exploration area for Anadarko in 2003. Three exploration wells were drilled in British Columbia and nine exploratory wells were drilled in the Northwest Territories with a working interest of 100%. Further on, the company drilled and completed 106 gas wells with a success rate of 92% in the province of Saskatchewan.

The main exploration area of Anadarko in North Africa remained Algeria in 2003. During this year, Anadarko and joint venture partners drilled six exploration and appraisal wells in the Hassi Berkine area. The success rate was 50%. (A.R.2004)

The exploration program of Anadarko in 2004 was focused again on its main core areas (USA, Algeria, and Canada). 34 wells were drilled onshore in the USA, three wells in Alaska, seven wells offshore in the Gulf of Mexico, 55 wells in Canada as well as five wells in Algeria.

USA stayed the major operation area of Anadarko in 2004. Around 69% of Anadarko's proved reserves were located in this country. 57% of the proved reserves were located onshore and 8% were located in the deepwater area of the Gulf of Mexico. The main operation states remained Louisiana, Texas and the western states (Wyoming, Colorado and Utah). 44 gross exploration wells were drilled in the USA. They had a success rate of 77%. The company's total US drilling program resulted into 549 gas wells, 193 oil wells and 17 dry holes.

Algeria is after the USA the area with the biggest reserves for Anadarko. At the end of 2004, 14% of Anadarko's reserves were located in Algeria. The company had a participation in four exploration wells. One well had a hydrocarbon potential.

The 3rd biggest reserve contingent of Anadarko is situated in Canada. During 2004, 55 gross exploration wells with a success rate of 75% were drilled. (A.R.2005)

The exploration activity of 2005 included 67 wells. 13 wells were drilled onshore in the USA, three wells in Alaska, eight wells offshore in the Gulf of Mexico, 40 wells in Canada, two wells in Algeria and one well was drilled in an other international area. In 2005, the United States stayed a major exploration area for Anadarko, because 74% of the company's proved reserves were located in this country at the end of 2005. Anadarko drilled 24 exploration wells where the company was the operator or had participation. The success rate was 83%. The total US-drilling operations resulted into 531 gas wells, 119 oil wells as well as five wells which did not have a hydrocarbon potential. The main drilling areas onshore stayed Texas, Oklahoma as well as Louisiana. The drilling program of this year was focused on tight gas reservoirs. The main areas for tight gas have been Vernon/Ansley in North Louisiana as well as the Bossier field in East Texas. The special horizontal drilling method was focused on multiple zones in Central Texas like in the year before.

The drilling activity of Anadarko in Alaska is focused on the North Slope. During 2005, the company had a participation in several exploration wells which were located in the so called National Petroleum Reserve-Alaska.

11% of the company's proved reserves were located offshore in the Gulf of Mexico at the end of 2005. Anadarko had a participation in four exploration wells with a success rate of 75%. One successful discovery (Genghis Khan) was operated by Anadarko and should be connected to the Marco Polo complex in 2007. The company is the operator of the Marco Polo platform.

Canada stayed a major exploration country for Anadarko in 2005. 11% of the Anadarko's proved reserves were located in this country at the end of this year. Around 40 exploration wells have been drilled with a success rate of 85%.

The second biggest proved reserves are located in Algeria. This fact did not change during the last years. 13% of the company's proved reserves are located in this country of North Africa. The company had a participation in three exploration wells. One was drilled by Anadarko itself. (A.R.2006)

Technology strategy

The main offshore exploration area for Anadarko is the Gulf of Mexico. In 2000, Anadarko drilled two deepwater wells which had a hydrocarbon potential in the Gulf of Mexico. At the beginning of 2000, Anadarko acquired a 45% working interest in a block in Venezuela. Most of the activities in this block were based on 3 D seismic calculations which were done the years before. During 2000, the company planned to develop its exploration blocks in Georgia around the Black Sea. The Black Sea in Georgia is a new area for Anadarko. The company has a production sharing agreement with the state of Georgia for an area of 8.000 km^2. The company acquired seismic date and used the sea bed sampling method for geologic studies as well as gravity and magnetic evaluations. The Northwest Territory is one of the major provinces for Anadarko in Canada. The company used a 2 D seismic survey in the so called Mackenzie Delta. The extension of this survey was about 1.000 km. (A.R.2000)

The major North African countries for Anadarko are Algeria and Tunisia. The company is the operator of the Anaquid block in Tunisia. It has an extension of 4.450 km^2. During 2001, the company used seismic surveys to explore this area. Main exploration areas at North Atlantic Margin are the Faroe Islands. Anadarko held two licences in this region. In 2001, the company operated a conventional long offset seismic program to explore this area efficiently. (A.R.2001)

The so called Hugoton Embayment which is located in the southwest of Kansas is a major exploration area for Anadarko. The exploration activity is focused on deeper oil and gas zones below the shallow gas formation. 3 D seismic technology is used by the company in order to explore these deep oil and gas zones efficiently. (A.R.2003)

Development and Production

The main production areas are the USA, Canada, and Algeria. The other international oil and gas production operations are focused on Latin America (Venezuela) and on the Middle East (Qatar).

Around 653 wells were drilled for development reasons worldwide in 2000. 470 wells were drilled onshore in the USA, 10 wells in the Gulf of Mexico, 151 wells in Canada, nine wells in Algeria and 13 wells in other areas.

The major core production area are the United States. In 2000, 64% of Anadarko's total proved reserves were located in the USA. The main operation states onshore are Texas, Oklahoma, Louisiana and Wyoming. The main operation area offshore is the Gulf of Mexico. 9% of the company's proved reserves were located in this area in 2000.

Anadarko entered into Canada after the acquisition of the company RME. During 2000, around 14% of the Company's total production was due to activities in Canada. Especially heavy crude oil reservoirs are located in these provinces.

The main production area for Anadarko in Africa is Algeria. The company is producing in the Algerian Sahara desert. The first oil production was in 1998 out of the Hassi Berkine South (HBNS) field. The advantage of this oil is its high quality. It is sold as the so called Sahara Blend. In 2000, the company drilled nine development wells which had a hydrocarbon potential. (A.R.2001)

The development activity of 2001 consisted of 1.298 wells. 797 wells were drilled onshore in the USA, 12 wells in Alaska, 11 wells offshore in the Gulf of Mexico, 433 wells in Canada, 19 wells in Algeria and 26 wells were drilled in other international locations.

The United States remained a major production core area for Anadarko. In 2001, 61% of Anadarko's total proved reserves were located in the USA. About 50% of the company's proved reserves were located onshore in the USA.

The Alpine field in Alaska was the last major discovery in the USA. Anadarko held a 22% interest in this field. During 2001, the field produced around 88 MBBL/d of oil.

During 2001, Anadarko also tried to expand its position in the Gulf of Mexico. About 7% of the company's proved reserves were located in this region at the end of 2001. The company produced 329 MMcf/d of gas and 24 MBBL/d of oil in the Gulf of Mexico.

The drilling activity in Canada was focused on the heavy oil assets in 2001. Around 123 wells were drilled and 101 wells were recompleted in the heavy crude oil areas of Saskatchewan and East Alberta.

The main core production area for Anadarko in Africa stayed Algeria. The company had proved reserves in Algeria of 387 MMBBL of crude oil at the end of 2001. The company could increase its production in 2001 by a participation in 19 wells. The production could be increased from 66 MBBL/d in 2000 to 77 MBBL/d in 2001.

During 2001, Anadarko expanded its position in the Middle East through the strategy of acquisition. Anadarko had a 65% interest in the Al Rayyan field offshore Qatar (production of 4 MBBL/d of oil in 2000). Anadarko planned a redevelopment program in 2001 with several horizontal wells to increase the production out of this area. (A.R.2002)

The development program in 2002 consisted of 835 wells. 429 wells were drilled onshore in the USA, 8 wells in Alaska, 16 wells offshore in the Gulf of Mexico, 345 wells in Canada, 31 wells in Algeria and six wells in other areas.

The United States stayed a main production area for Anadarko. Around 54% of its total proved reserves was located onshore and 11% were located offshore in the USA at the end of 2002. The production was especially concentrated on the Bossier Play in East Texas and North Louisiana. It's the largest onshore gas area of Anadarko. 15% of its total gas production was due to activities in these fields.

In 2002, the production out of the Alpine field in Alaska could be increased to 96 MBBL/d of oil compared to 88MBBL/d in 2001.

Anadarko could also increase its total production in Canada. 18% of the total company production was due to activities in Canada.

Algeria stayed a main production area for Anadarko in 2002. 17 development wells were drilled which result in 16 productive wells. One well was dry. (A.R.2003)

The development program of Anadarko in 2003 consisted of 922 wells. 622 wells were drilled onshore in the USA, eight wells in Alaska, 12 wells offshore in the Gulf of Mexico, 252 wells in Canada, 21 wells in Algeria and seven wells in other areas.

During 2003, around 56% of the proven reserves of Anadarko were located onshore in the USA. This indicates a clear USA focused strategy.

A special heavy accessible area is the North Slope region in Alaska. 3% of the company's proved reserves were located in this region. Anadarko has a 22% interest in the Alpine field which is the major field in Alaska. At the end of 2003, 17 wells were drilled and completed.

They resulted into five production and 12 injection wells. Production out of the Alpine field could be increased to 98 MBBL/d of oil.

The Gulf of Mexico remained a major production area in the USA during 2003. About 9% of the company's proved reserves were located offshore in the Gulf of Mexico.

The company drilled 19 development wells which resulted in seven gas wells, six oil wells and six dry holes. This indicates a success rate of 68%.

12% of the company's proved reserves were situated in Canada at the end of 2003. During the year, Anadarko had a participation in 344 wells with a success rate of 95%. The total drilled wells resulted into 276 gas wells, 51 oil wells and 17 dry holes.

The company's main production area in Africa remained Algeria. In 2003, Anadarko had a participation in 27 wells with a success rate of 85%.

The other production activities of the company were mainly focused on Venezuela and Qatar during 2003.

The Oritupano Leona contract area in Venezuela consisted of 274 producing wells. The main production could be started at the beginning of 2003, after two national strikes during 2002.

Qatar is also an important production country beside USA, Canada, Algeria and Venezuela. During 2003, the company was the operator of the Al Rayyan offshore field with a working interest of 92,5 %. The production could be increased from 4 MBBL/d in 2001 to 8 MBBL/d in 2003. A permanent platform was installed during this year and the existing wells were connected. (A.R.2004)

The development program of Anadarko in 2004 consisted of 965 wells. 690 wells were drilled onshore in the USA, eight wells in Alaska, 16 wells offshore in the Gulf of Mexico, 221 wells in Canada, 12 wells in Algeria and 18 wells in other international areas.

During 2004, nearly two third of the company's proved reserves were located in the USA. This indicates again a clear US focused strategy. Around 714 gross development wells with a success rate of 99% were drilled.

At the end of 2004, 4% of the company's reserves were located in Alaska, especially in the Alpine field where Anadarko had a 22% interest.

8% of the company's proved reserves were located in the Gulf of Mexico. The highlight of this year was the production start from the Marco Polo platform. It was Anadarko's first deepwater development project.

At the end of 2004, 11% of the company's proved reserves were located in Canada. Around 221 gross development wells were drilled with a success rate of 96%. (A.R.2005)

The company's development activity in 2005 consisted of 769 wells. It included 624 wells onshore USA, four wells in Alaska, three wells offshore in the Gulf of Mexico, 108 wells in Canada, 18 wells in Algeria and 12 wells in other international areas. The company had a participation in 631 development wells in the USA. The success rate was 99,8%.

In Canada, around 108 development wells with a success rate of 98% have been drilled. The number of wells drilled was reduced by 51% compared to the year before.

The major production area in North Africa stayed Algeria in 2005. The company had a participation in 18 wells with a success rate of 90%. Nine of them were injection wells. (A.R.2006)

Resource strategy

Anadarko produces conventional as well as unconventional resources. The company has several tight gas reservoirs in the USA. The Bossier Play field is situated in East Texas and North Louisiana. It has a low permeability and a low porosity. This tight gas reservoir is characterized by a hyperbolic decline rate. This means that an average well which starts at 3 MMcf/d declines rapidly to 1 MMcf/d after one year of production. The production rate declines afterwards at a much slower rate. These wells recover more gas than an average gas well.

The company has several coalbed methane reservoirs in Utah. During 2000, Anadarko produced 20 MMcf/d of gas out of its wells in Utah.

Unconventional heavy crude oil is located in the Canadian provinces of Anadarko. During 2000, the company produced 27 MBBL/d of crude oil condensate and NGL in Canada.

Another important raw material sector in the company's resource strategy is the production of minerals. Anadarko came into the mineral sector through the RME acquisition. The target of this strategy is to use the cash flow from the hard mineral operations in order to reinvest it into the oil and gas sector. The company has low sulphur coal deposits in Wyoming. The market burns the coal to produce steam in order to generate electricity. The largest trona reserves in the world are located in the Green River Basin in the South West of Wyoming. Anadarko owns 50% of these reserves. Natural soda ash is produced by reefing trona ore. The soda ash is used to produce glass for containers and in the production of certain chemicals. (A.R.2001)

In 2001, Anadarko tried to expand its position in coalbed methane production of Utah by drilling 18 wells. During 2001, the coalbed methane production increased by about 60% to 52 MMcf/d of gas. Wyoming is the second region for coalbed methane production. In 2001, 4 MMcf/d of gas was produced out of 20 wells. Additional 67 wells were drilled during this year to expand the production.

The company also planned to explore the methane hydrate resources in the arctic tundra of Alaska. Anadarko wants to study the methane hydrates by operating a drilling program with its own elevated drilling platform. The so called Arctic Platform Drilling System is mobile and can handle logistic problems. (A.R.2002)

During 2002, Anadarko sold its heavy oil interest in Eastern Alberta, Canada for about USD 160 million. (A.R.2003)

In 2003, Anadarko increased its development and production operations of tight gas and coalbed methane fields located in the Western states of USA (Wyoming, Kansas). Coalbed methane became a core segment in the natural gas production of Anadarko.

The production increased from 61 MMcf/d in 2002 to 66 MMcf/d in 2003. The company drilled or had a participation in 68 wells with a success rate of 97%. (A.R.2004)

During 2004, the development strategy was changed from conventional to unconventional resources. The company focused especially on tight gas and coalbed methane. (A.R.2005)

In 2005 the portion of tight gas reserves was about 40% of the total proved reserves. During 2005, the production out of CBM projects could be increased to 145 MMcf/d compared to 66 MMcf/d in 2003. (A.R.2006)

Supply chain strategy

Anadarko owns several gas gathering systems in the USA which are a major part of the midstream business. The company operates seven major gas gathering systems in the USA. These systems are located in areas where the company has its major gas producing fields (Oklahoma, Texas and Kansas).

In 2000, these gathering systems had a length of 4.350 km. They connected around 3.100 wells and transported around 600 MMcf/d of gas during this year.

In 2000, Anadarko bought the stock of Pinnacle Gas Treating Inc. for USD 38 million. The company wanted to increase its pipeline network with a further capacity of gas. The network of Pinnacle Inc. consisted of 100 km of large diameter pipe and 66 km of small diameter pipe. A treating plant was also acquired with this transaction. The Bethel plant removes carbon dioxide and hydrogen sulphide from the gas. It can handle 500 MMcf/d of gas. (A.R.2001)

In 2001, the pipe gathering system of Anadarko transported around 680 MMcf/d which indicates an increase of 13% compared to the year before. (A.R.2002)

In the next year, the gathering system through the USA was extended. It connected around 3.300 wells with a length of 5.000 km.

The average gas throughput was increased to 730 MMcf/d compared to 680 MMcf/d in 2001. The reason was the additional Vernon Gathering System in North Louisiana. (A.R.2003)

In 2003, the gas gathering system of Anadarko connected around 3.450 wells and had an average gas throughput of 800 MMcf/d.

In 2005, Anadarko could increase the gas throughput through its seven gathering systems to 950 MMcf/d compared to 900 MMcf/d in 2004. The total gas gathering system was extended to a length of 5.240 km. (A.R.2006)

Gathering systems

- Antioch Gathering System in Oklahoma
- Sneed system in Texas
- Hugoton Gathering System in Kansas
- Dew Gathering System in East Texas
- Pinnacle Gathering System in East Texas
- CJV / SEC Gathering System in East Texas
- Vernon Gathering System in Louisiana

The natural gas which is produced is processed in so called third party plants. Anadarko has agreements with four plants in the Western states, 14 plants in the Mid Continent area and 10 plants in the Gulf Coast area. Further on, Anadarko has interests in one operated plant and three non operated plants in the Western states. The plants and the agreements are used to process gas in the major core areas of Anadarko in the USA.

Latin America becomes a new operating area for Anadarko. Since the RME acquisition, the company owns a 100% interest in several exploration blocks in Guatemala. Further on, the company controls the production from its field to the port. Anadarko owns gathering and processing facilities at each field, an asphalt refinery, a pipeline with pump stations and a shipping terminal at the Caribbean coast. (A.R.2001)

The main field of Anadarko in Africa is the Hassi Berkine field in Algeria. SONATRACH and Anadarko are developing this field. In 2001, a crude oil production train as well as a gathering system and crude oil storages were installed to expand the field. (A.R.2002)

During 2004, Anadarko extended its natural gas portfolio. The company acquired a private Canadian company which owned a liquefied natural gas (LNG) terminal in Nova Scotia (Canada). The company wants to extend the terminal to process up to 1 Bcf of regasified LNG per day.

The natural gas which is produced is processed in so called third party plants. During 2005, Anadarko had agreements with eight plants in Texas, four plants in the Western states, five plants in the Mid Continent area and one plant in the Gulf Coast area. The difference between 2001 and 2005 was the reduction of 10 agreements.

Further, on Anadarko tried to expand the LNG terminal in Nova Scotia by constructing two LNG storage tanks and a marine jetty. (A.R.2005)

Technology

One of the main production areas in the USA is Texas. During 2000, Anadarko planned several waterflood programs to keep the production rate of wells constant.

Algeria is a main core area for Anadarko. In 2000, five injection wells were completed. They were used to increase the recovery. (A.R.2001)

During 2001, further enhanced oil recovery methods were used in the USA. Anadarko used the CO_2 injection method in the so called San Andres reservoir in Texas.

This was the first flood project which was operated by Anadarko. Further on, a water flood project was initiated in the Clearfolk reservoir in Texas. Anadarko had a working interest of 67% in this reservoir.

Central Oklahoma is also a very important core region for Anadarko in the USA. During 2001, net production out of 291 wells in the so called Golden Trend area which was operated by the company was 20 MMcf/d of gas and 600 BBL/d of oil.

Anadarko operates also five enhanced oil recovery units in this area. The enhanced oil recovery units are based on the method of CO_2 injection. They produced around 3 MBBL/d of oil and 3 MMcf/d of gas in 2001. During this year, the company invested USD 19 million to expand the recovery units. (A.R.2002)

In 2002, Anadarko increased its stimulation program in the main production areas of the USA. The method of water fracturing was used to increase the productivity index of several wells. Around 99 wells were stimulated in 2002. The Permian Basin is a very intensive exploration and development area for Anadarko. During 2002, 71 wells were drilled with a success rate of 99%. Further on, the company performed 237 workovers and re-completions in the Permian Basin. A carbon dioxide flood was installed to stimulate the wells. (A.R.2003)

In 2003, Anadarko expanded its enhanced oil recovery projects especially in Wyoming. Anadarko has special rights to market the CO_2 in the Powder River Basin since the acquisition of the company Howell. The company constructed a 210 km pipeline to transport CO_2 to the Salt Creek field in Wyoming. Anadarko wants to inject around 7.200 tons of CO_2 per day to recover more than 150 MMBBL of oil. The company as an operator had a working interest of 98% in the Salt Creek field and tried to increase the production from 4 MBOE/d in 2003 to 30 MBOE/d in 2009.

Further on, a 60 km pipeline was installed to inject CO_2 in the Monell field which is situated in south-central Wyoming. The main characteristic of the fields in Wyoming is the production of CO_2. That's the reason why Anadarko began a study of a long-term storage of CO_2 in its enhanced oil recovery projects. The company wants to reduce the amount of greenhouse gases by reinjecting the CO_2 in its fields. (A.R.2004)

During 2004, Anadarko started its first CO_2 project in Canada. The company tried to maintain the production rate constant in several fields. (A.R.2005)

In 2005, Anadarko increased EOR projects in its main core production areas. Especially Kansas and Oklahoma were a main focus for this kind of stimulation methods.

The production rate in Wyoming could be increased compared to 2004 because of an active EOR program with CO_2 injection. A CO_2 project was also started in the South of Alberta, Canada. (A.R.2006)

Corporations

The main offshore production area is located in the Gulf of Mexico. In 2000, Anadarko owned an average working interest of 58% in 330 blocks. Further on, Anadarko held 58 lease blocks in the deepwater area.

Algeria is the main operation area for Anadarko outside of the American continent. The company tried to develop a good working relationship with SONATRACH - the National Oil Company of Algeria during the last years.

In 2000, Anadarko had an interest in a production sharing agreement. Liquid hydrocarbons that are discovered, developed and produced will be shared by SONATRACH (NOC of Algeria), LASMO Oil (subsidiary of ENI-Agip), Maersk Olie Algeriet (subsidiary of the Danish A.P. Moller group) and Anadarko. SONATRACH is responsible for 51% of development and production costs. Anadarko was the operator with 50% and the other two partners had an interest of 25%.

Anadarko and SONATRACH extended their corporations during this year. Anadarko Algeria and SONATRACH formed the Groupement Berkine.

That's a non profit company. SONATRACH is the owner of 5% of Anadarko's common stock. Anadarko and SONATRACH also signed an agreement with the company Brown & Root in order to expand the infrastructure to produce efficiently out of their fields. Brown & Root is as subsidiary of Halliburton.

The contract consisted of the construction of a crude oil process train which should handle 75.000 barrels per day. Further on, the contract included the installation of a field gathering system. The system is used to reinject water and natural gas into desired wells.

The second North African country which is part of the portfolio of Anadarko is Tunisia. The company had a 47% interest and was the operator in the Anaquid block in the Ghadames basin in Tunisia.

Egypt plays just a minor role in the operation portfolio of Anadarko. The company had a 25% interest in a producing offshore field. Around 950 BBL/d of oil were produced in 2000.

Anadarko has also operations in West Africa. During 2000, Anadarko acquired the Agali block offshore in Gabon and the Keta block in Ghana. The company held a 50% interest in these blocks and got the operatorship for the Agali block. Anadarko was also the operator of the Marine-X block offshore in the Republic of Congo with a 42% interest. The company got these exploration blocks through a farm in agreement with Devon Energy.

During 2000, Anadarko also tried to use resources around the Black Sea. The company signed a production sharing contract with the state of Georgia. The contract included the exploration rights for three blocks. These blocks have an extension of 8.100 km² on the Black Sea continental shelf. Further on, Anadarko acquired about 2.300 km of seismic data. (A.R.2001)

In 2001, Anadarko expanded its position in the Gulf of Mexico. The company owned an average interest of 64% in 337 blocks. 139 blocks were situated in the deepwater area.

During the year 2001, Anadarko came to an agreement with El Paso Energy Partners (EPN). The company should install a floating production platform which can produce from multiple fields as well as from the Marco Polo field. Marco Polo was the first deepwater project of Anadarko in the Gulf of Mexico. The company made the discovery in 2000. EPN and Cal Dive International, Inc. should own the platform and Anadarko will be the operator. The production capacity should be 100 MBBL/d of oil and 250 MMcf/d of gas. The oil and gas which will be produced from the platform can be transported through gathering pipelines which are owned by the EPN. The agreement includes a demand charge of USD 2 million per month for five years. Starting time should be after the mechanical completion is done in 2004.

During 2001, Anadarko tried to expand its deepwater portfolio through a cooperation with BP. Anadarko signed a participation agreement with the British company to explore 95 deepwater blocks (South Auger Participation agreement). The blocks were owned by BP, but Anadarko had the option to get a 33% to 66% working interest for these blocks. Anadarko got also rights in eight blocks which are situated near the Marco Polo field.

During 2001, Anadarko expanded its position in the Middle East through the strategy of acquisition. Anadarko had a 65% interest in the Al Rayyan field offshore Qatar (production of 4 MBBL/d of oil). The company had also a 49% interest in an exploration and production sharing agreement in the offshore block 11 in Qatar.

Oman is the second interesting country for Anadarko. The company had a 100% interest as an operator in the Hafar field. In 2001, the company achieved a long term agreement with the government of Oman. Anadarko will sell the gas to the government.

The continent Australia plays just a supporting role in the strategy of Anadarko. The company had a 15% interest in production facilities of the Jabiru and Challis fields. (A.R.2002)

The USA is the biggest core area for Anadarko. The company operates several wells in different states. In 2002, the company was the operator of around 5.000 wells in the Permian Basin as well as of 1.900 wells in the Ozona field in Texas.

In the area of Central Texas/Gulf Coast around 1.500 wells were operated by Anadarko. Another 2.300 wells which were situated in the southwest of Kansas as well as in the Oklahoma and Texas panhandles were operated by Anadarko.

In 2002, the company's production of coalbed methane increased by 80%. Anadarko tried to expand the production with a 50% participation in a joint venture. The developing area has an extension of 539 km² and is situated in the so called Atlantic Rim.

The company also tried to increase its position in the Gulf of Mexico. During 2002, Anadarko had an average interest of 70% in 371 blocks.

Qatar is the main production area for Anadarko in the Middle East. In 2002, Anadarko got the operatorship of an offshore block in Qatar through an interest acquisition. The company had a 92,5% interest in the offshore field Al Rayyan which covers block 12 and block 13.

Further on, Anadarko increased its position in North Africa. It expanded its interest in the Anaquid block of Tunisia from 47% to 61%. Anadarko became also the operator of this block.

Gabon and Congo are the major operation areas of Anadarko in West Africa. The company obtained a 55% interest in an offshore block in Gabon. (A.R.2003)

During 2003, Anadarko increased its coalbed methane activities in the Atlantic Rim. The production of coalbed methane became a core competence of Anadarko. In 2002, a joint venture was signed with Warren Resources to develop CBM in the Atlantic Rim. The company operated 36 wells and drilled nine additional wells with the joint venture.

Anadarko tried to come in contact with the state of Wyoming and other agencies in order to develop new technologies to handle the produced coalbed water. The company reinjects the majority of the produced water to save the environment.

The offshore area of the Gulf of Mexico stayed an important region for Anadarko in the USA. The company owned an average interest of 69% in 417 blocks. Further on, Anadarko held 152 lease blocks in the deepwater area of the Gulf of Mexico

Marco Polo was the first deepwater discovery of Anadarko in 2000. Three years later, the last development wells were drilled. The company had a 100% working interest and became the operator of the platform at the end of 2003.

Further on, Anadarko, other energy companies as well as a third party came to an agreement to start the Front End Engineering Design (FEED) work to design a deepwater platform for the eastern Gulf of Mexico. It should handle and gather natural gas as well as condensate from six gas fields out of the deepwater area.

The Independence Hub will be installed in the Mississippi Canyon block in a depth of 2.400 meter and should be able to process around 850 MMcf/d. The companies should evaluate several floating platform ideas as well as the costs for processing the platform which are estimated around USD 350 million. The third party will construct and own the so called Independence Hub and Anadarko should become the operator. The agreement includes a demand charge of USD 2 million per month for five years. Starting time for the demand charge should be after the mechanical completion.

Anadarko also signed an agreement of participation with Exxon Mobil in the Gulf of Mexico. The agreement covered 32 blocks.

Tunisia is after Algeria the second important North-African country for Anadarko. The company operated two blocks during 2003. Anadarko had a 61% interest in the Anaguid block and a 100% in the Jenein block. These blocks covered an area of 6.000 km².

The company stopped certain exploration activities in West Africa. The 42% interest in the Marine block offshore in the Republic of Congo did not play an important role in exploration considerations anymore.

The Black Sea in Georgia is a new area for Anadarko. The company has a production sharing agreement with the state of Georgia for an area of 8.000 km².

During 2003, the company worked on geophysical and geological studies to explore this area. Anadarko was also searching for partners to reduce the risks and costs for future seismic as well as drilling activities. (A.R.2004)

In 2004, Anadarko owned an average interest of 73% in 190 blocks in the Gulf of Mexico. The company sold its interests in the continental shelf of the Gulf of Mexico to the company Apache for USD 573 million. These interests included 107 MMBOE of proved reserves in 78 fields.

Further on, the company sold its interests in the Westem Canadian Sedimentary Basin. The sale included around 64 MMBOE of proved reserves. (A.R.2005)

The Gulf of Mexico stayed a major offshore production area for Anadarko during 2005. 11% of the proved reserves were located offshore at the end of 2005. The company owned an interest of about 71% in 231 blocks. (A.R.2006)

Acquisitions

In 2000, Anadarko merged with the Union Pacific Resources Group. It was renamed to RME Holding Company (RME). The merger costs for this transaction were USD 67 million. A consequence of this transaction was the acquisition of 912 MMBOE of proved reserves in the USA, Canada and Latin America.

During 2000, the company tried to expand its position in its core provinces by acquiring acreage in the Northwest Territories and in the offshore deepwater area of Nova Scotia. The company acquired a 38% working interest in two exploration licences. In Nova Scotia, Anadarko held a 50% working interest in a block.

Anadarko also tries to develop a new core area in Latin America. The company got a 45% non-operating working interest in the Oritupano Leona block in Venezuela through an acquisition. The block covers around 246 producing fields.

The company's Guatemala operations in 2000 were also based on the RME merger transaction.

Anadarko also tries to expand its position in Latin America. The company acquired acreage in a block located in Brazil. Anadarko is the operator with a 90% interest.

During 2000, Anadarko acquired two blocks on the Faroe Islands. The company had a 100% interest in licence No. 007 as an operator and a 27,5% interest in licence No. 006. These licences have an extension of 2.500 km^2. (A.R.2001)

In 2001, Anadarko expanded its position in the Gulf of Mexico. The company owned an average interest of 64% in 337 blocks. Anadarko's first deepwater project is located on the so called Green Canyon block 608. The discovery was made in 2000 with two wells. In 2001, the company acquired the rights to explore and develop eight blocks in the Green Canyon field.

During 2001, Anadarko used the strategy of acquisition to expand its position in Canada. The next acquisition after RME in 2000 was the acquisition of the Berkley Petroleum Corp. This acquisition increased the reserves in Canada by about 42% or 99 MMBOE.

The Northwest Territories with the Mackenzie Delta is a major operation area for Anadarko. The company acquired a 3 D seismic program with an area of 216 km^2 to expand its position as an operator in the Mackenzie Delta.

Anadarko also tries to use the resources in the Middle East. During 2001, Anadarko acquired the company Gulfstream Resources Canada Ltd. for USD 118 million. These assets were located in Qatar and Oman. The acquisition increased the proved reserves by 57 MMBOE.

North Africa also plays an important role in the exploration strategy of Anadarko. The company held a 50% interest in the Jenein North block in Tunisia. The company tried to explore this area efficiently by acquiring two 2 D seismic surveys in this area.

West Africa is a new area for Anadarko. In 2001, the company had interests and was the operator in two fields in Gabon and in the Republic of Congo. The Agali block is located offshore in Gabon. As an operator of this block, Anadarko acquired 3 D seismic data.

Since the acquisition of two licences on the Faroe Islands in 2000, the company tries to explore this area efficiently. In 2001, a seismic survey was acquired which covers the exploration area.

The company's strategy in Latin America is to sell projects which do not reach the desired targets. The consequence was the sale of the company Basic Resources International in 2001. It was a subsidiary of Anadarko. The company got USD 120 million out of this sale. The company Basic Resources operates in Guatemala. It refines crude oil.

Anadarko also sold its interests in Argentina for USD 16 million in 2001. (A.R.2002)

In 2002, Anadarko went on with its acquisition strategy in order to increase the reserves. During the year, the company acquired around 87 MMBOE of proved reserves.

The major acquisition of 2002 was the transaction with the company Howell Corporation. The costs for this acquisition were USD 258 million. The result of this transaction was the increase of the proved reserves by 65 MMBOE in the USA and 13 MBOE in Qatar.

The company also invested in enhanced oil recovery. The company acquired the rights to buy, to market and to transport CO_2 into the Powder River Basin of Wyoming for USD 3 million.

The North Louisiana Bossier stayed a major exploration and development area for Anadarko during 2002. In order to identify hydrocarbon potential a 3 D seismic survey was acquired.

The Alpine field is the major hydrocarbon area in the North Slope. During 2002, Anadarko acquired 3 D seismic data around the Alpine field.

Anadarko also tried to increase its position in Alberta, Canada by acquiring 143 km^2 of 3 D seismic and by selling expensive assets.

The heavy oil reservoirs in Alberta were sold because of cost reasons. The asset had proved reserves of about 28 MMBOE. Anadarko got USD 160 million for this sale.

The company expanded its position in the Middle East by acquiring an interest in an offshore block situated in Qatar. The company became the operator with a 92,5% interest in the Rayyan field which covers block 12 and block 13. (A.R.2003)

In 2003, Anadarko acquired around 54 MMBOE of proved reserves which were located in the USA.

During 2003, Anadarko increased its exploration and development activities in the Alpine field of Alaska. The company had a participation in the acquisition of 3 D seismic data around the Alpine field. The data was used to evaluate additional recovery opportunities.

In 2003, Anadarko tried to expand its position in the Gulf of Mexico. The company acquired shelf properties from Amerada Hess. The transaction costs of USD 225 million included proved reserves of 23 MMBOE in 23 fields.

Qatar is the main production area for Anadarko in the Middle East. Since 2002, the company had as an operator a 92,5 % interest in the offshore field Al Rayyan. The company acquired 16 km^2 of 3 D seismic data for the offshore block 13. The data was used to identify potential hydrocarbon areas for the next drilling program in 2004. Another seismic acquisition was done for the offshore block 11. Since 2001, the company has a 49% interest in an exploration and production sharing agreement which covers this offshore block. In 2003, the company acquired around 1.240 km^2 of 2 D seismic data. (A.R.2004)

In 2004, Anadarko sold its interests in the continental shelf of the Gulf of Mexico. These interests included 107 MMBOE pf proved reserves.

During 2004, the company was awarded certain exploration and production rights in Indonesia. The offshore area has an extension of about 4.050 km^2. The production sharing agreement consists of a six year exploration phase and a 20 year production phase. (A.R.2005)

In 2005, Anadarko tried to increase its position in Indonesia. The company signed a joint venture exploration agreement with about 12 production sharing contracts. These contracts cover an area of 30.000 km² offshore and onshore in Indonesia.

During 2006, Anadarko acquired the companies Kerr McGee (KMG) and Western Gas Resources for USD 23,3 billion. This transaction increased the proved reserves by 585 MMBOE in the USA and by 269 MMBOE in the deepwater area of the Gulf of Mexico. The transaction expanded Anadarko's position in deepwater drilling.

KMG is the owner of 504 deepwater blocks and 10 producing fields. The acquisition also increased the interest of Anadarko in the Independence Hub project in the Gulf of Mexico from 49% to 72,3%. The transaction also included certain interests in China, offshore Brazil, Australia, West Africa, China, and Trinidad & Tobago.

In 2006, Anadarko sold the subsidiary Anadarko Canada Corporation (ACC) for USD 4,34 billion to the company Canadian Natural Resources.

The sale included an undeveloped area 6.070 km² in British Columbia and Northwest Alberta as well as a current production of 69 MBOE/d. The sale did not include the assets in the Northwest Territories or in the Mackenzie Delta.

Anadarko wants to focus on new assets after the acquisition of Kerr-Mc Gee and Western Resources. Anadarko also sold its interests in the Bear Head LNG terminal in Nova Scotia for USD 123 million. (A.R.2006)

Office locations

- Houston Corporate Office
  Houston, Texas
- Anadarko U.K. Company
  London, U.K.
- Anadarko Algeria Company
  Algiers, Algeria
- China Kerr McGee Petroleum Ltd.
  Beijing, China
- Brazil Kerr McGee Petroleo Ltd.
  Rio de Janeiro, Brazil
- Anadarko Indonesia Company
  Jakarta, Indonesia
- Anadarko Tunisia Anaguid Co.
  Tunis, Tunisia
- Anadarko Qatar Energy Co., LLC
  Doha, Qatar

Apache Corporation

Apache Corporation is an independent energy company. It explores, produces and develops crude oil, natural gas and natural gas liquids. Apache's main exploration and production operations are focused on North America (USA, Canada), on Western Australia (offshore), on Egypt (off- and onshore) as well as on the British North Sea (offshore). Further on, the company has certain operation interests in Argentina, Poland and offshore China. The company also has several interests through its subsidiaries Apache Energy Limited (AEL), Apache International, Inc. as well as Apache Overseas, Inc.

Exploration and Appraisal

The main exploration activities are focused on North America, Egypt and Australia. The activities are focused on special core areas because Apache wants to be the operator in most of its projects. 80% of the company's proved reserves were located in North America at the end of 2000. The operation regions on this continent are separated in four segments:

- Offshore
- Mid-Continent (Oklahoma, East & North Texas, Arkansas and N-Louisiana)
- Southern (Permian Basin, W-Texas, Central Texas, New Mexico)
- Canada (Alberta, British Columbia)

The Gulf of Mexico is the main offshore area for Apache. During 2000, the company had a participation in 35 wells. 22 wells were productive (63%). The so called Mid-Continent region covers Oklahoma, East and North Texas, Arkansas and North Louisiana. In 2000, Apache had a participation in 210 wells. 78% of these wells were completed to be productive. The Southern region consists of the Permian Basin in West Texas and New Mexico, the San Juan Basin of New Mexico, Central Texas as well as the coasts of Texas and Louisiana. In 2000, the company had interests in 149 drilling wells of which 139 wells were productive (93%).

Canada is also an important exploration area for Apache in North America. The main operating provinces are Alberta and British Columbia. During 2000, the company had a participation in 114 wells. 77% of these wells were productive. (A.R.2001)

The drilling activities worldwide in 2001 consisted of 939 gross wells with a productive rate of 88%. Exploration activities were mainly focused on Canada. During 2001, the drilling activity in Canada was expanded. The company had a participation in 447 wells. The participation was increased by 333 gross wells compared to the year before. 93% of the drilled wells were productive.

The Gulf of Mexico stayed a main operation area for Anadarko in the USA. The company had a participation in 57 drilled wells. 47 wells (82%) were productive compared to 63% in 2000. The company increased its participation in wells drilled in the Southern region by 55% compared to 2000. Apache had interests in 230 wells of which 91% were productive. Apache decreased its interests in the number of wells drilled in the Mid Continent region from 210 wells to 132 wells in 2001. 84% of them were productive compared to 78% in 2000.

Internationally, the main exploration activities were focused on Egypt in 2001. The company drilled 43 wells mainly in the Western desert with a success rate of 70%.

Australia remained the 3rd important core area for Apache after North America and Egypt. The company had a participation in 24 wells. Half of these wells were productive. (A.R.2002)

Apache reorganized its exploration and production portfolio in 2002. The three activity regions in the United States were combined to two.

US-domestic areas:

- Gulf Coast
- Central

The drilling operations in the USA were focused mainly on development operations. Apache decreased its total number of US wells drilled from 419 in 2001 to 194 wells in 2002. The company achieved a success rate of 87%. Most of the drilling activity was reduced in the new Central area (Mid Continent & Southern). Apache had a participation in 138 wells compared to 362 in 2001. This indicates a reduction of 62%. The number of productive wells reached a portion of 92%.

The Gulf of Mexico stayed a main operation area for Apache. The company had a participation in 56 wells. 41 wells (73%) had a hydrocarbon potential compared to 47 wells (82%) out of 57 wells drilled in 2001.

The drilling activity in Canada was extremely expanded in 2002. Apache had a participation in 836 gross wells which indicates an increase of 87% compared to 2001.

The main operation core area outside of North America stayed Egypt. Apache increased the number of wells drilled from 24 to 55 in 2002. The success rate was slightly decreased to 82%. The company also drilled four exploration wells in the deepwater area of the West Mediterranean block.

The second important operation region international remained Australia. The company had a participation in 25 wells. 40% of the drilled wells were productive. (A.R.2003)

In 2003, Apache increased the number of gross wells drilled worldwide by 30%. Generally, the exploration activity was focused on assets outside of North America. In the United States, Apache had a participation in 293 wells compared to 194 wells in 2002. The portion of productive wells was 91%.

The drilling activity in the Gulf Coast area was also increased from 56 wells in 2002 to 85 wells in 2003. 79% of the drilled wells had a hydrocarbon potential. The Central region followed the trend of expanding the drilling program. Apache extended the participation in drilled wells by 50% compared to the year before.

Canada was the most active drilling region for Apache in 2003. The company increased its participation from 836 wells in 2002 to 984 wells in 2003. 92% of the drilled wells had a hydrocarbon potential.

The largest drilling program outside of North America was performed in Egypt. The company increased the number of gross wells drilled from 59 in 2002 to 107 wells in 2003. This indicates an extension of 81%.

The drilling program in Australia was also increased by 48%. The company had a participation in 37 wells. 24 wells were exploration wells with a success rate of 41%. (A.R.2004)

The drilling program of 2004 was again expanded. Exploration activities were focused on areas outside of North America. Apache increased the number of gross wells drilled worldwide from 1.449 wells in 2003 to 1.913 wells in 2004 (+32%).

The company increased the number of wells drilled in the USA by 41%. The drilling activities in the USA were concentrated on the extension of existing fields. Nearly all of them were development wells.

The number of gross wells drilled was also expanded in Canada. Apache increased its participation in wells drilled by 33%. Three quarter of them were development wells.

Apache stayed also the most active driller in the Western desert of Egypt. The company had a participation in 106 wells with a success rate of 88%.

The drilling program of Apache in Australia was slightly decreased from 37 wells in 2003 to 31 wells in 2004. 22 of them were exploration wells with a success rate of 40%. (A.R.2005)

The drilling program of Apache in 2005 consisted of 2.383 wells. This indicates an increase of 25% compared to 2004. During the last years the development activities were focused mainly on North America and the exploration activities were focused on the other international core areas. This strategy was extended also in 2005.

In 2005, Apache had a participation in 478 gross wells drilled in the USA. This indicates an increase of 15%. Especially the number of wells drilled in the Central region was increased. Nearly all of them were development wells. The Central region covers the biggest reserve contingent for Apache after Canada.

The drilling activity in Canada was again extended by 28% compared to the year before. Most of the gross wells were drilled for development reasons.

The number of gross wells drilled in Egypt was slightly increased from 116 wells to 121 wells. The success rate was 86%.

The exploration program in Australia was extended in 2004. 26 exploration wells were drilled compared to 22 wells in 2004. The success rate decreased from 40% to 30%.

The drilling program in the new core area of the North Sea included 23 gross wells drilled. These activities increased the company's proved reserves by 45,2 MMBOE at the end of 2005. (A.R.2006)

Technology strategy

During 2000, Apache started an exploration program in the Carnarvon Basin offshore in Australia which included around 550 sq kilometres of 3 D and around 1.050 kilometres of 2 D seismic surveys.

Apache is one of the biggest acquirers of 3 D seismic data in the world.

After the new entry into the North Sea, a massive 3 D seismic survey was processed to explore the major Forties field efficiently. The surveys lead to a new 4 D snapshot which is used to find new drilling targets in the future. The survey was processed for 27 blocks out of 45 Apache's North Sea blocks.

In 2004, Apache drilled horizontal wells in two operating fields located offshore in Australia. (A.R.2005)

Development and Production

The production operations are focused on the USA, Canada, Egypt and Australia.
About 70% of the proved reserves were located in North America at the end of 2000. 56% of the company's worldwide production was due to activities on this continent. The most development projects were performed in the USA.

The main production of 2000 could be achieved in the offshore region of the Gulf of Mexico (Texas, Louisiana). 18% of the company's proved reserves were located in this area at the end of 2000. This indicates a clear offshore strategy. 12% of Apache's proved reserves were located in the Mid Continent at the end of 2000. Around 68 workovers and recompletions were performed in this region of the USA. The Southern area is also a major production region for Apache. 29% of the total proved reserves were located there in 2000. During this year, 490 workovers and recompletions were performed.

Around 21% of Apache's proved reserves were situated in Canada. The production in Canada is focused on conventional resources as well as on coalbed methane gas. The company performed 204 workovers and recompletions as an operator in 2000.

Egypt is the most important African county for Apache. 6% of its proved reserves were located in this country at the end of 2000. The third important core region for Anadarko is Western Australia. 14% of the company's total proved reserves could be found on this continent in 2000.

Poland is a new operation country for Apache. In 2000, two well tests were performed which achieved rates of 16,9 MMcf/d and 9,5 MMcf/d of natural gas.

Well tests were also performed in a Chinese offshore block which was operated by Apache in 2000. It achieved rates up to 40.000 BBL/d of oil. (A.R.2001)

The main production of Apache during the last years was due to activities in the USA. Generally, development activities were focused on the USA during 2001. The offshore region stayed a main production and development area for Apache. The company performed 135 workovers and recompletions during 2001 compared to 188 workovers in the year before. The amount of proved reserves changed from 18% in 2000 to 14,8% in 2001.

The second biggest reserves were located in the Southern USA operation segment of Apache. 24% of the company's proved reserves were located in this region at the end of 2001 compared to 29% in 2000. Around 695 workovers and recompletions were performed during 2001 which indicates an increase of 42% compared to 2000. The proved reserves in the Mid Continent region decreased from 12% to 8,6% in 2001. 65 workovers and recompletions were done which stayed nearly the same as in the year before.

The biggest proved reserves of 2001 were located in Apache's Canadian provinces of Alberta, British Columbia and Saskatchewan. The reserve contingent was increased from 21% to 28% in 2001. The development program consisted of 455 workovers and recompletions projects. This indicates an increase of 123% compared to 2000.

Internationally, Egypt remained the main production area for Apache in 2001. The company became the largest producer of liquid hydrocarbons and the 2nd largest producer of natural gas in the desert of Egypt. The total proved reserves could be increased from 6% in 2000 to 12,4% in 2001.

Australia stayed the 2nd important international production area for Apache in 2001. 12,2% of the company's total proved reserves were located in Australia compared to 14% in 2000. (A.R.2002)

The main development and production core area stayed North America in 2002. 78% of the estimated proved reserves were situated on this continent at the end of this year. The Gulf Coast is the main offshore region for Apache. The amount of proved reserves increased from 14,8% in 2001 to 21% in 2002. The company performed around 586 workovers and recompletions in this area. This indicates an increase of 334% compared to the year before. The Mid Continent as well as the Southern area were combined to the Central region in 2002. The company's proved reserves in this region decreased from 32,6% in 2001 to 27% in 2002. The number of performed workovers was also decreased from 760 in 2001 to 519 in 2002.

The biggest reserve contingent of Apache was located in Canada as in 2001. The proved reserves could be increased from 28% in 2001 to 30% in 2002. Apache also increased the number of workovers by 55%.

10% of the company's proved reserves were located in Egypt in 2002 compared to 12,4% in 2001. The production rate increased in all of the operated concessions of Apache. Net oil production was expanded by 12% and net gas production by 28%.

Apache's proved reserves in Australia decreased from 12,2% to 11% in 2002. Five workovers and recompletions were performed during this year. (A.R.2003)

Apache could increase its average daily production from 341 MBOED in 2002 to 417 MBOED in 2003. Generally, the development program was focused on North America as in the years before. The main production area in North America stayed the Gulf Coast. The proved reserves remained the same as in 2002 but the number of workovers and recompletions was decreased from 586 in 2002 to 354 in 2003. The Central region in the USA stayed the 2nd biggest proved reserve contingent for Apache. 23% of the proved reserves were located in this region at the end of 2003. The number of performed workovers decreased steadily during the last years from 760 in 2001 to 519 in 2002 and to 357 in 2003.

Canada is the country where Apache has the largest proved reserves. This fact did not change during 2003. 26% of the estimated proved reserves were located in this country at the end of 2003. The company increased the number of workovers performed from 682 in 2002 to 889 workovers in 2003.

The British North Sea became a new production area for Apache after an acquisition in 2003. 9% of the company's proved reserves were located in this region at the end of 2003.

Egypt stayed the major production area for Apache outside of the North American continent. The total proved reserves increased from 10% in 2002 to 16% in 2003.

The proved reserves in Australia could be increased through exploration and development activities by 33 million BOE as well as through acquisitions by 6,7 million BOE during 2003. The number of workovers performed was also extended from five in 2002 to 11 in 2003.

The first production out of Apache's operation field in China could be started in 2003. (A.R.2004)

The development program of 2004 was mainly focused on the USA as in the years before. 378 workovers were performed in the Central region which covered about 23% of the company's proved reserves at the end of 2004. The Gulf of Mexico stayed the 3rd biggest proved reserve contingent area for Apache. 21% of the company's reserves were located in this area at the end of 2004. The number of workovers was increased from 354 in 2003 to 452 in 2004. The company became the 2nd largest producer in water depth less than 400 m.

Apache's largest proved reserves were located in Canada in 2004 as well as in the years before. The number of performed workovers increased by 23%.

Egypt stayed a main production area for Apache. The company is the biggest producer of hydrocarbon liquids in the Western desert of Egypt. The total percentage of proved reserves decreased slightly from 16% in 2003 to 12% in 2004. (A.R.2005)

The development program during 2005 was focused on the USA as in the years before. The biggest reserves were located in the Central area with 23,7%. 14% of the worldwide production was due to operations in this area. The number of workovers was massively increased from 378 in 2004 to 861 in 2005 in order to maintain the production. This indicates an extension of the workover performance by 128%. The Gulf of Mexico stayed the leading core production area. At the end of 2005, the Gulf Coast region covered 18% of the company's estimated proved reserves and 24% of total production. The number of workovers was decreased from 452 in 2004 to 325 in 2005 (-28%). The massive hurricanes in the third quarter of 2005 decreased the daily production of gas by 59 MMcf/d and of crude oil by 10.813 BBL/d out of the US Gulf Coast operations. The financial result was a reduction of crude oil and natural gas revenues by USD 397 million. Nine operated platforms were completely destroyed and two were extremely damaged during the hurricanes. The repair costs were expected to be USD 230 million. (A.R.2006)

Canada is the most important development area for Apache because the largest proved reserves of the company (27%) are located in this country. Around 971 workovers were performed which stayed nearly the same as in 2004. 19% of the global production was achieved in this country at the end of 2005.

19% of Apache's worldwide production was achieved in its core area of Egypt which accounts for 13% of the company's total reserves in 2005. (A.R.2006)

Resource strategy

Apache tried to increase its position in the Canadian provinces of Alberta, British Columbia, Saskatchewan and Northwest Territories during the last years. In 2004, Apache acquired certain interests from ExxonMobil in Canada. These fields have great coalbed methane potential and Apache became the biggest national producer of CBM in 2004. (A.R.2005)

In 2006, Apache drilled around 175 wells in its Canadian provinces in order to increase the CBM production which was around 130 MMcf/d at the end of 2005.

Supply chain strategy

Since 1998, Apache has a strategic alliance with the company Cinergy. The alliance is used to market the produced natural gas in North America. Cinergy Marketing & Trading markets the natural gas from Apache's production till 2008.

The crude oil which is produced in the USA is sold to refiners, traders and transporters. The contracts which are valid for 30 days are renewed automatically.

The natural gas from Canada is sold to major aggregators and direct users with long term and short term contracts. Natural gas is transferred through transportation contracts to California (12 MMcf/d) to Chicago (40 MMcf/d) as well as to the Eastern Canadian area (6 MMcf/d). This specific oil and gas contracts are used to react on price variations because of changing market conditions.

Australia is a main core area for Apache. In 2000, the subsidiary Apache Energy Limited operated a gas hub and two 100 km pipelines (12 inch and 16 inch). They were used for transportation reasons from the Varanus Island hub.

Egypt is the most important production area for Apache in Africa. The oil which is produced from the Qarum block in the Western desert is transported through pipelines to tanks or it is transported via trucks to the refinery in Alexandria. The operator of the pipelines is the Arab Petroleum Company. The crude oil is sold to the General Egyptian Petroleum Corporation which has the primary rights to buy the oil. (A.R.2005)

Technology strategy

In 2004, Apache started an enhanced oil recovery project in the Canadian province of Saskatchewan. The company wanted to recover additional 45 to 60 MMBBL of oil through injecting of around 26 MMcf/d of CO_2 into the so called Midale field. Apache was the operator of this field with a 100% interest. The CO_2 was transported through a pipeline operated by the Dakota Gasification company. The total development costs were expected to be USD 100 million.

During 2004, Apache was a partner in the so called Ravensworth development program in Australia. The company BHP Billiton drilled three injection wells for gas treatment .The method of gas cycling was used. (A.R.2005)

In 2005, Apache started a waterflood project in the so called Umbarke field located in the Western desert of Egypt as an operator. During 2005, Apache also drilled 14 wells in the operating Forties field located in the United Kingdom for water injection purposes.

In 2006, Apache planned to continue the development program in the so called Zama Area in Canada with EOR projects. (A.R.2006)

Cooperations

Generally, Apache follows an operatorship strategy. In 2000, the company was the operator in nearly 80% of its total assets. Apache wants to influence the development in the most efficient way. The Gulf of Mexico is a main core area for Apache in the USA. Apache had a participation in 35 drilled wells and the company was the operator of 22 wells (63% operatorship) at the end of 2000.

The 2nd important core region after North America is Egypt. All the operations are based on so called production sharing contracts. This means that the contractor pays all the operating and capital expenditure costs for exploration and development. The contractor has interests in 40% of the production to cover the operating and capital expenditure costs. In 2000, Apache had a 75% interest in the Qarum block and a 40% interest in the Khalda block. These blocks are located in the desert. The produced natural gas is transported through a gas pipeline from the Khalda block to Alexandria. It is sold to the Egyptian General Petroleum Corporation (EGPC). Apache has a so called take or pay contract with EGPC.

The Egyptian Company has to pay for 75% of future gas production from the Khalda block. At the end of 2000, Apache became the operator of three blocks in Egypt through an acquisition. The company acquired a 50% interest in the Khalda block, a 32% interest in the Ras Kanayes block as well as a 50% interest in the Ras El Hekma block from Repsol.

Apache also tries to be the operator in most of its assets in Western Australia. The subsidiary Apache Energy Limited (AEL) is used for this purposes.

At the end of 2000, the company was the owner of a developed area of 1.050 km^2 and an undeveloped area of 7.150 km^2 of offshore Western Australia. AEL also operated the so called Varanus Island gas hub which could handle 240 MMcf/d in 2000. Further on, the company got two gas sale contracts in 2000.

Poland is a new operation area for Apache. The company had a 50% interest in an area of about 20.000 km2.

Apache also performs certain operation activities in China. In 2000, the company had a 24,5% interest of the Zhao Dong block offshore. (A.R.2001)

In 2001, Apache continued its operatorship strategy. The company could increase its operatorship portion in different projects from 80% to 85% in 2001.

Egypt is the main core area for Apache in Africa. The company was the operator of 10% of the total oil and gas production of Egypt in 2001.

Australia is the 3rd core area for Apache. The gas which is produced by its subsidiary was sold via 23 contracts compared to 20 contracts in 2000.

South America is a new continent for Apache. In 2001, the company acquired certain interests from Anadarko in Argentina. The consequence of this transaction was the operatorship with a 100% interest of the Lindero de Piedra and El Santiaguena blocks. (A.R.2002)

The exploration activity in Australia was focused on the offshore areas of Perth in 2003. The company held 26 exploration permits and 10 production licences. Nine production licences were operated by Apache. Generally natural gas is sold in Western Australia via long term contracts.

The biggest acquisition of 2003 was focused on the British North Sea. Apache acquired the operatorship of an offshore field (Forties) from BP with a 96% interest. The transaction included five platforms. The acquisition was also used to expand the relationship to one of the biggest integrated companies.

Further on, Apache tried to expand its contact with the NOC of Egypt during 2003. A so called Memorandum of Understanding (MOU) was signed with the Egyptian General Petroleum Corporation (EGPC) concerning a gas sale agreement, a field development plan and a deepwater development lease for around 2,7 Tcf of natural gas over 25 years. (A.R.2004)

In 2004, Apache extended its position in offshore Australia by increasing the number of exploration permits from 26 to 29. In the marketing sector, Apache signed three new gas sales contracts. At the end of 2004, the company had 27 gas contracts which were valid till 2026.

The North Sea became a new core area for Apache after the acquisition of BP interests. Apache also signed a crude oil sale contract with the British company. BP had to market all the crude oil from Apache. A portion of the crude oil was sold at fixed prices, the other portion at variable prices. The contract ended at the end of 2004. In 2005, two new sale contracts were signed.

During 2004, Apache focused its acquisitions on the USA and came to certain agreements with ExxonMobil. Beside this acquisition, a joint venture was initiated to explore for deep gas in South Louisiana and on the Continental shelf of the Gulf of Mexico. Exxon became the operator of the deepwater prospects and Apache operated the shallower prospects. (A.R.2005)

In 2005, Apache tried to expand its offshore position in Western Australia. The company increased the exploration licences in its assets from 26 in 2003 to 35 in 2005. Apache also signed six new gas sale contracts because the company expected an increase of gas sales. At the end of 2005, Apache held by 32 sale contracts.

During 2005, Apache signed an agreement with ExxonMobil in order to expand exploration and development activities in Western Canada (Alberta).

At the end of 2005, the company had interests in 363 blocks in the Gulf of Mexico. 255 (70%) were operated by Apache.

Further on, the company stayed the largest acreage holder in Egypt with 18 concessions in the Western desert. (A.R.2006)

Acquisitions

Apache's strategy is focused on increasing the reserves through acquisitions. In the acquisition process Apache wants to avoid auctions where the company has to compete against others. The company tries to obtain appropriate prices in this way. The acquisitions and investments are focused on special domestic and international areas because Apache wants to be the operator in most of the assets. In that way, Apache tries to influence the development process in its different assets efficiently.

In 2000, the company acquired worldwide 254 million BOE for USD 1,4 billion. The acquisitions of 2000 were focused on the North American continent. The company bought certain production interests in Oklahoma and Texas from the company Repsol YPF for USD 118,7 million. The transaction increased the proved reserves by 28,7 MMBOE. The next acquisition of this year was focused on production interests in the Permian Basin and South Texas. Apache acquired certain interests from the company Collins & Ware, Inc. for USD 320,7 million. The transaction expanded the company's proved reserves by 83,8 MMBOE. During this year, Apache also increased its position in the Gulf of Mexico. The company acquired Delaware Limited from Occidental Petroleum for USD 321,2 million. The transaction included 32 fields in the Outer Continental Shelf of the Gulf of Mexico as well as 53,1 MMBOE of proved reserves.

Further on, Apache acquired interests from the company Phillips Petroleum in Canada for USD 490, 3 million. The acquisition increased the proved reserves by 70 MMBOE.

The transaction included 1.310 km^2 of 3 D seismic data as well as 6.925 km of 2 D data in the Northwest of Alberta. The acquisition also consisted of three sour gas plants which can process around 150 MMcf/d. After the transaction, Apache also owned gathering lines with a length of 250 km and 13 compressor stations.

Certain other non detailed mentioned acquisitions increased the proved reserves by 18,3 MMBOE. The total investment for these transactions was USD 104 million. (A.R.2001)

In 2001, Apache continued its acquisition strategy in order to increase reserves. The company acquired 213 million BOE for USD 1,2 billion.

The first acquisition was done in Canada. Apache acquired certain subsidiaries from the company Fletcher Challenge Energy for USD 465 million, which had interests in the Western Sedimentary Basin. The acquisition increased the proved reserves by 120,8 MMBOE.

The next major acquisitions were performed in Egypt. Apache acquired around 66 MMBOE of proved reserves from Repsol´s interest in the Khalda field. The costs for this transaction were USD 447 million. Further on, Apache acquired also the interests of the company Novus Bukha Limited in the Khalda field as well as certain interests in the Western desert. Acquisition costs were USD 66 million. Apache became the owner of the Khalda field with 100% and could increase its proved reserves by 11,7 MMBOE.

Apache also acquired certain production and exploration assets in Argentina from the company Anadarko. (A.R.2002)

In 2002, Apache went on with its strategy of increasing the reserves through acquisitions. Apache spent around USD 355 million for acquisitions compared to USD 1,2 billion in 2001. The acquisitions in 2002 increased the proved reserves by 49 MMBOE.

72% of the acquisitions were performed in the USA. The company acquired an area of 947 km^2 in Louisiana. This transaction increased the proved reserves by 178 Bcf of gas. The acquisition included also around 1.415 km^2 of 3 D seismic data. Total costs for this transaction were USD 259 million.

The next acquisitions on the North American continent were performed in Canada. Apache acquired proved reserves of 4,8 MMBOE from the company Burlington Resources in Alberta for USD 26 million. Another 10,7 MMBOE of proved reserves were acquired from ConocoPhillips for USD 60 million. (A.R.2003)

Apache could increase the proved reserves by 267 MMBOE in 2003 because of acquisitions. Total costs for these transactions were USD 1,6 billion.

The year 2003 was characterized by the biggest acquisition in the history of Apache. The company bought interests from BP in the British North Sea and in the Gulf of Mexico for USD 1,3 billion. The acquisition increased Apache's proved reserves in the Gulf of Mexico by 67,1 MMBOE and in the North Sea by 143,7 MMBOE. The North Sea became a new core area for Apache. The transaction also extended Apache's position in the Gulf of Mexico. The company became the 9th largest oil producer in the North Sea and the 4th largest oil producer in the Gulf of Mexico.

The 2nd acquisition of this year was also focused on the Gulf of Mexico. Apache acquired certain production interests on the Continental Shelf from the company Shell Exploration and Production for USD 200 million. The acquisition increased Apache's proved reserves in the Gulf of Mexico by 26,9 MMBOE. The transaction included 26 fields with an area of 846 km^2 as well as interests in two offshore gas plants. (A.R.2004)

Apache went on with its acquisition strategy in 2004. The first acquisition was focused on the USA. The company acquired interests in 23 producing oil and gas fields in West Texas and New Mexico from the company ExxonMobil for USD 318 million.

Apache also acquired all the Continental Shelf interests of Anadarko in the Gulf of Mexico for USD 537 million. The transaction included interests in 74 fields, 232 offshore blocks and 112 platforms. The proved reserve base was increased by 99 MMBOE. Apache became the operator of 49 fields (66% operatorship) which cover around 70% of the total production.

The company also focused its acquisitions on Canada. Apache acquired an area of about 1.550 km^2 in a farm in agreement with the company ExxonMobil. Apache became the major producer of coalbed methane in Canada after this transaction. (A.R.2005)

Apache extended its position as the biggest coalbed methane producer in Canada through a further farm in agreement with ExxonMobil in 2005. It covered an area of 2.630 km^2 undeveloped properties in Alberta. Apache has to drill 145 new wells as an operator during the next three years.

The company also extended its position in the North Sea region. Apache acquired 14 new blocks around the Forties area.

In 2005, Apache bought certain interests in eight fields which were located in West Texas and New Mexico from Amerada Hess. The proved reserves were estimated to be 32 MMBOE. The transaction costs were USD 269 million. At the same time, Apache sold its 55% interest in the West Mediterranean Concession located in the deepwater area of Egypt to Amerada Hess. The company got USD 413 million for this transaction.

The company Pioneer sold all of its operation interests in Argentina to Apache for USD 675 million. Further on, Apache acquired the remaining producing properties of BP on the outer Continental Shelf of the Gulf of Mexico for USD 1,3 billion. (A.R.2006)

Organization

Offices 2000

- Executive Office in Houston, Texas
- Operating Office Tulsa, Oklahoma
- Operating Office in Calgary, Alberta
- Operating Office in Cairo, Egypt
- Operating Office in Perth, Australia
- Operating Office in Beijing, China
- Operating Office in Warsaw, Poland

New office 2001

- Operating Office in Buenos Aires, Argentina

New office 2003

- Operating Office in Aberdeen, Scotland

Occidental Petroleum Corporation

Occidental Petroleum is the biggest independent oil and gas producing company in the world. Independent means, that the company does not have marketing or refining operations. The headquarters are located in Los Angeles, California. The main operations are situated in the United States, the Middle East/North Africa as well as in Latin America. In the USA, Occidental is the largest oil producer in Texas and the largest natural gas producer in California. Other US operating regions are Kansas, Oklahoma and New Mexico. Further on, the company has an interest in a non operating field in the Gulf of Mexico. Assets in the Middle East/North Africa are located in Oman, Yemen, Qatar and Libya. Latin America is the 3rd core operating region with the countries Colombia, Ecuador, Bolivia and Argentina. Further on, the company has minor operations in Russia and Pakistan which are defined as other eastern hemisphere. The resource portfolio is strongly oil focused. (A.R.2006)

Exploration and Appraisal

The oil and gas operations in the United States were focused on five states during 2000. The company had operations in California, Kansas, New Mexico, Oklahoma as well as in Texas.

The 2nd core area for Occidental is the Middle East with Oman, Yemen and Qatar. All operations in these countries are based on production sharing contracts. The company held as an operator a 65% interest in block 27 in Oman and started an exploratory drilling program at the end of 2000. (A.R.2000)

Occidental continued its drilling program in the Middle East during 2001. In Yemen, the company had interests in seven exploration blocks which cover around 60.728 km^2. Occidental was the operator of two blocks (44 and 20) with a working interest of 75% and 50%. Further on, the company had a working interest of 40% in the other blocks. (A.R.2001)

The exploration activities of 2002 were focused on the core regions. Occidental made an oil discovery in Texas and went on with its drilling program in Oman. In Yemen, Occidental drilled and completed two exploratory wells in the operating block 20. (A.R.2002)

The exploration activity in Yemen and Oman was extended in 2004. Occidental drilled two exploration wells in the operating block 20 located in Yemen. (A.R.2004)

In 2005, the company re-entered into Libya after the USA stopped the economic sanctions against the country. The company participated in the official exploration bid round and got nine new areas for USD 90 million. Occidental is the operator of five onshore areas with a 90% working interest. Further, on the company has a 35% exploration working interest in four offshore areas. The Australian company Woodside Petroleum Ltd. is the operator of these offshore regions. (A.R.2005)

Technology

The company is the operator of the Elk Hills field in California. Across this field, geologists and engineers use a 3 D visualization technology to reproduce the complex reservoir structure. The 3 D images can be projected on massive screens which are used to identify new exploration possibilities and reserves. (A.R.2000)

Ecuador is a main core region for Occidental in South America. The company has a 60% working interest as an operator of block 15 in the Oriente Basin. During 2001, the company was expanding its exploration program by starting a massive 3 D seismic survey in order to identify a hydrocarbon potential.

At the end of 2001, Occidental was planning a 3 D vertical seismic profile survey for the acquired Thums oil property located in Long Beach, California.

Oman is a core region for Occidental in the Middle East. The company used multi lateral horizontal wells in order to increase the production and the recovery. The number of wells needed could also be reduced. During 2001, the company wanted to extend its exploration drilling program in Yemen. A 3 D seismic program was initiated for identifying possible drilling targets. (A.R.2001)

In 2002, Occidental made an oil discovery in its assets located in Texas. This discovery was the consequence of 3 D seismic project which started the year before.

Oman stayed a main core region for Occidental in the Middle East. 60% of the total production in 2002 was based on horizontal and multilateral drilled wells. During this year, Occidental also finished a 2 D seismic project for its operating block 44 located in Yemen.

Ecuador is a main production region for Occidental in Latin America. During 2002, the company expanded its exploration activities in the operating block 15 (Oxy 60%) by an intensive 3 D seismic program. The company completed the seismic surveys in 2003 and started an intensive drilling exploration program in 2004. (A.R.2004)

During 2005, Occidental re- entered into Libya and started planning seismic surveys in order to identify a hydrocarbon potential in its operating exploration blocks. (A.R.2005)

Development and Production

During 2000, 64% of the company's total oil and gas production was due to activities in the USA. The main US production areas were California (29%) the Permian Basin (26%), and the Hugoton area of Kansas, Oklahoma and Texas (9%). The company operated around 14.000 producing wells in the United States. Most of them were located in the Permian Basin between Texas and New Mexico. Occidental became the largest oil producer in Texas after the acquisition of the company Altura Energy for USD 3,6 billion. Further on, the company held several production interests in the so called Hugoton area. This is the largest natural gas field which was discovered in North America.

The other oil and gas operations are focused on the Middle East and on Latin America. 23% of the total oil and gas segment income was based on operations in the Middle East (Qatar, Oman and Yemen) during 2000. The development activity in Qatar was focused offshore on the North and South Dome fields. In Oman, the company developed around six fields as an operator in 2000.

Latin America with Colombia and Ecuador is the 3rd core area for Occidental. Around 9% of the total income was due to activities in these countries at the end of 2000. A massive development drilling program was started in Colombia during this year. Around 16 development wells were completed in order to use the last reserves from the mature Cano Limon field. Oxy was the operator with a 35% interest. (A.R.2000)

The main production areas of 2001 have been the USA, Colombia, Ecuador, Pakistan, Qatar, Yemen and Russia.

The USA stayed the major production region for Occidental. 58% of the company's worldwide oil production and 92% of its gas production was due to activities in the USA at the end of 2001. The US production core regions stayed the same. The company remained the operator of the Elk Hills oil and gas field in California with a 78% interest. It is the 10th largest reserve field onshore in the USA. Another important field for Occidental in California is the Thums oil property offshore Long Beach. This is the 4th largest field of the company's domestic operation area. Beside the core onshore regions in the USA, Occidental owned a 33% interest in the so called Horn Mountain field in the deepwater area of the Gulf of Mexico at the end of 2001. The company British Petrol was the operator.

Latin America stayed the 3rd major core area for Occidental during 2001 after the USA and the Middle East/North Africa region. The company was already the operator of the Cano Limon field in Colombia. Further on, Occidental had a 44% interest in the so called Cano Limon Covenas oil pipeline which includes also a marine export terminal. It is operated by Ecopetrol which is Colombia's National Oil Company.

The 2nd important South American country stayed Ecuador in 2001. The company had a working interest of 60% and was the operator of a block in the so called Oriente Basin. Occidental held also a 12% interest in a heavy oil pipeline (OCP) project. The 500 km pipeline which was planned during 2001 is used to transport heavy oil from the Oriente Basin (Eden Yuturi field) to the port of Esmeraldas.

In 2001, Occidental sold its interest in a LNG project located in Indonesia to Mitsubishi Corporation of Japan for USD 480 million. (A.R.2001)

During 2002 and 2003, the production regions for Occidental in the USA stayed the same. In 2003, 63% of the total company's production was due to activities in the United States. The main production regions stayed the Permian Basin in Texas and New Mexico as well as the Elk Hills field in California. Around 50% of Occidental's worldwide production could be achieved in these regions. During 2003, Occidental was the biggest producer in the Permian Basin with around 15% of the total Permian production. At the end of 2003, the Elk Hills oil and gas field as well as the Permian Basin assets accounted for 65% of Occidental's worldwide proven oil reserves and 45% of its proven gas reserves. The production out of the Horn Mountain field (Oxy 33%) in the deepwater area of the Gulf of Mexico could also be started at the beginning of 2003.

During 2003, the Middle East accounted for 17% of Occidental's worldwide production.

The 3rd core production region stayed Latin America with Colombia and Ecuador. 10% of the company's total worldwide production was due to activities on this continent. The production in Latin America could be increased by 19% because of starting new producing fields in Ecuador (Eden Yuturi, Yanaquincha) and because of an intensive development program which was initiated for mature fields. Further on, the Oleoducto de Crudos Pesados (OCP) Ltd. oil export pipeline in Ecuador could be finished. The company held a 12% interest in this pipeline at the end of 2003. (A.R.2003)

The development program of 2004 was focused on the company's core regions. 73% of the total proved reserves were located in the USA, 18% in the Middle East, 6% in Latin America and 3% in other international areas.

The United States stayed the main core area for Occidental during 2004. 60% of the company's total production was due to activities in this country. This indicates a decrease of 3% compared to the year before. 47% of the company's worldwide production was due to operations in the Elk Hills field and in the Permian Basin at the end of 2004. The production activity offshore in the Gulf of Mexico was disturbed by massive hurricanes during 2004. The production out of the Horn Mountain field (Oxy 33%) was stopped for two months.

After the USA, the Middle East stayed the main production region for Occidental. During 2004, 18% of the company's total production could be achieved in Oman, Yemen and Qatar.

The production in Latin America could also be extended by 33% compared to 2003. An intensive development project for the operated Eden Yuturi field in Ecuador was the reason for this production increase. (A.R.2004)

The development program of 2005 was focused on the core regions. This fact did not change during the last years. 69% of the total proved reserves were located in the USA at the end of 2005. This indicates a reduction of 4%. The company's proved reserves in the Middle East decreased by 2% compared to the year before. Occidental could extend its proved reserves in Latin America from 6% in 2004 to 13% in 2005 in relation to the worldwide proved reserves.

The United States remained the biggest production core region for Occidental in 2005. The production areas in the Permian Basin and in California (Elk Hills) accounted for 53% of the worldwide production compared to 50% in 2004. During 2005, Occidental went on with an intensive development and stimulation program in the USA. Around 291 new wells were drilled and 548 workovers were performed in the Elk Hills oil and gas field of California. This development program could keep the production rate at a constant level. The Permian Basin is the major area for Occidental in the USA. During 2005, the company increased its development program by drilling 250 wells. The CO_2 projects were also intensified.

The production out of the Horn Mountain field in the Gulf of Mexico was again disturbed by lots of hurricanes during 2005. The production was stopped for 47 days.

During 2005, the Middle East/North Africa core region was extended by Libya. At the end of this year, the company could produce out of its former oil assets. During the last years, these assets were operated by a subsidiary of the National Oil Company of Libya. (A.R.2005)

Technology

The Permian Basin is a main production and development region for Occidental. Especially, enhanced oil recovery methods are used in these mature fields. During 2000, around 50% of the production out of the Permian Basin was based on CO_2 injection. This technique can extend the production out of a field by more than 15 years. The CO_2 is injected under high pressure into the oil formation in order to release the oil from the rock. In that way, the oil can flow easily to the well head and causes an increase of the recovery rates.

After the acquisition of the company Altura Energy, Occidental became a world leader in using the CO_2 injection technology. A so called infill drilling program was also initiated during this year. The program was started in order to place producing wells closer together. At the end of 2000, Occidental bought a 75% working interest from BP in the so called Bravo Dome CO_2 unit. It is located in New Mexico and has a gross production of 320 MMcf per day.

The Middle East is the 2nd core area for Occidental. The company started several development programs during 2000 in order to increase the recovery out of the North and South Dome fields located offshore in Qatar. A waterflood project was initiated and operated to increase the production.

Occidental also tried to evaluate new reserves in Latin America. A 3 D seismic survey which was initiated in 2000 discovered a massive reserve potential in the so called Eden Yuturi field which was found several years ago. A heavy oil pipeline is under construction which can be used to transport hydrocarbons out of this field. (A.R.2000)

Oman stayed a main core region for Occidental in the Middle East during 2001. A water flood program was started and operated in order to increase the ultimate recovery of the fields. (A.R. 2001)

During 2002, Occidental went on with several enhanced oil recovery projects in the Permian Basin. In this way, Occidental extended its position as a world leader in the development of enhanced oil recovery technology. (A.R.2002)

Qatar stayed a main core region for Occidental in the Middle East in 2003. The company could increase the production out of its fields by using new waterflood and reservoir characterization techniques. (A.R.2003)

In 2004, the Permian Basin remained the biggest core production area for Occidental in the USA. Around 45% of the Permian production was based in CO_2 injection compared to 50% in 2000. The company remained a world leader in the utilization of this technology. During 2004, the company could increase its reserves by 120 million BOE through improved recovery methods. In the Elk Hills field of California, water and gas flood techniques were used to increase the recovery. (A.R.2004)

During 2005, Occidental went on with its enhanced oil recovery projects (secondary & tertiary methods) in the USA (Permian Basin, Elk Hills, Thums) as well as in Qatar. The company could increase its reserves by 139 million BOE through improved oil recovery methods. 60% of the total Permian oil production was based on CO_2 and enhanced oil recovery techniques. This indicates an increase of 15% compared to 2004. (A.R.2005)

Acquisitions

In 2000, Occidental tried to increase its position in the USA through acquisitions. The company acquired Altura Energy in Texas for around USD 3,6 billion. Most of the Permian interests could be obtained through this acquisition. Altura had proven reserves of 850 MMBOE. Further on, Occidental acquired the so called Thums oil property in Long Beach, Califomia for USD 68 million from the company ARCO Long Beach. The acquisition of Thums properties increased the company's net oil reserves by 95 MMBOE.

During 2000, the company also tried to increase its position in Yemen through the strategy of acquisition. Occidental increased its interest in the Masila block to 38% and acquired another 29% interest in the East Shabwa fields close to the Masila block.

The company also extended its position in Latin America. Three exploration blocks which cover an area of 15.541 km² have been acquired in Colombia. The company had a working interest of 88% in these blocks. The company was also active in Ecuador and tried to reduce its risk in this country by farming out a 40% interest of block 15 situated in the Oriente Basin. This farm out capital was used for EOR programs. Occidental stayed the operator of block 15 with a 45% working interest. (A.R.2000)

In 2002, Occidental acquired a 24,5% interest in the company Dolphin Energy Limited (DEL) for USD 310 million. DEL is the operator of the so called Dolphin offshore natural gas project located in the UAE and Qatar. The Dolphin project includes a production sharing agreement with Qatar in order to develop natural gas from the operated North Field. The second part of the project involves the construction of a sub sea pipeline with a length of 433 km and a capacity if 3,2 Bcf per day to transport natural gas from Qatar to the United Arabian Emirates. Partners of the Dolphin project are the United Arabian Offset Group (51%) and Total Fina Elf (24,5%).

During this year, the company tried to increase its position in the USA, especially in the Permian Basin area. Occidental increased its reserves by 53,3 million BOE through several acquisitions of producing properties. The costs for these transactions were USD 73 million.

Further on, the company increased its oil and gas working interests in four blocks located in Pakistan. Occidental acquired additional interests in two of these blocks from the government of Pakistan. The transaction costs were USD 72 million. (A.R.2002)

During 2003, the Japanese company Mitsu Oil Exploration acquired a 35% interest of block 27 in Oman from Occidental Petroleum. The US company which stayed the operator of this field and the Japanese company planned to explore this field under a joint venture.

The US acquisitions of 2003 were focused again on the Permian Basin. The company acquired around 103 million BOE for a total price of USD 317 million. Most of these assets were acquired from the company BP. (A.R.2003)

At the beginning of 2004, the company acquired an oil gathering and pipeline system in the Permian Basin. The pipeline with a length of 2.166 km is used to transport the company's production to Midland. Occidental has several storage facilities in Midland. The costs for this transaction were USD 143 million.

During 2004, Occidental tried to increase its reserve base through further acquisitions. The company acquired around 29 million BOE in Latin America and 11 million BOE in the USA, (Permian Basin). (A.R.2004)

Occidental went on with its strategy of increasing reserves through acquisitions in 2005. The company acquired around 139 million BOE. 97% of these proved reserves were acquired in the USA. In 2005, Occidental tried to increase its strong position in the Permian Basin through massive acquisitions. The company acquired oil and gas producing assets from the company ExxonMobil for USD 972 million. Further on, Occidental acquired several other assets in this area for USD 300 million. Occidental owns several oil and gas interests in the Hugoton area of Kansas and Oklahoma. During 2005, the company acquired around 56 km² of seismic data in this region in order to identify new exploration possibilities. (A.R.2005)

At the beginning of 2006, Occidental acquired the company Vintage Petroleum for USD 3,8 billion. This acquisition increased the company's proved reserves by 342 million BOE. The transaction included producing assets in Argentina, Bolivia, the USA and Yemen. (A.R.2006)

Cooperations

Besides the USA, the Middle East is the second core area for Occidental. The operations in Oman, Yemen and Qatar are based on production sharing contracts. The company gets a share of the production in order to recover the costs. Occidental's share of production out of these contracts decreases when the oil price rises and increases when the oil price falls. Generally, the financial benefit is greater when the oil price rises.

During 2000, the company was the operator of the block 9 in Oman. Occidental had a 65% interest in a production sharing contract. Occidental was also the operator of the North and South Dome fields in Qatar.

Ecuador is beside Colombia the main core region for Occidental in Latin America. The company is part of a consortium which was awarded a contract by the government of Ecuador. The contract consisted of building a new heavy oil pipeline. (A.R.2000)

In the Eastern Hemisphere, the company had a working interest in three blocks situated in Pakistan at the end of 2001 which were operated by BP. Further on, the company held a 50% interest in a joint venture company called Vanyoganneft which operates in Siberia. (A.R.2001)

In 2002, Occidental signed an agreement with the government of Oman in order to sell around 120 to 130 MMCF of natural gas per day from the operating block 9 to the state. Two more agreements were signed with the government of Qatar during 2002. The first development agreement was focused on the North Dome field offshore which is operated by Occidental. The other agreement was signed in order to increase the production out of the South Dome field by starting a full field development project. This field is also located offshore. In Saudi Arabia, Occidental had a 20% interest in the so called Core Venture Consortium at the end of 2002. The consortium was initiated to invest in the Red Sea region in order to help the Kingdom of Saudi Arabia which wants to develop new gas reserves for its domestic market. (A.R.2002)

During 2003, the Dolphin Project in Qatar was pushed forward by signing new sale contracts. The company DEL in which Occidental has a 25% interest signed a 25 year sale contract with two power and water companies in the UEA. The contract included the sale of around 1 Bcf of natural gas per day. The main production activities in Oman are focused on the operating block 9. During 2003, the company signed another gas sale agreement with the government of Oman. The contract included the sale of around 120 MMCF of natural gas out of this block to the government. In addition, Occidental was part of a tight gas development project. (A.R.2003)

Colombia is a main production region for Occidental in Latin America. The company is the operator of the Cano Limon oil field. During 2004, Occidental signed an agreement with the government of Colombia in order to extend the contract as an operator for the Cano Limon field until 2018. (A.R.2004)

In 2005, Occidental and its partners signed a contract with the Sultanate of Oman in order to develop the Mukhaizna oil field. This field, which is one of the largest heavy oil fields in Oman, was discovered by the company Petroleum Development Oman (PDO). At the end of 2005, Occidental became the operator of this giant field. Occidental's partner in this joint venture is the company Liwa Energy Limited which is owned by the government of the Emirate of Abu Dhabi.

During 2005, Occidental extended its position in Latin America through the acquisition of the company Vintage Petroleum. Further on, the company signed an agreement with the National Oil Company of Colombia, Ecopetrol in order to develop a mature oil field. Several enhanced oil recovery projects are planned to stimulate one of the largest oil fields of Colombia. (A.R.2005)

At the end of 2005, the government of Ecuador rescinded the operating licence for the Eden Yuturi field. (A.R.2005)

BG Group

BG Group is an integrated company with the business segments exploration & production, liquefied natural gas, transmission & distribution and power generation.

The E&P activities include the exploration, development and marketing of oil and gas. The LNG segment consists of the development, the transport and the use of LNG. The transmission and distribution sector combines the development, the ownership and the operation of major pipelines and networks. The last sector, power generation, includes the development, the ownership as well as the operation of gas fired power generation plants.

The company is active on four continents and has interests in 20 countries. The core exploration and development areas are the United Kingdom, Egypt, Tunisia, Kazakhstan, India, Thailand, Canada, Bolivia as well as Trinidad Tobago. (A.R.2005)

Exploration and Appraisal

The key exploration activities of British Gas in 2001 were focused on the U.K., Thailand, Trinidad and Tobago, Kazakhstan and Tunisia.

The U.K. exploration operations are located on the U.K. Continental Shelf (UKCS). The so called Armada fields which are operated by British Gas have an extension of 31 km^2 and cover five exploration blocks.

During 2001, BG drilled its first deepwater exploration well offshore on the Faroe Islands. It was drilled together with the Faroes Partnership in which BG had a 39,96% interest.

The exploration operations in Italy were focused on the Sicily channel and on the Po Valley near to Milan.

Bolivia was the main exploration area for BG in South America during 2001. The company held a 25% interest in the Itau X-2 well which was drilled successfully.

The exploration activity in North Africa is basically focused on Egypt. The company operates the Rosetta Concession and has a 40% interest in the West Deep Marina Concession (WDDM). Since 1997 the company drilled 24 exploration and appraisal wells with a success rate of 92%. During 2001 the company made two gas discoveries offshore in the Nile Delta of Egypt.
Further on, BG held two exploration permits in the Gulf of Gabes in Tunisia. British Gas supplied up to 60% of the total Tunisian daily gas demand out of this area. The so called Miskar field was operated by British Gas which held an interest of 100% at the end of 2001.

BG is also active in Israel since the company got its first exploration licence in 1999. In 2001, BG discovered potentially gas reserves in the Palestinian Area of Israel. The two Gaza Marine wells were drilled by BG and its local partner. The Gaza Marine discovery was located in deep water.

Kazakhstan is a core area for BG in Asia. The company is part of the North Caspian exploration joint venture. It covers an area of about 5.600 km^2 in the Black Sea which includes also the Kashagan discovery. Agip is the operator of the Kashagan consortium and BG held an interest of 14,25% in 2001. After the discovery of hydrocarbons in the Kashagan area two more wells were drilled in 2001. These appraisal wells which were drilled in the near of the Kashagan structure were successful.

Another interesting exploration area for BG is Thailand. The company had a 50% interest and was the operator of three exploration blocks at the end of 2001. The blocks are located in the so called Joint Development Area between Thailand and Cambodia. (A.R.2001)

The exploration key activities of BG in 2002 were focused on the United Kingdom, Tunisia, Thailand, Trinidad & Tobago, Kazakhstan, Tunisia, India and Egypt. The company could achieve a success rate of 72% which was nearly the same as in 2001.

The main exploration successes were basically in the Caspian Sea, in the Egyptian West Delta Deep Marine Concession (WDDM) as well as in the offshore area of Italy.

The upstream activities of BG in Italy are concentrated on the Sicily Channel and on the Po Valley. During 2002, a natural gas discovery was made in the Sicily Channel in which BG had a 37,5% interest. (A.R.2002)

In 2003, BG drilled 17 exploration and appraisal wells compared to 25 in 2002. The main successes could be achieved in the U.K., the Caspian area, in Egypt, Trinidad & Tobago as well as in the offshore area of Sicily in Italy. (A.R. 2003)

During 2004, 28 exploration and appraisal wells were drilled with a success rate of 64%. The main exploration successes could be achieved in the U.K., Trinidad, Tunisia, Kazakhstan, Bolivia, Egypt, Thailand and in the new exploration areas of Canada and Mauritania.

BG entered into Canada after an acquisition of certain exploration licences from the company El Paso. The company drilled seven wells during this year. Three wells had a hydrocarbon gas potential.

The next new entry of 2004 was Mauritania after an acquisition of certain blocks. They are located in the shallow as well as in the deepwater area. Three oil discoveries and one gas discovery could be achieved in these blocks. (A.R.2004)

The exploration program of 2005 consisted of 29 exploration and appraisal wells. Successful wells have been drilled in Canada (8), Egypt (1), Mauritania (2), Trinidad & Tobago (1) as well as in the U.K. (2).

Technology

The exploration activity in South America was focused on Bolivia and Brazil in 2001. BG had an interest of 37,5% in the Margarita X-3 appraisal well in Bolivia. A 3 D seismic project was started in order to identify a hydrocarbon potential.

Further on, a 3 D seismic survey was initiated for three blocks in the Santos Basin located offshore Sao Paulo. It was one of the largest offshore surveys which were performed in 2001. (A.R.2001)

One of the biggest oil discoveries could be achieved in the North Sea of the U.K. during 2002. The discovery was made in an area which covered two licences of BG. The company held a 20% interest in one licence and a 29,4% interest in the other one. It was one of the biggest discoveries during the last ten years. A new 3 D seismic survey was initiated after the discovery in order to identify new exploration possibilities.

On the Faroe Islands, BG is part of a partnership which drilled its first well offshore in 2001. 3 D seismic data was acquired in 2002 in order to plan future drilling activities.

During 2001, horizontal wells have been drilled in combination with an EOR project in the British part of the North Sea.

Egypt is a main core area for British Gas. A 3 D seismic survey was initiated to maximize the exploration success in the so called WDDM area.

A 2 D seismic survey was performed in Brazil and in the USA (Alaska) during 2001. (A.R.2002)

BG Group started a 3 D seismic survey for an operating block in Tunisia during 2004.

BG is the operator of the Karachaganak field in Kazakhstan. During 2005 a massive development program was initiated which included 16 horizontal and multilateral wells.

A seismic program was started for an operating offshore block in China at the end of 2005.

In addition, seismic surveys were initiated in Norway and Israel during 2005. (A.R.2005)

Development and Production

The production operations of British Gas in the U.K. are focused on the Continental Shelf. The company operates the so called Armada complex (BG 46%) in the central North Sea, the Blake Oil field and the Easington Catchement Area field in the Southern North Sea. Other production areas are the Elgin/Franklin fields (BG 14%) in the Central North Sea, the Brae area in the Northern North Sea and the Everest/Lomond fields (BG 58% and 61%) in the Central North Sea. (A.R.2001)

In Thailand, BG holds a 22,22% interest in the Bongkot field located in the Gulf of Thailand. During 2001, the field supplied one quarter of the country's gas demand.

In 2002, the company had interests in 30 fields in the United Kingdom which produced around 8% of England's total gas demand. The difference between 2001 and 2002 was the extension of the UK portfolio by the South West Seymour field which is located in the East of the Armada fields. The field was discovered and operated by BG in 2002.

Bolivia is an important country for BG in South America. The company had the 2nd biggest reserves in this country at the end of 2002. British Gas held interests in the largest gas discoveries in Bolivia (Itau, Margarita) as well as in eight large exploration blocks.

BG tries to deliver the Brazilian market with gas from Bolivia through extending its existing gas sale contracts with the Brazilian company Comgas. (A.R.2002)

The development operations of BG during 2003 were focused mainly on its operating fields in the UK, on the giant Karachaganak field (operated by BG), on the WDDM Concession in Egypt as well as on the operated Miskar field in Tunisia. The production could be increased from 136 MMBOE in 2002 to 156 MMBOE in 2003. This indicates an extension of 15% because of an intensive operation activity in Trinidad and Egypt. (A.R.2003)

The production rate of 2004 could be increased to 167 MMBOE compared to 156 MMBOE in 2003. The main suppliers of this increase have been Kazakhstan, Egypt and Canada.

The U.K stayed the main production area for British Gas. 40% of the company's total production was due to activities in the UK at the end of 2004.

A major development operation area for BG in North Africa is Egypt. The Scarab Saffron field offshore which is located in the WDDM concession is one of the longest sub sea tie backs in the world. It is also the first deep water development project in Egypt. The field supplies the domestic market. The 2nd major development area for British Gas on the African continent stayed Tunisia at the end of 2004. About 50% of the total Tunisian gas demand was delivered from the Miskar field which is operated by BG (100%).

India is a core area for BG in Asia since 2002. The company expanded the production out of the Panna/Mukta and Tapti fields which delivered around 10% of the total oil and gas production of India at the end of 2004. In India, British Gas could increase the production out of its fields through an intensive development program. Around USD 220 million have been invested to recover additional oil and gas. A special infill program was started which consists of around 18 wells in order to increase the recovery. (A.R.2004)

In 2005, the production could be increased by 10% from 167 MMBOE in 2004 to 183 MMBOE. Especially, the production in Kazakhstan and Egypt could be expanded.

The U.K. stayed a main production area for BG during 2005. Nevertheless the production portion which can be achieved in Britain decreased from 40% to 30% of the company's total production. (A.R.2005)

Technology

Kazakhstan is a major core area for British Gas. The company is a joint operator and holds a 32,5% interest in the giant Karachaganak gas condensate field. During 2002, a massive development program was initiated in order to increase the production out of this field. The technology of gas injection was used in order to increase the recovery. Secondary recovery methods, especially gas injection were also initiated in the Kashagan fields in the Caspian area. (A.R.2002)

During 2005, BG (22%) was part of an EOR development project in the British part of the North Sea. The company Nexen (43%) operated a 16 wells water injection program.

At the end of 2005, BG completed an infill drilling program in India.

A six infill well drilling project was planned for the operated Miskar field in Tunisia between 2006 and 2009. (A.R.2005)

Pipelines

The Shearwater Elgin Area pipeline (SEAL) connects the Elgin/Franklin fields to onshore gas processing facilities. British Gas holds a 7% interest in the SEAL pipeline. The SEAL pipeline is also connected to the UK Continent Interconnector pipeline through the Seal Interconnector Linkline (SILK) pipeline. The company holds an interest of 15% in SILK pipeline.

The UK Continent Interconnector pipeline is also used as a gas transmission link between the U.K. and Europe. The company's interest was 25% in 2001. The pipeline can transport 20 Bcm of gas per year from Bacton in the U.K. to Zeebrugge in Belgium.

Further on, the company holds a 51,16% interest in the CATS (Central Area Transmission System) offshore pipeline. It transports gas from the central North Sea to Teesside.

The pipeline which has a length of 404 km has a capacity of 1.700 MMscf/d. The CATS consists also of two gas processing plants which are located onshore.

British Gas also holds a 50% interest in the company Premier Transmission Limited at the end of 2001. This company owns and operates a pipeline between Northern Ireland and Scotland.

South America with Argentina, Bolivia, Brazil and Uruguay is also an important core area for BG. The company controlled two gas distribution businesses in these regions at the end of 2001. BG has an influence on Companhia de Gas de Sao Paulo (COMGAS) which is the largest gas distribution company of Brazil. BG held an interest of 60% at the end of 2001. The company expects that the demand for gas will grow significantly in Brazil during the next years. BG also controls the company Metro GAS S.A. in Argentina. This company supplies 1,9 million customers in Buenos Aires.
In the transmission sector of South America, BG holds an 8,1% interest in the so called Bolivia Brazil pipeline (BBP). The company tries to use its production gas platform to supply Brazil with this pipeline.
In 2001, BG was also a member of a consortium which was initiated to construct a pipeline (Southern Cross) from Buenos Aires to Montevideo in Uruguay. BG operated and held an interest of 40% in this pipeline. The pipeline is used to supply industrial, commercial and natural gas vehicle customers.
Further on, BG holds also a 25,5% interest in the so called Gas Link pipeline. This pipeline connects the Southern Cross pipeline with the transportation network in Argentina.
India is a core geographic area for BG in Asia. The company has a participation in two gas distribution joint ventures. BG holds an interest of 50% in the company Mahanagar Gas Limited at the end of 2001. The company supplies 60.000 industrial, commercial and domestic customers in the Mumbai region. It also supplies the customers with compressed natural gas (CNG).
British Gas also holds a 65,13% interest in India's largest private gas distribution company called Gujarat Gas Company Limited in 2001. (A.R.2001)

Trinidad and Tobago is a main core region for BG. The company produces and develops gas reserves on the East and on the North coasts of Trinidad. The gas is used for sale to local markets as well as for LNG exports. The company holds interests in the so called Atlantic LNG export plant.
The major field of BG in the so called East Coast Marine Area (ECMA) of Trinidad is the Dolphin field. The company was the operator with a 50% interest in this field at the end of 2001.
Further on, British Gas is the operator of the North Coast Marina Area (NCMA) production and drilling platform which was installed in 2001. It is the largest platform in Trinidad Tobago. 50% of the NCMA gas will be transported to the Atlantic LNG train. The company had an interest of 26% in the first train. It is used to supply the United States, Spain and Puerto Rico with LNG.

Another LNG terminal was planned in 2001 in Italy. The terminal which will be operated by BG is located in Brindisi at the South East coast of Italy. The capacity for the plant which will be completed in 2009 should be 6 mtpa (million tonnes per year). (A.R.2001)

The Atlantic LNG terminal located in Trinidad and Tobago was extended in 2002 through a further train. BG held a 32,5 % interest in this 2nd train. Both trains have a capacity of around 3,1 mtpa and are used to supply the North American market. (A.R.2002)

During 2003, BG extended its LNG activities in the USA, Trinidad & Tobago, as well as in Egypt. The Unites States play a strategic role in the LNG business for BG. During 2003, the BG Group delivered 1,1% of the daily US gas demand and the company was responsible for around 53% of the total LNG import into the USA.
Since 2003, the subsidiary company BG LNG Services owns 100% of the Lake Charles regasification terminal in Louisiana. The capacity rights were bought from the company Duke Energy and are valid till 2023.
Further on, the company acquired capacity rights at the Elba Island LNG terminal in Georgia for USD 127 million.
In 2003, 2,8 million tonnes of LNG were processed in the Atlantic Basin Area of Trinidad & Tobago. This indicates an increase of 155% compared to the year before. The two already existing trains were extended by a 3rd train.

The second massive LNG project located in Egypt was also pushed forwards. At the end of 2003, the first train was nearly completed and the 2nd train was under construction.

Owning LNG ships is a key strategy to increase the position in the LNG sector. In 2003, BG bought three LNG vessels with a capacity of 145.000 m^3 from the company Samsung. These vessels are used for certain LNG projects in Egypt and Equatorial Guinea. (A.R.2003)

The LNG sector of BG was also extended during 2004. The 3rd train of the Atlantic LNG terminal in Trinidad and Tobago was completed and the 4th train was under construction. (A.R.2004)

In 2005, the LNG project in Egypt reached a new step. The 2nd train was finished and was supplied by a BG field. The company holds a 35% interest in this plant as an operator.

In Trinidad and Tobago, BG extended its LNG position by completing the 4th train in the Atlantic LNG plant. It is one of the largest trains with a capacity of 5,2 mtpa. The trains are used to export LNG to North America. BG has an overall interest of nearly 30% in the Atlantic LNG plant. The production capacity of the LNG plant was 15 million tons of LNG per year.

The United States play a major role in the LNG strategy of British Gas. Especially the Lake Charles regasification terminal was again expanded. During 2005, BG imported around 37% of the total LNG demand of the USA compared to 53% in 2003. (A.R.2005)

Acquisitions

During 2001, the company acquired around 136 MMBOE of proved reserves.

In 2001, British Gas acquired two 3 D seismic surveys over two licences which are located offshore in Northern Israel.

In India BG acquired a 30% interest in an oil and gas field as well as a 62,64% interest in an exploration licence. (A.R.2001)

In 2002, BG changes its portfolio through the acquisition of exploration and production assets in India and through the exchange of North Sea assets with BP. The company acquired a 30% interest in the Panna/Mukta and the Tapti oil and gas fields located offshore in India. The acquisition included also a 62,6% interest in an exploration licence. The total transaction costs were USD 350 million. India became an important core area for BG after this acquisition.
British Gas also acquired the entire share capital of BG Exploration and Production India Limited for USD 486 million. The company was named Enron Oil and Gas India Limited before this transaction.

The North Sea exchange was done in order to consolidate the United Kingdom Continental Shelf portfolio.

BG also increased its interests in the large Kashagan field and got a 100% interest in seven exploration licences offshore in Spain. During 2002, a 2.500 km^2 3 D program was finished in the offshore area of Spain. It was the largest seismic survey in this country.

Exploration efforts were also increased in the Palestinian area of Israel. In 2002, 2 D seismic data was acquired which covered an area of 375 km^2. (A.R.2002)

In 2003, BG acquired a licence in the deepwater area of Brazil.

During 2004, 64 MMBOE of proved reserves were acquired. The company tried to develop a new exploration area in the offshore region of Norway through acquisitions. At the end of the year, the company held nine exploration licences offshore Norway. Seven of these licences were located close to its operating locations in the British area of the North Sea. Three licences were acquired during 2004. The company also acquired 3 D seismic data which covered one of these licences.

Egypt stayed a core region for BG in 2004. The company was the operator of the Rossetta (BG 40%) and the West Delta Deep Marine (BG 40%) concessions located offshore. During this year, BG increased its interest in the Rossetta concession by 40% through an acquisition.

BG also tried to increase its position in the core area of Trinidad and Tobago. The company acquired a 65% interest in an onshore block. The acquisition included the operatorship of this block which covered an area of 111 km^2. This block consists also of the so called Carapal Ridge field which is the largest onshore discovery in Trinidad during the last 40 years.

British Gas entered into Canada during 2004. The company acquired several exploration and production assets from the company El Paso for USD 345,6 million. The company wants to supply the US market with gas. The assets are located in British Columbia and in Alberta and have access to three major pipelines. They can be used to transport gas from Canada to the United States.

The second new entry of 2004 was Mauritania. British Gas acquired a 13% interest in three blocks which are located in shallow water. Further on, the company acquired a 12% interest in two deepwater blocks. Total costs for this transaction were USD 132 million.

In South America BG acquired a 100% owner and operatorship of an offshore block in Sao Paulo. (A.R.2004)

In 2005, BG tried to extend its position in the new area of Canada. The company acquired 2.176 hectares in British Columbia. At the end of 2005, the company held 346.000 hectares in this country.

Nigeria is new operation area for BG. The company acquired a 45% interest and the operatorship of a deepwater block in 2005. During 2006, the next step in the exploration program was the acquisition of 3 D seismic data in order to identify a hydrocarbon potential. (A.R.2005)

Cooperations

The United Kingdom is a main core area for British Gas. The company has interests in 30 fields on the Continental Shelf and sells the gas to the National Transmission System (NTS) under long term and short term contracts. Approximately 30% of the produced gas in the U.K. was sold on a day to day basis into the spot market during 2002.
In 2001, the Elgin and Franklin gas condensate fields as well as the Everest and Lomond fields in the Central North Sea were developed under a joint venture. Other partners were Chevron, ExxonMobil and Gaz de France.

In 2001, BG was a member of a consortium which initiated the construction of a pipeline (Southern Cross) from Buenos Aires to Montevideo in Uruguay. BG held an interest of 40% in this pipeline. The pipeline is used to supply industrial, commercial and natural gas vehicle customers.

Trinidad is a main production area for British Gas. The major Dolphin field produced around 325 MMcf/d in 2001. The gas is sold through long term contracts to the National Gas Company of Trinidad and Tobago.

Egypt is the major operation country for BG in Africa. In 2001 the company signed a LNG Export Project Agreement with the Egyptian General Petroleum Corporation (EGPC) and with the Italian company Edison International in order to develop a LNG joint venture export project in Egypt (ELNG).
ELNG consists of the building, the ownership and the operation of the plant (BG 35%). The gas for this plant is delivered from the so called WDDM field which is developed by the Burullus Gas Company. That's a joint venture between BG, EGPC and Edison International.

One of the main production areas of BG in Asia is Kazakhstan. The company holds a 32,5% interest and is a joint venture partner of the Karachaganak oil and gas condensate field in Western Kazakhstan. A production sharing agreement was signed between BG and its joint venture partners Chevron, ENI and Lukoil.

BG is also a part of the Caspian Pipeline Consortium (CPC) with 2%.

In Indonesia BG was the operator of the Muturi Production Sharing Contract during 2001. It covers an area of 2.298 km^2 in the so called Kepala Burung region. The gas should be used to supply the Tangguh LNG export project. China, Philippines as well as Japan, Taiwan and Korea are expected to be potential customers for LNG. (A.R.2001)

In 2002, BG was planning a massive LNG project in Egypt. A gas sale agreement was signed between BG, its WDDM partners and Gaz de France in order to sell the entire output of LNG from the first train to Gaz de France.

British Gas stayed the largest producer of gas in Tunisia in 2002. The company has long term gas sales contracts with the Tunisian State Electricity and Gas Company. Over 230 MMscf/d of gas was delivered from the Miskar field in 2002.

During 2002, the company sold several assets in the British North Sea for USD 135 million. The transaction consisted of 11 non operated fields which were not efficient enough.

The next divestment was the Muturi Production Sharing Contract and the Tangguh LNG project in Indonesia for USD 236 million.

India became after the acquisition of fields in 2002 a major core region for British Gas. During 2002, certain sale contracts were signed. All the produced gas is sold to the company Gas Authority of India Limited and the produced oil is sold to Indian Oil Corporation Limited. (A.R.2002)

During 2003, BG tried to expand its LNG portfolio with further agreements. BG signed an agreement with Nigeria LNG Limited to acquire 2,5 mtpa of LNG for 20 years.

A so called letter of understanding was signed with the company Marathon Offshore Alpha Limited in order to acquire 3,4 mtpa of LNG from Equatorial Guinea.

Two sale agreements were signed in Egypt concerning the ELNG project between BG and its partners. The total output of the 2nd train of ELNG has to be sold to the BG Group. The output of 3,6 mtpa is used to deliver the LNG terminal in Lake Charles, USA.

In 2003, BG sold its interest in the Production Sharing Caspian Agreement for USD 1,8 billion. The company had an interest of 16,7% in this PSA. This transaction included the Kashagan oil field. BG wants to concentrate its operations on the Karachaganak gas field. (A.R.2003)

In 2005, British Gas tried to increase its position in India. A joint venture was initiated to operate three offshore deep water exploration blocks in the East coast of India. It is a cooperation between BG and the company ONGC.

Nigeria is a new operation area for BG. In 2006 the company signed a production sharing agreement for a block with the Nigerian National Petroleum company. BG acquired a 45% interest and the operatorship in this deepwater block. It is located in depths of 100 to 1.000 meters in the South East of Lagos.

Another participation agreement was signed for around 8.520 km² located in the North Slope of Alaska.

The regasification terminals in Lake Charles as well as on Elba Island play a major role in BG´s US strategy. In 2006 a so called Memorandum of Understanding was signed with the company Nigeria Brass LNG in order to acquire 2 mtpa of LNG for 20 years. It is used to supply the terminals in the USA. (A.R.2005)

Statoil ASA

Statoil ASA is a fully integrated Norwegian petroleum company. The headquarters are located in Stavanger, Norway. It has operations in 29 countries and is the major company in the exploration and production of oil & gas on the Norwegian Continental Shelf (NCS). Further on, Statoil is active in the refining sector of Norway, Denmark and the Netherlands. In addition, Statoil is one of the most important gas suppliers of Europe.

Exploration and Appraisal

The Norwegian Continental Shelf is the major domestic core area for Statoil. During 2000, 42% of the total gross exploratory wells were drilled in this area.

Internationally, the upstream operations were focused on the core assets of Western Africa (Angola, Nigeria), the Caspian area (Azerbaijan), Venezuela and Western Europe (U.K.). The company could achieve oil and gas discoveries in Kazakhstan, Azerbaijan (Caspian Sea), as well as in the offshore areas of Angola and Nigeria. The company participated in 19 wells with a success rate of 63%. The offshore region of Angola is the main exploration region for Statoil in Africa. Further on, Statoil held as an operator several deepwater licences in Nigeria. The company drilled two deepwater wells in this African country during 2000.

The company was also the operator of an exploration licence located in the West of Greenland (Polar region). During 2000, the company drilled one unsuccessful exploration well in this environmental sensitive area. (A.R.2000)

In 2001, Statoil decreased the number of gross exploratory wells drilled by 18%. Two third of the gross wells were drilled in Norway. (A.R.2001)

During 2002, Statoil remained the largest operator on the Norwegian Continental Shelf (NCS). The company extended its position as one of the largest offshore oil operators in the world.

In 2001, nearly two third of the exploration wells have been drilled in Norway with a success rate of 66%. The number of worldwide exploratory wells drilled was reduced by 15% compared to 2001. (A.R.2002)

In 2003, Statoil shifted its mayor exploration activity from Norway to the offshore regions of Nigeria and Angola. 60% of the total exploratory wells were drilled outside of its domestic area. The success rate of these wells was nearly 79%. (A.R.2003)

In 2004, Statoil reduced the number of exploratory wells drilled by 39% compared to 2003. Nearly 58% of these wells were drilled internationally. (A.R.2004)

In 2005, Statoil became the 2nd largest offshore drilling operator in the world. The number of exploration wells drilled was increased by 43% compared to 2004. 45% of these wells were drilled on the NCS.

The international exploration activities of 2005 were focused on Algeria, Angola, Libya, Nigeria, Azerbaijan, Iran, Brazil, Venezuela, on the US Gulf of Mexico as well as on the Faroe Islands. In Angola, Statoil held a 14% interest in three deepwater blocks. They were operated by other companies. (A.R.2005)

Technology

Generally, Statoil tries to use the best possible technology to identify hydrocarbons. The company uses 4 D seismic technology as well as horizontal drilling methods to allow optimal drainage of the reservoir.

The Continental Shelf of Norway is the main core region for Statoil. The company uses 4 D seismic methods in order to improve the recovery. Angola is a major region for Statoil in West Africa. During 2000, a 3 D seismic survey was performed for a deepwater block. (A.R.2000)

In 2001, Statoil initiated a 3 D seismic survey in the Sha Deniz field located in Azerbaijan. The Sha Deniz project covers a massive offshore gas field located on the Caspian Shelf. The area is located in water depths between 50 meters and 500 meters. The first production out of this field was planned for 2007. In 2003, Statoil became the operator for this project. (A.R.2001)

In 2002 the company went on with its strategy of using EOR methods. Especially, the horizontal drilling method as well as water and gas injection methods were used to improve the recovery. During 2002, Statoil acquired 2 D as well as 3 D data for its operating fields on the Faroe Islands.

Since 2002, the company performed exploration activities in Brazil. The company acquired interests in several deepwater blocks with Petrobras as the operator. During 2004, a 3 D seismic survey was recorded in order to identify a hydrocarbon potential. (A.R.2002)

In 2005, Statoil began a two year 2 D seismic program for its operating block located in Algeria. The company had a 75% interest in the so called Hassi Mouina block at the end of 2005. (A.R.2005)

In 2006, Statoil became the largest offshore drilling operator in the world for water depths greater than 100 meters. (A.R.2005)

Development and Production

Norway is the main production core region for Statoil. Nearly 93% of the total production was due to activities on the Continental Shelf at the end of 2000. In 2000, Statoil started the production out of the Asgard B platform on the Norwegian Continental Shelf. It is the largest floating gas platform in the world. This semisubmersible platform is connected with 52 wells through flexible flow lines.

Venezuela is the core region for Statoil in Latin America. Production could be increased after new platforms for the processing of oil and gas were completed. Especially, a water injection platform was installed to develop a field (27% interest) in the Maracaibo Lake. It was operated by Chevron at the end of 2000.

Statoil also participated in the Kashagan field located in the Caspian area of Kazakhstan. The company had a 5% interest in this oil field at the end of 2000. One year later, Statoil restructured its E&P portfolio and sold its interest in the Kashagan field. (A.R.2000)

Norway stayed the main producing area for Statoil in 2002. 58% of the total oil & gas output from Norway was operated by the company at the end of this year. The Norwegian Continental Shelf (NCS) is divided into four core areas. Three areas were producing hydrocarbons during this year. The company operated 20 developed fields in these core regions of Norway. The operatorship included also the famous Troll gas field. During 2002, Statoil increased the average daily production out of the NCS area by 5% compared to 2000.

Internationally, Statoil tried to increase its position in its four core regions. At the end of 2002, the company held interests in 10 producing fields in the Caspian area, West Africa, West Europe and Venezuela. The company could increase its average daily production by nearly 30%. Especially, the Girassol field (13% interest) in the deepwater area of Angola as well as the Sincor field onshore in Venezuela contributed to this production growth.
The so called Sincor Joint Venture was initiated by Total, PDVAS (NOC of Venezuela) and Statoil in order to develop & produce extra heavy Orinoco crude oil and upgrade to higher quality. The first production of 200 MB/d heavy crude oil (API 8.5) was upgraded into 180 MB/d (API 32).

In addition, Statoil became the operator for a development project concerning three offshore fields in South Pars area of Iran. That's the largest gas field in the world. The agreement with the National Iranian Company included the construction of three producing platforms as well as the construction of three pipelines from the field to a plant located onshore. (A.R.2002)

The production rate of 2002 and 2003 stayed more or less the same. Around 92% of the total worldwide production could be achieved in Norway.

In 2004, Norway stayed the main production region for Statoil with nearly 90% of the total worldwide production The company operated 22 developed fields on the NCS compared to 20 fields in 2002.

Internationally, the four producing core areas stayed the same. The company held interests in 15 producing fields in Azerbaijan, Algeria, Venezuela, Angola, U.K. and China. This indicates an increase of the number of producing fields by 50% compared to 2002. (A.R.2004)

In 2005, Statoil operated 24 developed fields in the three core areas of the Norwegian Continental Shelf. 84% of the worldwide production was due to activities on the NCS. This indicates a reduction of 6% compared to 2004.

Internationally, the number of interests in producing fields stayed the same as in 2004.

Statoil was involved in several development projects in Algeria, Angola, Nigeria, Azerbaijan, Ireland, in the Gulf of Mexico as well as in the Iran. The oil and gas production outside of Norway could be increased by 61% compared to 2004. Three fields in Angola and Azerbaijan started its production during 2005. (A.R.2005)

In 2006, Statoil was the operator of 60% of all the gas & oil production in Norway. The company operated 24 oil and gas fields on the Continental Shelf of Norway. Internationally, the company held interests in 18 producing fields in Algeria, Angola, Azerbaijan, U.K., Venezuela as well as in China. (A.R.2006)

Technology

The company is one of the leaders concerning the operation of floating platforms. In addition, Statoil is the 2nd largest operator of gas and sub sea facilities after Petrobras. At the end of 2005, the company was operating 284 sub sea completed wells on 23 fields.

Statoil is also a leader in using enhanced oil recovery technologies. Around one million tonnes of CO_2 is injected every year into the operating fields of the North Sea. The CO_2 is transported via ships or pipelines to the mature fields which are stimulated.

In 2005, Statoil operated several development projects on the NCS concerning EOR. All types of enhanced oil recovery methods were used. The so called Tordis improved oil recovery project which is operated by Statoil on the NCS will be the first field with sub sea processing. (A.R.2005)

Pipelines

Statoil is one of the biggest suppliers of natural gas in Europe. The company has a 21,3% interest in the so called Gassled joint venture. That's the largest gas processing facility of Europe located in Norway.
Statoil operates a large transportation network from the Norwegian Continental Shelf to the markets in continental Europe. This system has a length of 6.600 kilometres. The network connects the offshore gas fields with plants onshore in Norway and further on with terminals located in France, Belgium, Germany and the United Kingdom.
Statoil is the operator of the Troll Oil Pipelines 1 & 2 which transport oil from the Troll B & C platform to the terminal in Mongstad (NOR). In addition, Statoil is the operator of the Kvitebjorn oil pipeline and holds several interests in the Nordpipe Oil AS, in the Oseberg Transportation System as well as in the Frostpipe.
Statoil has also a 9% interest in the Baku Tbilisi Ceyhan pipeline project between Azerbaijan and Turkey. The pipeline is operated by BP.
The company is the main natural gas supplier in Scandinavia. Statoil controlled around 25% of the total market in 2002. In addition, Statoil´s portion in the LPG market is 40%. (A.R.2005)

Refining

Statoil operates the refineries Mongstad and Kalundborg in Norway. Further on, the company has a 10% interest in the refinery Pernis. These refineries have a total capacity of around 15 million tonnes per year. (A.R.2005)
Internationally, Statoil had a 15% interest in a refinery located in Malaysia at the end of 2000. One year later, Statoil sold its interest in the refinery to Petronas and Conoco Asia. (A.R.2002)

LNG

In 2001, Statoil started the famous LNG Snohvit joint venture project in Norway. The company which holds a 33,53% interest became the operator of this project. Other partners are Gaz de France, Hess, Petoro, RWE Dea, and TOTAL.
Snohvit which was discovered in 1984 is the largest gas field in the Barents Sea. Gas reserves are estimated to be 6,8 Tcf. In addition, the field Snohvit had estimated reserves of 150 MMbbls of condensate and LPG at the end of 2005.
Snohvit is also the first LNG export project in Europe. The plant lies around 140 km northwest of Hammerfest. The first production out of the field is planned for 2007. The LNG train is constructed for a capacity of 4,2 million tonnes per year. (A.R.2005)
Water, condensate and carbon dioxide will be separated from the produced gas. Afterwards the CO_2 is injected in a sub surface formation and the remaining lean gas will be liquefied for transportation purposes. The main markets for Snohvit will be Europe and the USA. The LNG plant will supply the US market with 2,4 billion cubic meters of LNG per year. Costs for this project (field development, pipeline, plant) are nearly USD 10 billion (50% above the original estimate). (Global E&P Strategies 2006)

Acquisitions

In 2002, Statoil acquired capacity rights from the company El Paso in a LNG regasification terminal located in Maryland, USA.

During 2002, Statoil extended its position in South America through an acquisition. The company acquired two offshore licences in Brazil. (A.R.2002)

In 2003, Statoil expanded its core region in North Africa by Algeria. The company acquired ownership interests in two assets (In Salah, In Amenas). They were bought from the company BP for USD 285 million. Statoil, BP and the Algerian State Oil & Gas company formed a joint venture in order to develop these two assets. "In Salah" where Statoil has a 32% interest is the third largest gas development project in Algeria. The second development project "In Amenas" is the fourth largest project in this country. The company holds a 50% interest in this project. (A.R.2003)

In 2004, Statoil increased its interest in the LNG Snohvit project. The company acquired a 10% interest from Norsk Hydro and a 1,24 % interest from Svenska Petroleum. After these transactions, Statoil holds a 33,53 % ownership in this LNG project. (A.R.2004)

In 2005, Statoil tried to expand its international portfolio through an acquisition in the Gulf of Mexico. The company acquired all the deepwater assets in the Gulf of Mexico from the company EnCana. The transaction which had a volume of USD 2 billion was the largest acquisition of the company. The portfolio of EnCana in the Gulf of Mexico included an average interest of 40% in 239 blocks. The proved reserves were estimated to be 234 MMBOE. The transaction included also a 25% interest in the so called Tahiti field. The Gulf of Mexico became a core region for Statoil after this acquisition. (Global E&P Strategies 2006)

Cooperations

In 2000, Statoil and seven other partners signed an agreement with Turkey, Georgia and Azerbaijan for the construction of an oil pipeline from Baku in Azerbaijan to the port of Ceyhan in Turkey. Statoil's interest in the planning phase was 6,4% at the end of 2000. The pipeline which is strategically very important is planned for a length of 1.760 km.

Further on, Statoil signed a cooperation agreement with the National Oil Company of Iran. The agreement included the mapping of possible exploration areas near the Strait of Hormuz in the Persian Gulf.

Statoil is a key player in the European gas market. Most of the company's gas production is sold under so called long term contracts to European costumers. The biggest gas deliveries go to Germany, France, Belgium and the Netherlands. (A.R.2000)

In 2001, Statoil became a partner in a development project operated by Norsk Hydro in the North Sea. The produced gas should be transported to the Troll platform. The Troll platform is operated by Statoil and Norsk Hydro.

Snohvit is the biggest LNG project of Statoil. In 2001 the company signed a sale contract with the Spanish Company Iberdrola SA. This company wants to buy 1,6 Bcm of LNG per year. The contract is valid until 2026. The LNG is shipped to the regasification plant of Bilbao. (A.R.2001)

During 2002, Statoil signed a gas sale contract with the National Gas Company Botas in Turkey. Around 6,6 Bcm of gas will be sold to Turkey out of the operated Shah Deniz field in Azerbaijan. A 650 km pipeline which should be built from the field in Azerbaijan through Georgia to the Turkish border was under construction at the end of 2002. Statoil became the operator of the so called South Caucasus pipeline. The project will be completed in 2007. (A.R.2002)

In 2003, Statoil signed an agreement to deliver the Cove Point regasification terminal in the United States with 2,3 Bcm of LNG per year. This contract is valid until 2023. (Global E&P Strategies 2006)

During 2004, Statoil increased its position in Brazil by becoming the operator of two offshore exploration blocks. The company performed exploration activities in Brazil since 2001. Statoil tries to work together with the National Oil Company, Petrobras in many projects. At the end of 2004, the company had interests in five exploration blocks and operated three of them.

Further on, Statoil signed a Memorandum of Understanding with the Russian gas company Gazprom and the Russian oil company Rosneft. This Memorandum included a possible cooperation in the development of the so called Shtokam field. This gas field is located in the Barents Sea.

In 2004, Statoil and the company Norske Shell extended its exploration collaboration in the North Sea. (A.R.2004)

During 2005, Statoil signed a so called Memorandum of Understanding for cooperation with the company KazMunayGaz (NOC) in Kazakhstan. The companies want to initiate a joint venture project for development and exploration activities in the Caspian area.

In China, Statoil operated an oil field with a 75% interest at the end of 2005. The partner in this development project was the National Offshore Oil Company of China.

In addition, Statoil tried to increase its position in the new area of the Gulf of Mexico. The company signed two exploration agreements with the company ExxonMobil. The two companies planned to drill exploration wells under a joint venture.

Further on, Statoil signed an exploration sharing agreement with the company BP in Libya. The project involved the acquisition of seismic data and the drilling of two exploration wells in an asset. (A.R.2005)

Energy Portfolio

Bioenergy is the most important renewable energy source in the Nordic region of Europe. Statoil focused its bioenergy strategy on bio pellets. The company operates a pellet plant together with the company Norsk Skog. Statoil sold around 30.000 tonnes in 2000. (A.R.2000)

In 2001, Statoil started to sell wood pellets in Denmark and signed a sale agreement with a Danish pellets producer.

Statoil could increase its wood pellets production by 50% compared to 2000. The company sold 61.000 tonnes in Norway, Sweden and Denmark. Around 22.000 tonnes of pellets were sold in Sweden during 2001. (A.R.2001)

During 2003, Statoil became after the acquisition of the company EcoNordic the largest supplier of wood pellets in Denmark. Statoil controlled around 40% of the Danish market at the end of 2003. (A.R.2003)

In 2005, Statoil increased the pellets production to 191.000 tonnes. This indicates an extension of 537% compared to 2000.(A.R.2005)

Repsol YPF

Repsol YPF is an integrated oil and gas company. The company has oil & gas exploration and production interests in 24 countries but is most active in Spain and Argentina. During 2005, the company acted as an operator in 20 of these countries.
The Spanish company became after the acquisition of YPF the largest company in its domestic country and the 3rd biggest producer of LPG. Further on, Repsol YPF is one of the biggest companies in Latin America concerning its total assets.
Repsol operates in all parts of the petroleum business including the exploration and production of hydrocarbons as well as the transportation, refining and marketing of petroleum products. The product range consists of crude oil, natural gas and liquefied petroleum gas.
The headquarters are located in Madrid, Spain and in Buenos Aires, Argentina. These countries are the main operation regions for Repsol YPF.
In the downstream sector Repsol operates or has interests in several refineries in its core regions.

Exploration and Appraisal

In 2000 the main exploration assets were located in Argentina, Bolivia, Venezuela, Trinidad, Algeria and Libya.

The major exploration activity of 2000 was concentrated on Argentina. The company held mineral rights in 42 exploration blocks which cover an area of 82.000 km^2. During 2000, Repsol drilled around 38 exploratory wells in Argentina with a success rate of 34%. Nearly 40% of the total exploratory wells were drilled in this country.
A second important region for Repsol in Latin America is Bolivia. At the end of 2000, the company had mineral rights in 16 exploration blocks which covered an area of 18.200 km^2. Six wells were drilled during 2000 with a success rate of 50%.
Further on, the company had exploration rights in eight blocks located offshore in Brazil. One exploration well was drilled at the end of 2000.
Colombia is also an operating region for Repsol. The company had mineral rights in five exploration blocks and drilled one unsuccessful well during this year.
Ecuador is another operating country for Repsol in South America. During 2000, the company had rights in three exploration blocks.
The 6th exploration country for Repsol in Latin America is Venezuela. The company held mineral rights in one exploration block and drilled five wells in 2000. The success rate was 60%.

Azerbaijan and Kazakhstan are non core regions. The company held as a non operator certain interests in an exploratory block in Azerbaijan. The other exploration block located in Kazakhstan covered an area of 28 km^2 and was operated by Repsol in 2000.

Egypt is the main exploration region for Repsol in North Africa. The company had mineral rights in nine exploration blocks and drilled around 17 wells during 2000. The success rate was 53%. A massive discovery could be achieved in the deepwater area of the Nile Delta.
Libya is the 2nd exploration country for Repsol in Africa. The company operated three exploration blocks and drilled as an operator three exploration wells during 2000.

In Europe, Repsol had interests in five offshore exploration blocks located in Spain. One successful exploratory well was drilled as an operator in the near of the operated Casablanca offshore platform.

In Asia, the company's exploration activities are focused on Indonesia and Malaysia. During 2000, Repsol had mineral rights in four exploration blocks and drilled around 16 wells. The success rate was 19%.

In the United States, the company focused its exploration activity on the Gulf of Mexico. At the end of 2000, Repsol held interests in 24 deepwater exploration blocks. (A.R.2000)

The exploration activity of 2001 was focused on the core regions in Latin America, on Spain as well as on Indonesia/Malaysia. The number of wells drilled was reduced from 93 in 2000 to 82 in 2001.

During this year, discoveries could be achieved in Libya (3), Spain (4), Argentina (3), Indonesia (1), Bolivia (1) as well as one discovery which was made in Trinidad & Tobago.

The main exploration program was performed in Argentina during 2001. 43% of the total exploration wells were drilled in Argentina. This indicates an increase of 3% compared to the year before. The country stayed the major core area with around 40% of the total company's assets. The number of interests in exploration blocks was slightly decreased from 42 in 2000 to 33 blocks in 2001. The discoveries in Argentina resulted from wells which were drilled in the near of already developed production areas.

The number of interests in other domestic and international exploration regions stayed more or less the same. The only exception is the USA where Repsol increased the number of interests in exploration blocks from 24 in 2000 to 30 in 2001. (A.R.2001)

The exploration program of 2002 was cut by 48% compared to 2002. The company drilled 43 exploration wells compared to 82 wells in 2001.
60% of these wells were drilled in the core area of Argentina. The number of interests in exploration blocks was decreased from 33 to 31 blocks in 2002. The number of exploratory wells drilled was also reduced by 28%.
In Bolivia, the drilling program was also decreased by 75% compared to 2001.

In Asia (Indonesia/Malaysia), Repsol sold its interests in three offshore blocks for USD 592 million. The number of exploration wells drilled in 2002 was reduced to zero.

In Europe, the company increased its interests in Spanish exploration blocks from five blocks in 2000 to 16 blocks in 2002. (A.R.2002)

In 2003 the exploration activity concerning the number of wells drilled was slightly reduced by 10% compared to 2002. The major discoveries of this year could be made in the USA, Bolivia and Argentina.

Argentina stayed the major exploration area for Repsol. 70% of the total wells were drilled in this country. This indicates an increase of 10% compared to 2002.

During 2003, Repsol entered into new exploration countries. The company owned two offshore blocks in Sierra Leone as well as 25% interest in an offshore block in Equatorial Guinea at the end of this year. In addition, Repsol expanded its exploration portfolio with three offshore exploration blocks in Morocco.

Libya stayed beside Algeria the main operating country for Repsol in North Africa. The company increased its interests in exploration blocks from three blocks in 2000 to 15 blocks in 2003. The assets in Egypt were already sold in 2001 to Apache and RWE DEA.

Spain is the domestic exploration region for Repsol. In 2003 the company increased its interests in exploration blocks from 16 blocks to 25 blocks.

The number exploration blocks owned in the USA was also increased by 37%. They were located in the deepwater area of the Gulf of Mexico. (A.R.2003)

During 2004, Repsol increased the number of exploratory wells drilled by 28%. The major discoveries of 2004 could be achieved in Libya, Venezuela, Trinidad & Tobago as well as in Argentina.

The main exploration region stayed Argentina with 58% of the total wells drilled. This indicates a decrease of the Argentinean exploration activity by 12% compared to 2003.

Repsol intensified its position in the USA through the increase of the interests in exploration blocks from 41 blocks in 2003 to 76 blocks in 2004. Four US exploration wells have been drilled during this year compared to one well in 2003.

During 2004, Repsol became the largest operator in Libya, beside the National Oil Company. (A.R.2004)

The exploration investment of 2005 was mainly focused on Brazil with 24%, Argentina with 15%, Libya with 14%, Algeria with 7% and on the USA with 6% of the total exploration capital.

In 2005, Repsol YPF decreased the number of exploration wells drilled by 24% compared to 2004. Especially, the exploration activity in Argentina was reduced. 40% of the total exploration wells were drilled in this country compared to 58% in 2004. The number of interests in exploration blocks was also decreased from 31 blocks in 2002 to 16 blocks in 2005.
Bolivia stayed the 2nd largest operation region for Repsol in South America but the number of exploration block participations was reduced from 16 blocks in 2000 to seven exploration blocks in 2005.
The company's offshore activity in Brazil was increased during the last years. Repsol extended its interests in exploration blocks from eight blocks in 2000 to 24 blocks in 2005. This indicates an increase of 200% during this time period.
Libya and Algeria stayed the main exploration areas for Repsol in North Africa. The company increased its rights in Libyan exploration blocks from three blocks in 2000 to 15 blocks in 2005. This indicates an extension of 400% between 2000 and 2005. The exploration activity of Repsol in Libya included ten wells in 2005 compared to two wells in 2004.

Technology

In 2001, Repsol acquired around 649 km of 2 D data and around 1.084 km² of 3 D seismic data for several deepwater blocks in Cuba. The company had mineral rights in six offshore exploration blocks in the North of Cuba at the end of 2001. (A.R.2001)

During 2002, Repsol YPF acquired 3 D seismic data for an operating field in Argentina. The acquisition was part of a development and exploration plan. (A.R.2002)

In 2003, Repsol had mineral rights in two exploration blocks in Algeria. During this year, Repsol acquired around 369 km² of 3 D seismic data for its operating exploratory block in Algeria. In addition, Repsol obtained 943 km² of 3 D data and 743 km of 2 D seismic data for a block also operated by Repsol with a 45% interest.

Bolivia is a main core region for Repsol in South America. During 2003, the company drilled three exploratory horizontal wells.
In Brazil Repsol held six exploration blocks located offshore at the end of 2003. During this year, 6.596 km of 2 D seismic data as well as 1.621 km² of 3 D seismic data have been acquired.
In addition, Repsol owned four exploratory blocks in Colombia in 2003. Around 150 km of 2 D seismic were acquired for an operating block. (A.R.2003)

In 2004 an intensive seismic program was started in Argentina. Around 92 km of 2 D seismic and 3.000 km² of 3 D seismic were recorded. Further on, a 2 D and 3 D seismic program was initiated in Bolivia during this year.
In addition, around 51.617 km of 2 D seismic data and 18.259 km² of 3 D seismic data have been acquired in Brazil.
In Colombia around 1.500 km of 2 D seismic data has been recorded.
Repsol held mineral rights in three exploration blocks located in Peru. In order to identify a hydrocarbon potential, around 190 km of 2 D seismic data were recorded.

In 2004, Respol was awarded two exploration blocks in Liberia. The company held a 50% interest in both blocks and started a 2 D seismic program in order to identify a hydrocarbon potential. Another 5.509 km of 2-D seismic data and 385 km² of 3 D seismic data were recorded in Libya.

In 2003, Repsol was awarded a development contract from the National Company of Mexico. During 2004, the company recorded around 756 km² of 3 D data for this field.

Trinidad and Tobago is a main operation region for Repsol. During 2004, the company acquired around 1.052 km² of 3 D seismic data.

During 2004, Repsol intensified its exploration program in the United States. The company acquired around 7.150 km² of 3 D seismic data to identify new exploration targets. (A.R.2004)

In 2005 Algeria and Libya remained the major operation areas for Repsol YPF in North Africa. The company recorded around 566 km of 2 D seismic data as well as 1.122 km² of 3 D seismic data in Algeria.

During 2005, the company's exploration success rate in Argentina was nearly 47%. A seismic program was started in order to maintain this rate. The company recorded around 34 km of 2 D data and 3.771 km² of 3 D seismic data during 2005.
Two exploratory wells were drilled in Brazil during 2005. The success rate of both wells drilled was zero. Repsol acquired around 18.002 km of 2 D seismic as well as 4.756 km² of 3 D seismic data in order to increase the success rate of future exploration programs.

Repsol had mineral rights Equatorial Guinea concerning two exploration blocks. The only well which was drilled during 2005 did not have a hydrocarbon potential. In that way, the company acquired around 940 km of 2 D seismic data.

The main exploration region for Repsol in Europe stayed the offshore area of Spain. The company had mineral rights in 24 exploration blocks at the end of 2005. The only well which was drilled during this year did not reach the desired success. The company registered 1.843 km² of 3 D seismic data in order to intensify the exploration program.

During 2005, Repsol also intensified its US interests in exploration offshore deepwater blocks to a sum of 72 blocks. Around 5.616 km² of 3 D seismic data was acquired to identify a hydrocarbon potential in the deepwater area of the Gulf of Mexico. (A.R.2005)

Development and Production

At the end of 2000, around 86% of the company's proved reserves were located in Latin America, especially in Argentina and 6% in North Africa. The other main reserves were located in Indonesia, Spain, in the USA and in the Middle East.

The main South American production countries are Argentina, Bolivia, Brazil, Colombia and Ecuador. 75% of the company's total production could be achieved due to activities in Argentina.

The main production area for the company in the Middle East is Dubai. Around 5% of the company's production could be achieved in this country in 2000.

Indonesia and Malaysia are the core regions for Repsol in Asia. The operations in these countries produced around 6% of the total worldwide production.

The company's major production and development areas in North Africa are Egypt, Algeria and Libya. They accounted together for 5% of Repsol´s total production during 2000. (A.R.2000)

The main production operations were focused on Latin America during 2001. 90% of the total proved reserves were located on this continent. This indicates an increase of 4% compared to the year before. Just 5% of the company's proved reserves could be found in North Africa and in the Middle East.

The total net production was slightly decreased by 2% compared to the year before because of the sale of all assets in Egypt to the companies Apache and RWE DEA.

Around 66% of the total capital expenditures were used for development projects in 2001. Most of the development capital was spent in Argentina (57%), in Venezuela (15%), in Bolivia (7%), in Indonesia (7%) and in Spain with 5% of the total development expenditures..

The main production increase in 2001 could be achieved in Bolivia by 262% and in Venezuela by 60%. (A.R.2001)

In 2002 Latin America stayed the main reserve base for Repsol. Around 95% of the total proved reserves were located on this continent. This indicates an increase of 5% compared to 2001.

Nearly 60% of these reserves were located in Argentina and 25% in Bolivia. 5% of the company's reserves can be found in North Africa and the Middle East.

86% of the total capital expenditures were used for development projects during 2001. The expenditures for development and production were increased by 20% compared to 2001. Three quarter of this capital was used in Argentina and Bolivia. The rest was invested in Venezuela (6%), Trinidad & Tobago (6%), Ecuador (3%) and Brazil with 4% of the total development budget.

The total proved reserves decreased by 6% compared to 2001, which was a consequence of the sale of assets in Indonesia.

The main production increase could be achieved in the operating countries of Repsol in South America. In Colombia the production rate could be expanded by 570% and in Venezuela by 123% compared to the year before. (A.R.2002)

The petroleum production was around 1,099 million BOE per day in 2003 which indicates an increase of 13% compared to 2002. Especially, the production in Trinidad and Tobago could be expanded by 290% compared to 2002. Other production extensions could be achieved in Argentina with 6% and in Bolivia with 19%.

During 2003, the development investment was massively decreased. It accounted for 39% of the total investment of 2003 compared to 86% in 2002. (A.R.2003)

In 2004, Repsol produced 1,165 million BOE per day. This indicates an increase of 3% compared to 2003. The reason for this expansion was the increase of the gas production by 11% which took place mainly in Argentina and Bolivia. The production rate in Bolivia could be increased by 46% compared to 2003.

Generally, the development investment accounted for 70% of the total capital investment. This indicates an increase of 31% compared to 2003. The main development countries were Argentina with 65%, Trinidad & Tobago with 10%, Bolivia with 7% and Venezuela with 6% of the total development investment. The investment was focused on development drilling and secondary oil recovery projects. (A.R.2004)

The main development program of 2005 was focused on South America as in the years before. Nearly 96% of the company's proved hydrocarbons were located on this continent. During 2005, 49% of the total reserve base of Repsol was located in Argentina. 69% of the company's oil and 56% of its gas production was due to activities in Argentina.

In 2005 the production rate was slightly decreased by 3% compared to 2004. Especially, the production rate in Argentina out of mature fields was reduced by nearly 7%.

Generally, the development investment was decreased by 14% compared to 2004. The main development regions stayed Argentina (65%), Trinidad & Tobago (10%), Bolivia (7%) as well as Venezuela with 6% of the total development investment. (A.R.2005)

Technology

Argentina is the main production region for Repsol. In 2000 the company started several enhanced oil recovery projects in its Argentinean assets. Especially, water injection methods were used to stimulate fields in the so called San Jorge Gulf Basin. (A.R.2000)

One of the main development strategies of 2001 was the utilization of enhanced oil recovery techniques in order to improve the recovery factors out of mature fields in Argentina and Venezuela. The net proved reserves could be increased by 82 million BOE because of using these kind of technologies.

Dubai is the main production region for Repsol in the Middle East. In 2001 a secondary horizontal gas injection project was started in an oil field operated by the company. (A.R.2001)

In 2002 most of the development expenditures were used for secondary oil recovery methods in Argentina, Bolivia and Libya.

The proved reserves could be increased by 116 million BOE through the intensive use of EOR technologies. Especially, secondary recovery methods like water injection were used to develop mature fields in Argentina. (A.R.2002)

In 2003, Repsol went on with its enhanced oil recovery projects in mature fields. Especially in Argentina, the company drilled several infill and extension wells in order to maintain the production rate. Secondary recovery methods were used in most cases. (A.R.2003)

During 2004, Repsol increased its proved reserves by 19,6 million BOE through the use of improved recovery techniques. Especially, the method of water injection was used in Argentina. (A.R.2004)

In 2005 improved recovery projects were used to increase the proved reserves. Water injection methods could increase the proved reserves by 7,1 million BOE especially in the mature oil fields of Argentina. (A.R.2005)

Refining

Repsol YPF has a strong refining business segment. At the end of 2000, the refining and marketing operations accounted for 21% of the total operating income of Repsol.
The company operates 10 refineries in Spain, Argentina and Peru. Further on, the company is the biggest refiner in Argentina and Spain. 58% of the total Spanish crude oil was processed in the refineries of Repsol. The company operates five refineries in Spain with a total capacity of 740.000 BBL per day. Two refineries are located on the Mediterranean coast, one is situated in the Northwest coast, one is located on the North coast and the fifth one is strategically positioned inland.
The other international refineries with a total capacity of 466.000 BBL per day are located in South America. Four refineries with a total capacity of 364.000 BBL per day are positioned in the core region of Argentina. The other refinery in Peru which is located in the neath of Lima has a capacity of 102.000 BBL per day.
During 2000, around 53 million tonnes of crude oil was processed by the company. (A.R.2000)

In 2001, Repsol increased its refining and marketing segment. 29% of the total operating income was due to downstream operations. This indicates an increase of 8% compared to 2000.

Since 2001, the company has interests in two refineries of Brazil after a deal with the company Petrobras. During 2001, Repsol YPF processed around 51 million tonnes of crude oil which indicates a decrease of 3% compared to 2000. (A.R.2001)

In 2002 the refining and marketing operations accounted for 26% of the total operating income. This indicates a decrease of 3% compared to 2001.

During this year, the company processed 52,8 million tonnes of crude oil in its refineries. That's nearly similar as in 2001. (A.R.2002)

In 2003 the refining and marketing segment contributed to around 31% of the total operating income. This indicates an increase of 5% compared to 2002. The company processed 53,4 million tonnes of oil equivalent in its refineries. It could be extended by 5% compared to 2003 because of a higher production in Argentina. (A.R.2003)

During 2004, the refining and marketing operations contributed to 36% of the total operating income. This indicates an increase of 5% compared to 2003. (A.R.2004)

In 2005 Repsol expanded its refining and marketing segment. The segment accounted for nearly 44% of the total operating income. Repsol processed around 53,4 million tonnes of crude oil which indicates an increase of 1% compared to 2004. (A.R.2005)

Pipelines

In Europe Repsol owns a 62% interest in the company CLH which is located in Spain. The transportation network of CLH consists of nine tankers and several pipelines with a length of 3.422 km.
Repsol also has a strong pipeline position in Argentina. The company owns two crude oil pipelines with a total length of 1.113 km. They are connected with refineries operated by Repsol.
The company also has a 37% interest in the company Oldeval which operates 818 km of pipelines in South America.
A strategic important network is the Transandean Pipeline between Argentina and Chile. At the end of 2004, Repsol had an 18% interest in this transportation line.
Further on, Repsol operates a network of several pipelines for the transportation of refined products in South America. This network has a total length of 1.801 km.
In addition, the company owns tankers with a total capacity of 7.734 deadweight tonnes in order to transport LPG.

Repsol extended its position in Latin America through construction a gas pipeline in Bolivia. The pipeline is used to transport natural gas from new discoveries in Bolivia to Brazil. The company Andina, which is controlled by Repsol held a 50% interest in this pipeline at the end of 2002.

In Ecuador Repsol has a 30% interest in a heavy crude oil pipeline (400 km) to transport oil from the Amazonas to the Pacific. (A.R.2005)

LNG

During the last five years, Repsol was very active in the LNG sector.
In Trinidad and Tobago Repsol YPF had a 20% interest in the 1st LNG train of the so called Atlantic LNG plant at the end of 2000. In order to strengthen its strategic natural gas position in this country, Repsol YPF acquired 10% of the located gas and liquid reserves from the company BP. The acquisition covered around 205 million BOE which were planned to be processed in the 2nd LNG train which was under construction. (A.R.2000)

In 2002 the 2nd train in which Repsol had 25% interest started production. This train has a capacity of 4,4 Bcm per day. (A.R.2002)

During 2003, the 3rd train in Trinidad and Tobago was installed with the same capacity as train 2. (A.R.2003)

At the beginning of 2004, Repsol YPF and the company Western LNG Ltd. signed a contract to supply around 2 Bcm of LNG from the plant in Trinidad & Tobago to a regasification plant on the East coast of the USA. Since 2002, Repsol leased three tankers with a capacity of 416.500 cubic meters to transport LNG from Trinidad & Tobago to the USA or Europe. (A.R.2004)

In 2005 the fourth train in the Atlantic LNG plant began its operation. The train which has a capacity of 5,2 million tonnes per year is one of the largest in the world. Repsol held a 22,2% interest in this 4th train at the end of 2005. The capacity of all trains of the Atlantic LNG plant is 15 million tonnes per year.

During 2005, Repsol YPF and the company Irving Oil Limited signed an agreement to develop the first LNG regasification terminal in the East coast of Canada. The agreement included the creation of a new company which will build and operate the terminal. The plant is used to supply the domestic market as well as the USA with natural gas. The plant which will have a capacity of 10 Bcm of LNG per year should be completed in 2009. (A.R.2005)

Acquisitions

In 1999, Repsol acquired the company YPF which was the largest producer of LPG in Argentina. 48% of the total liquefied petroleum gas demand in Argentina was delivered by YPG.

In 2000, Repsol YPF expanded its reserve base through the strategy of acquisition. During this year, the company acquired around 87 million BOE.

Repsol tried to expand its position in South America through the acquisition of the company Lipigas Group. It was the leading company in Chile on the liquefied petroleum gas sector. Repsol became the third largest producer of LPG in the world after this acquisition.

In the upstream sector, Repsol increased its position in Venezuela. The company acquired all the participation rights from the company BP in a block. The transaction costs which increased the company's proved reserves by 15 million BOE were USD 53 million. After this acquisition, Repsol and the NOC of Venezuela signed a production sharing contract related to this wholly owned block. (A.R.2000)

In 2001, Repsol could increase its reserve base by 733 million BOE through further acquisitions. Most of this increase was due to the acquisition of interests in the Bolivian company Empresa Petrolera Andina from the company Pluspetrol Bolivia Corporation. The total costs for this transaction were USD 434,5 million. After this acquisition, Repsol held a 50% interest in the company Andina. (A.R.2001)

In 2003, Repsol increased its proved reserves by 482 million BOE through the acquisition of new assets. During 2003, Repsol acquired certain blocks from the company BHP Billiton. Repsol acquired a 15% interest in five exploration blocks located in the Gulf of Mexico (Neptune project) and a 50% interest in a Bolivian block. BHP stayed the operator of the Neptune consortium which discovered a hydrocarbon potential in the deepwater area of the Gulf of Mexico. (A.R.2002)

During 2004, Repsol increased its proved reserves by 16,4 million BOE through the acquisition of new assets. Repsol acquired the company Shell GAS (LPG) S.A. in Portugal. The Spanish company became the 3rd largest operator of the LPG market in Portugal after this transaction. (A.R.2004)

During 2005, Repsol YPF tried to increase its proved reserves through several acquisitions. The company acquired a 10% interest of two blocks in Peru with net proved developed reserves of 20,3 million BOE.
In Venezuela Repsol expanded its proved reserves by 2,5 million BOE through the acquisition of a 25% interest in a crude oil field.

In the LNG sector, Repsol reached an agreement with the US operator Hunt Oil. Repsol acquired a 20% interest in a LNG project located in Peru. This project included the construction and the operation of a liquefaction plant with a capacity of four million tonnes of LNG per year. The plant should be completed in 2009.

At the beginning of 2006, Repsol acquired a 10% interest in the Swedish Company West Siberian Resources. This strategic alliance is used for the joint development & production of oil and gas fields in Russia. (A.R.2005)

Cooperations

In 2000, Repsol signed a cooperation agreement with the National Oil Company of Chile (ENAP) for exploration and production operations in Chile, Argentina, Colombia and Venezuela. The cooperation also included refining and marketing activities in Chile, Argentina, Peru and Ecuador.

Further on, the company reached an agreement with National Company of Cuba, Cupet. The agreement included a joint venture for developing certain deepwater exploration assets in the Gulf of Mexico.

At the end of 2000, the company held a 20% interest in the Atlantic LNG plant in Trinidad and Tobago. Repsol was part of the joint venture with BP and BG. (A.R.2000)

Bolivia is after Argentina the most important operation area for Repsol in South America. In 2001 Repsol YPF, the BG Group and BP signed an agreement in order to start a study for the production and sale of natural gas out of the so called Margarita field in Bolivia. This major field was operated by Repsol.
In addition, Repsol started a joint venture with the private Bolivian company SAMO in the LPG sector. Repsol held a 51% interest in the new formed company Repsol YPF Gas Bolivia.

Further on, Repsol signed an agreement with the government of Ecuador in order to construct a heavy oil pipeline. (A.R.2001)

Latin America is the main operation and cooperation area for Repsol. In 2002 the company signed a gas sale contract with the National Oil Company of Venezuela (PDVSA). This deal is valid until 2013.

In 2002, Repsol started to work out 3 D data in order to develop several offshore blocks in Spain. During this year, RWE DEA and Woodside became partners in this project and started a joint venture. (A.R.2002)

In 2003, Repsol signed a contract with the National Oil Company of Libya for the exploration and production of six blocks in Libya. Repsol became the operator with 60% and the company OMV held 40% in this concession.

During 2003, Repsol was awarded a service contract for the development and production of a field in Mexico. This was the first award which was performed by the National Oil Company of Mexico. (A.R.2003)

In 2004, Repsol and its partners signed an agreement with the Ministry of Oil and Mineral Resources of Saudi Arabia for a gas exploration project. The joint venture consists of ENI with 50%, Repsol with 30% and Saudi Aramco with 20%.

During 2004, Repsol (60%) and the company Gas Natural SDG (40%) signed a LNG project agreement in Algeria. The project consists of the exploration, production and liquefaction of natural gas.

In the Middle East Repsol YPF and Shell signed a cooperation agreement with the National Company of Iran for the so called Persian LNG project.

In South America Repsol YPF signed several strategic agreements with the National Oil Company of Venezuela (PDVSA) in order to create a joint venture in a LNG project between these two companies. (A.R.2004)

In 2005, Repsol YPF and the Algerian company Sonatrach signed a joint venture agreement in order to build and operate a LNG plant. The whole project was already started in 2004.

Repsol had mineral rights in one exploration block located in Cuba. During this year, the company signed a joint operating agreement with Norsk Hydro (Norwegian company) and ONGC (Indian company). Repsol stayed the operator of this block. (A.R.2005)

Energy Portfolio

Repsol YPF invests in wind power production. The main interests in wind power production companies are listed up in this table provided by the annual report of 2005.

	% of Total Ownership			Amount in Millions of Euros				
Line of Business	Consolidation Method	% of Direct Ownership	% of Control	Share Capital	Reserves	2005 Income (Loss)	Interim Dividend	Assets Owned (2)
Distribution of gas	P.C.	30.85	100.00	12.4	30.7	10.6	—	16.6
Services	P.C.	30.85	100.00	0.3	1.7	(0.3)	—	0.5
Electricity cogeneration	P.C.	30.85	100.00	10.7	0.8	0.1	—	3.6
Electricity cogeneration	P.C.	25.06	81.25	1.7	0.2	(0.1)	—	0.5
Electricity cogeneration	P.C.	24.68	80.00	1.2	(0.1)	1.1	—	0.5
Electricity cogeneration	P.C.	18.51	60.00	1.3	—	0.1	—	0.3
Electricity cogeneration	P.C.	15.42	50.00	0.9	0.1	—	—	0.2
Electricity cogeneration	P.C.	13.88	45.00	1.1	0.2	1.0	—	0.3
Electricity cogeneration	P.C.	15.42	50.00	0.8	(0.6)	(0.2)	—	0.0
Electricity cogeneration	P.C.	27.76	90.00	—	—	—	—	—
Retailing of gas and industrial electricity	P.C.	30.85	100.00	2.4	29.6	4.1	—	11.1
Portfolio company	P.C.	30.85	100.00	5.1	(1.0)	(0.6)	—	1.1
Portfolio company	P.C.	29.30	95.00	0.1	(88.1)	(0.6)	—	(26.0)
Portfolio company	P.C.	14,65	50.00	63.2	12.2	8.5	(20.4)	9.3
Portfolio company	P.C.	14.65	100.00	0.6	0.1	0.1	(0.2)	0.1
Electricity production	P.C.	14.65	100.00	63.2	4.8	47.2	(28.6)	12.7
Retailing of domestic gas and electricity	P.C.	30.85	100.00	2.9	2.7	—	—	1.7
Energy management	P.C.	15.42	50.00	—	(0.3)	—	—	(0.0)
Electricity production and retailing	P.C.	30.85	100.00	13.1	(0.9)	0.2	—	10.0
Wind power production	P.C.	30.85	100.00	1.0	(0.1)	(3.5)	—	(0.8)
Wind power production	P.C.	30.85	100.00	6.0	(0.3)	0.6	—	1.9
Wind power production	P.C.	20.98	68.00	2.5	0.1	0.7	—	0.7
Wind power production	P.C.	15.11	49.00	6.0	(2.2)	2.5	—	1.0
Wind power production	P.C.	15.42	50.00	2.7	2.4	4.5	—	1.5
Wind power production	E.M.	8.02	26.00	2.4	0.4	1.7	—	0.4
Wind power production	E.M.	7.48	24.24	1.5	0.1	0.3	—	0.1
Wind power production	P.C.	30.85	100.00	42.3	120.9	3.9	—	51.5
Wind power production	P.C.	30.85	100.00	0.1	0.1	—	—	0.1
Wind power production	P.C.	30.70	99.52	5.2	2.5	2.4	—	3.1
Wind power production	P.C.	10.23	33.33	2.2	—	—	—	0.2
Wind power production	P.C.	18.42	60.00	0.1	—	—	—	0.0
Wind power production	P.C.	27.76	90.00	2.6	2.7	1.8	—	2.0
Wind power production	P.C.	30.85	100.00	0.1	—	—	—	0.0
Wind power production	P.C.	15.42	50.00	9.9	18.1	7.6	—	5.5
Wind power production	P.C.	11.18	36.25	16.5	2.4	5.6	(1.0)	2.6
Wind power production	P.C.	15.42	50.00	10.2	3.6	9.9	—	3.7
Wind power production	P.C.	10.28	33.33	3.0	1.0	1.7	—	0.6
Wind power production	P.C.	7.71	75.00	1.0	—	—	—	0.1
Wind power production	E.M.	6.17	20.00	3.1	2.5	1.8	—	0.5
Wind power production	E.M.	5.55	18.00	1.5	1.4	1.5	—	0.2
Wind power production	P.C.	30.85	100.00	—	—	—	—	—
Telecommunications	P.C.	30.85	100.00	21.1	20.5	8.0	—	15.3
Distribution of gas	P.C.	27.89	90.41	3.2	27.9	2.1	—	9.3
Distribution of gas	P.C.	30.83	99.94	19.4	(2.2)	(0.2)	—	5.2
Distribution of gas	P.C.	30.75	99.99	25.5	60.3	7.6	—	28.7
Gas supply	P.C.	30.85	100.00	0.6	18.3	(44.6)	—	(7.9)
Finance	P.C.	30.85	100.00	—	2.5	0.7	—	1.0
Portfolio company	P.C.	30.85	100.00	0.3	0.2	—	—	0.2
Distribution of gas	P.C.	30.85	100.00	346.4	(175.6)	(5.5)	—	51.0
Finance	P.C.	30.85	100.00	25.4	15.5	0.2	—	12.7
Portfolio company	P.C.	30.85	100.00	349.5	(60.0)	64.4	—	109.2
Marketing of gas	P.C.	18.38	59.59	20.1	(0.1)	7.3	(5.2)	4.1
Distribution of gas	P.C.	16.71	54.17	147.7	(85.8)	19.6	(11.1)	11.8
Marketing of gas	P.C.	30.85	100.00	—	—	(1.4)	—	(0.4)
Portfolio company	P.C.	30.85	100.00	1.0	(0.1)	(0.2)	—	0.2
Portfolio company	P.C.	22.21	72.00	48.9	60.6	—	—	24.3
Transmission and distribution of gas	P.C.	15.55	70.00	214.7	(152.2)	10.4	(13.4)	9.2
Portfolio company	P.C.	22.21	72.00	105.0	(23.4)	—	—	18.1
Electricity production and retailing	P.C.	30.84	99.99	0.6	(1.5)	(0.4)	—	(0.4)
Services	P.C.	30.85	100.00	1.7	0.3	0.1	—	0.6