Management systems for oil and gas operations – comparison of Russian and Norwegian regulations and their possible impacts on fisheries in the Barents Sea

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CHAPTER 1.
INTRODUCTION

1.1 The Barents Sea ecoregion

The Barents Sea is one of the most productive areas in the world and one of the most biologically divers regions of the Arctic. One of the characteristic features of this place is the high degree of natural savagery. The Barents Sea represents one of Europe's last large, clean and relatively undisturbed marine ecosystems. The following factors make this place especially valuable:

- the shallow structure
- the inflows of warm Atlantic water and cold Arctic water, and
- the concomitant nutrient-rich upwelling (Larsen, Boltunov et al. 2004).

As the result, the Barents Sea has

- considerable concentrations of plankton
- rich benthic communities
- huge concentrations of migratory seabirds
- some of the world's largest fish stocks
- a diverse community of sea mammals.

The total area of the Barents Sea ecoregion is about 2.2 million square kilometres (Larsen, Boltunov et al. 2004). It represents in some way the transition zone between European boreal and arctic nature. The ecoregion stretches north to the Arctic Ocean from the coasts of northern Norway and northwest Russia. It includes the Northeast Atlantic and Arctic shelf seas north of the Arctic Circle, the White Sea, the western part of the Kara Sea and the waters surrounding the arctic archipelagos of Spitzsbergen, Franz Josef Land and Novaya Zemlya (Larsen, Boltunov et al. 2004).

The average depth of the sea is about 230 meters (ICES 2005). The ecoregion has a very diverse benthic flora and fauna compared to other arctic seas (Larsen, Boltunov et al. 2004):

- more than 2500 benthic invertebrate species
- more than 400 coral reefs that may cover an area of 1500-2000 square kilometres
- more than 600 species may be associated with the single coral reefs
- the kelp forests along the rocky coastline of Norway and the northern Kola Peninsula
- large colonies of sponges and scallops on the shallow banks.

All these elements create the necessary prerequisites for the rest of the marine ecosystem in the Barents Sea.

The ecoregion is home for about 150 fish species of 52 families such as Gadidae, Zoarcidae, Cottidae, Pleuronectidae, Salmonidae and Rajidae (Larsen, Boltunov et al. 2004). Thus, the Barents Sea has some of the largest fish stocks in the world, including Norwegian-Arctic cod, capelin, spring spawning herring and polar cod.

Twelve species of large cetaceans, five species of dolphins, seven pinniped species and polar bears are also integral parts of the Barents Sea ecosystem (Larsen, Boltunov et al. 2004). Likewise, it is necessary to mention more than 40 species of marine birds that are closely associated with the marine environment.

One of the distinguishing features of this region – is the low sea-water temperature. This fact leads to reduced speed of evaporation processes and bacteriological degeneration of pollutants (Young 1999). Another feature is extreme fluctuations of light intensity due to "polar nights" and "polar days". Changes in the water inflow from the Atlantic impose continual shifts in temperatures and ice extension (Young 1999). Since the ecosystem of the Barents Sea is relatively simple, there are few organisms on each link of the food chain, so that changes in one stock may have serious implications for the rest of the system (Young 1999).

Undoubtedly, the Barents Sea is one of the most biologically diverse and productive ecosystems within the Arctic. Yet there are several serious challenges caused by with human activities such as over-fishing, shipping, aquaculture, pollution, tourism, climate change and introduced species (Larsen, Boltunov et al. 2004). In the near-term outlook large-scale exploitation and transportation of carbohydrates is likely to play a significant role in the political, economic and environmental development of the region.

1.2 Exploitation of bioresources in the Barents Sea

The Barents Sea, controlled by Russia and Norway, supports one of the world's major fisheries, and is as such, already economically very important.

Normally, there are about 100-150 Russian trawlers fishing in the Barents Sea . Most Russian fishing activity takes place in the Russian Exclusive Economic Zone (EEZ). There are a significant number of Russian vessels operating in the Norwegian EEZ or around Spitzbergen. A large number of vessels from Norway is occupied with the fishing of Norwegian-Arctic cod. The Norwegian fleet with a license to fish for cod consisted in 1997 of

110 trawlers and additionally 96 vessels over 28 meters. The third player present in the Barents Sea is EU with a share in total allowable catch (TAC) of about 4 percent in 1997. The most intensive presence (about 10 – 12 twin trawlers) of vessels from third countries is the Spanish summer fishery for cod. Apart from this, vessels from the Faroe Islands, Greenland, Great Britain, Germany, France and Portugal occasionally fish in the Barents Sea .

The major demersal stocks in the Northeast Atlantic include cod, haddock, saithe, shrimp, redfish, Greenland halibut, and flatfishes. In 2004, landings of cod, haddock, saithe, redfish, and Greenland halibut was about 0.9 million tonnes (ICES 2005). An additional catch of about 100000 tonnes was taken from other demersal stocks, including crustaceans (ICES 2005).

The major pelagic stocks are capelin, herring, and polar cod. The highly migratory species blue whiting and mackerel extend their feeding migrations into this region, but there is no directed fishery for these species in the area. Species with relatively small landings include salmon, halibut, hake, pollack, whiting, Norway pout, anglerfish, lumpsucker, argentines, grenadiers, flatfishes, horse mackerel, dogfishes, skates, crustaceans, and molluscs (ICES 2005).

TACs are decided for most of the exploited stocks. In addition to an agreed quota, a number of additional regulations are applied. The regulations differ among gears and species. Figure 1 contains the summary data about landings of different species. It is necessary to mention the problem of unregulated fishery in the Barents Sea. All official figures do not reflect the volumes of catches adequately. Over-fishing represents an additional threat to the ecosystem and may lead to economical losses in the long run due to stocks collapse.

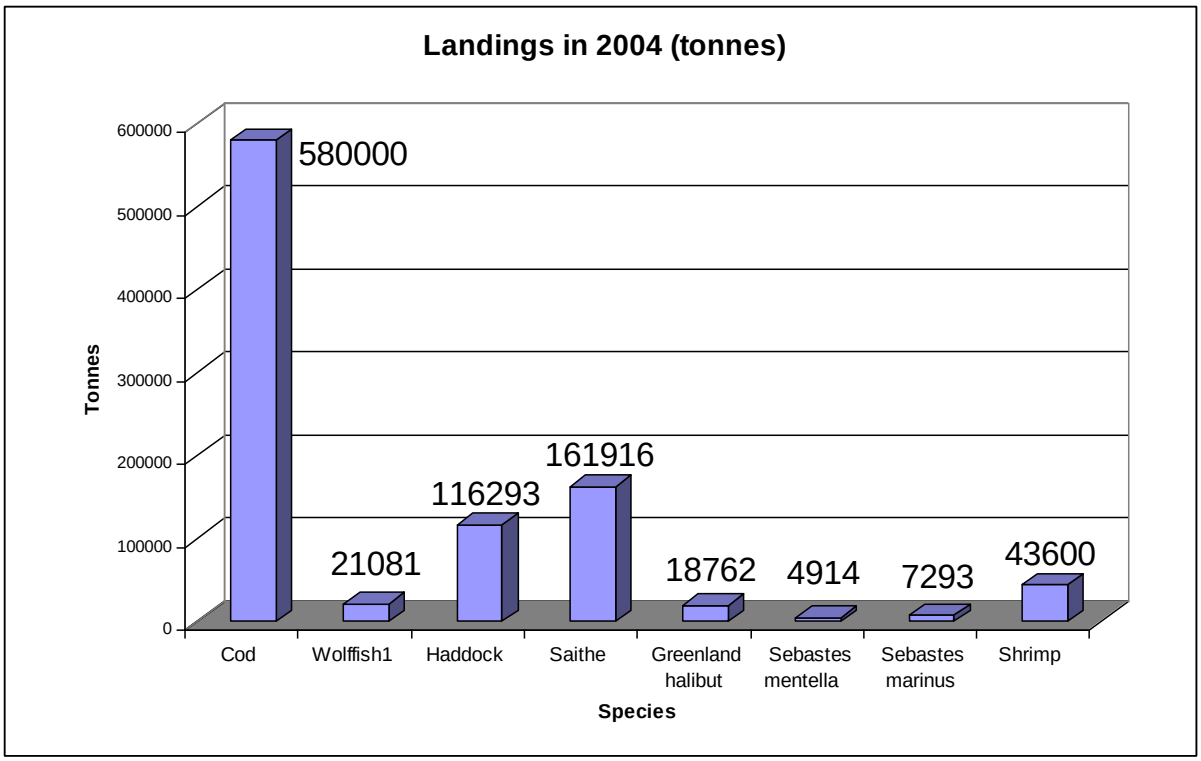

Figure 1. Landings of different species in Northeast Atlantic (Source: ICES 2005).

Noticeably, the main part of the landings consists of cod, which is the most valuable species in terms of market prices.

Thus, the Barents Sea is not only a unique northern ecosystem but a valuable area for fishing as well. It provides employment and is a source of income for people from many countries.

In northern Norway, the fishing industry provides from 5 to 10 percent of employment (Young 1999). For instance fisheries provide about two-thirds of the industrial employment in the county of Finnmark (Young 1999 from Hersoug 1992). Only one tenth of the Norwegian population is living in the northern part of the country whereas the share of fishermen is about 50 percent (Young 1999). Almost 90 percent of the catch is exported, and fisheries products is the third biggest item in Norway's export after petroleum and metals (Young 1999).

In northwest Russia and especially in the Kola Peninsula the fishing industry also plays a very important role in the economy. The economy of the Murmansk region is based on exploitation of natural resources and it is highly dependent on mining, energy production and fisheries. According to official data from the regional government, the Murmansk region provides about 14 percent of Russian food-fish production. Fisheries employs 19,3 percent of the region's workforce is among the key industries of Kola Peninsula.

1.3 The Barents Sea as a potential conflict area between fishery and hydrocarbons-production

There are a lot of different estimates of hydrocarbon resources in the world sea, ranging from 320 to 2000 milliard tonnes of oil equivalents (Patin 2001). No doubt these resources are very rich and highly perspective as long as the proportion between on-land hydrocarbon resources and resources of the shelf zone is 1:3 (Patin 2001). The majority of the famous offshore oil and gas fields are situated in coastal and shelf zones with the depth around 400-500 meters (Patin 2001).

It is generally known that the coastal and shelf zones are the most productive part of the world ocean in terms of bioresources. The main fisheries are concentrated in these areas. The Barents Sea is no exclusion. As already mentioned, the Barents Sea is a unique place in terms of productivity, bio diversity and economical importance.

Rich in terms of carbohydrates and bioresources the Barents Sea represents one of the areas where the fishery and the energy sector will intersect in very close future. This development is due to several factors such as:

- the area's deposits of hydrocarbon resources;
- exhaustion of the traditional Norwegian hydrocarbon sources in the Northern Sea and Russian hydrocarbon sources in Siberia;
- improved technology for offshore operations;
- closeness of the area to major consumers;
- stability in terms of different kind of risks;
- increasing demand and world prices for hydrocarbon resources.

This means that the possibility of a conflict between the oil and gas industry and the fishing industry seems to be unavoidable. The reason is that different stages of petroleum activities create sources of various emissions and discharges. For example exploration activity can cause discharge of drill cuttings and atmosphere-emissions from energy production, and oil spills can destroy larvae, fish eggs, fish seabirds, marine mammals and organisms in the shoreline. The operations phase is dangerous because of discharges to sea and emissions to atmosphere :

- oil spills
- water with residues of oil and chemicals (produced water)

- carbon dioxide (CO_2) and nitrogen oxides (NO_x) from energy production and flaring
- non-methane volatile organic compounds (nmVOC) from storage and loading of crude oil.

All these factors can be devastating for bioresources and environment (see fig. 2, Patin 2001).

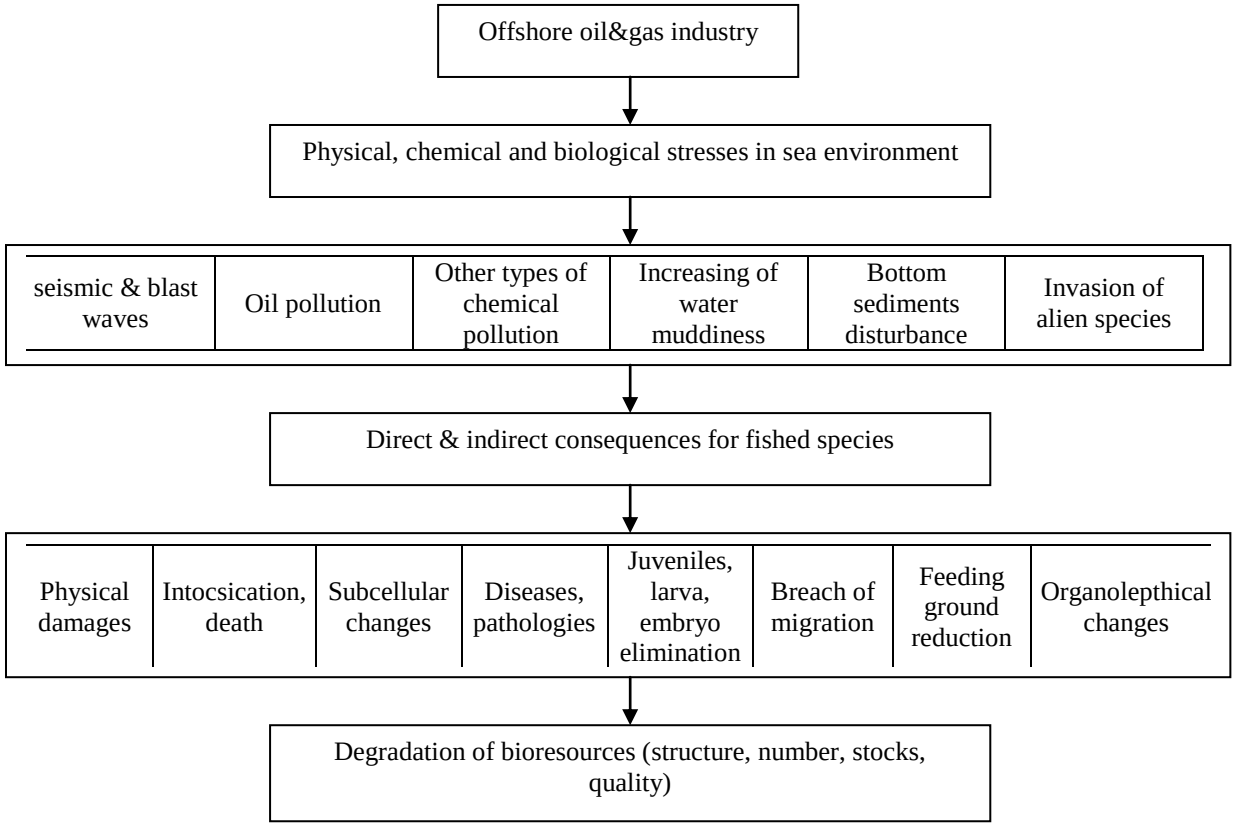

Fig. 2. The possible problems for bioresources from petroleum industry (source: Patin 2001)

1.4 Problem to be addressed and research questions

The importance of addressing this topic is confirmed by the fact that neglecting the vital interdependence between the two industries (fisheries and oil&gas) working in the same areas can cause a crisis in an important sector of the economy (fishery) both in Norway and North-West of Russia. The consequences of such a development cannot be overestimated. The fishery sector is the bread-winner and source of employment and tax incomes for many thousands of people on both sides of the border. Considerable resources have been invested in the improvement of this sector. So it would not be a wise decision to exploit one natural

resource, which is non-renewable, in a way that can be harmful for the exploitation of another renewable resource.

But not only economical reasons are important. As already shown, the unique biosystem of the Barents Sea is especially vulnerable in comparison with areas situated further south. This is attributable to physical environmental conditions such as low temperature, periods with little or no light, ice cover etc. Human activity can easily destroy the northern environment and lead to the extinction of Arctic animals as well as indigenous cultures.

It is possible to conclude that any actions in the Barents Sea should be carefully planned before implementation. This work should include various political, legislative, social, economic, technical and other aspects. There is a wide range of studies that can be performed on the above-mentioned issues. But the most interesting question is related to how they all meet and get connected in the framework of the management system of the Barents Sea. In this case we deal with the systems of two countries – Russia and Norway (See fig. 3).

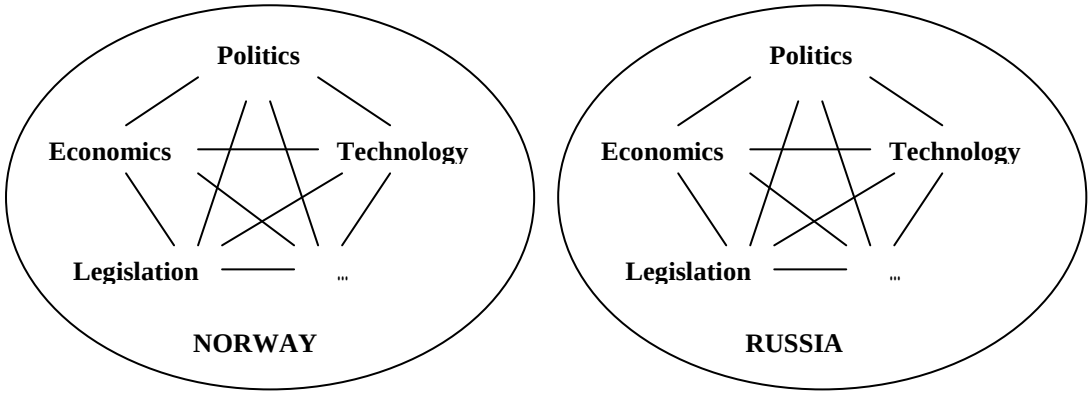

Fig. 3. Russia and Norway as two political, socio-economical, technological and legislative systems.

Obviously there are noticeable differences between Russia and Norway in all the above mentioned components. It is logically to suppose that there are differences in the management systems of two countries. There is a wide variety of management systems in any country but in our case the natural resource management systems will be emphasized. As already mentioned, there are two kinds of natural resources in the Barents Sea which are interesting for people from an economical point of view and highly relevant for this study: fish and carbohydrates.

Talking about the management system for fishery it is necessary to note that the Barents Sea and its bioresources are shared by two states – Russia and Norway. Fish stocks do not recognize national borders. Accordingly, the health of the biosystems depends on the coordinated actions of both Russian and Norwegian fishermen and authorities. The companies of these countries are the main actors in this part of the world. This fact required the introduction of some common approaches to the natural resource management system in fishery. So, fishing activities are regulated by a common Russian-Norwegian commission. This bilateral regime was set up in the mid 1970s . The Joint Norwegian-Russian Fishery Commission annually establishes TACs (total allowable catches) for the joint species of cod, haddock and capelin, as well as overall technical regulations of the fishery. Norwegian and Russian authorities in turn set further regulations for their respective zones and distribute their respective quota shares between individual users. Both in Russia and Norway compliance control is performed both at sea (during the fishery) and ashore (in connection with landings of fish).

It is important to understand that pollutions, just like fish, do not recognize national boarders. This implies that the health of the biosystems in the Barents Sea will depend on the environmental approaches and standards adhered to by Russian and Norwegian companies. It is logically to suppose that even if country "A" has environment protection as a first priority, whereas country "B" is not giving environmental considerations similar weight, the consequences for the biosystems will be defined by the companies of country "B". Hence, the introduction of common approaches and mechanisms in some aspects of the natural resource management systems of our countries could be a wise decision if we want to exploit the resources of the Barents Sea in an environmentally friendly way. The experiences from successful cooperation in management of fish resources can be the good example that proves the possibility of such cooperation in other fields.

In order to decide whether the approaches of Russia and Norway are completely different or not it is necessary to compare the natural resource management systems in Russia and Norway. The "resource management system" in our case is the system that deals with the carbohydrates resources. So, first of all it is necessary to define what management systems are in general and natural resource management in particular. After that the thesis will focus on the following research objectives:

1. defining the main characteristics of the two management systems;
2. revealing the main differences and similarities;

3. identifying the measures taken to secure a peaceful coexistence with fisheries and the environment;
4. deciding to what extent the management systems of the two countries fit together.

CHAPTER 2.
NATURAL RESOURCE MANAGEMENT SYSTEMS

This chapter will be dedicated to the following questions which are important for understanding the main research questions:

- What is a management system and what is it made up of?
- How can management systems be regarded as part of governance regimes?
- Why are systems and regimes different across countries and industries?
- Why is it necessary to have a management system for the exploitation of natural resources?
- What kind of typical measures and procedures are utilized in the case of natural resources?

2.1 Management systems as the object of study

There are many definitions of management but none of them excludes or denies the others. They supplement each other in most of the cases, so it is not necessary to cite all of them. One of the good definitions is that management is the art of taking measures affecting a resource and its exploitation with a view to achieving certain objectives, such as the maximization of the production of that resource . Another definition states that management is the act of influencing, directing, or controlling use of a resource .

According to the definition of the International Organization for Standardisation (www.iso.org) and its ISO 14001:2004 environmental management standards a management system is a network of interrelated elements that include responsibilities, authorities, relationships, activities, functions, processes, practices, procedures, and resources. A management system uses these elements to establish policies and objectives and to develop ways of applying these policies and achieving these objectives.

Using the example of fisheries management system, the following components can be defined on the basis of FAO sources: management authority, procedure, objective, management organisation and strategy.

Management authority in the case of fisheries is the legal entity which has been assigned by a state or states with a mandate to perform certain specified management functions in relation to a fishery, or an area (e.g. a coastal zone). While generally used to refer to a state authority, the term may also refer to an international management organisation.

Management procedure is a description of the data to collect, the way to analyse it, and the way to translate the analysis into actions.

Management objective is a formally established, more or less quantitative target that is actively sought and provides a direction for management action.

Management organisation in the case of fisheries is an institution or arrangement established (usually between two or more states) to be responsible for activities related to fisheries management, including consultation between parties to the agreement or arrangement, formulation of the fishery regulations and their implementation, allocation of resources, collection of information, stock assessment, as well as monitoring, control and surveillance (FAO).

Management strategy (FAO) is adopted by the management authority to reach established management goals. In addition to the objectives, it includes choices regarding all or some of the following: access rights and allocation of resources to stakeholders, controls on inputs (e.g. fishing capacity, gear regulations), outputs (e.g. quotas, minimum size at landing), and fishing operations (e.g. calendar, closed areas and seasons).

It is easy to see from this definition that different countries can have divergent management systems. This is caused by differences in the elements and networks that constitute the management systems. Obviously the authorities of different states can have different type of goals, priorities and responsibilities. Relationships, activities, functions, processes, practices and procedures can also be different. The question is how much these systems are different from each other and how far they are from something that can be considered as the "ideal system".

Symes (Symes 1999) tries to specify the basic features of an "ideal" natural resource management system by the example of fishery. Such a system should be one:

- based on clear, precise definition of use rights
- with a broad, well-defined and stable set of aims and objectives
- developed at an appropriate geographical scale
- involving all major stakeholders
- using relatively simple and transparent procedures
- involving a well-integrated combination of regulatory measures
- implemented, as far as possible, through responsible user group organisations
- with effective means of surveillance and enforcement
- amenable to effective monitoring
- subject to periodic review and capable of rapid response to changing circumstances

Undoubtedly, these features are important and relevant for almost any type of natural resources, including carbohydrates.

By analogy with the management system for fishery (Charles 2001), one can mark out the following components of any natural resource management system (see fig 4):

- policy and planning
- resource management
- development
- research.

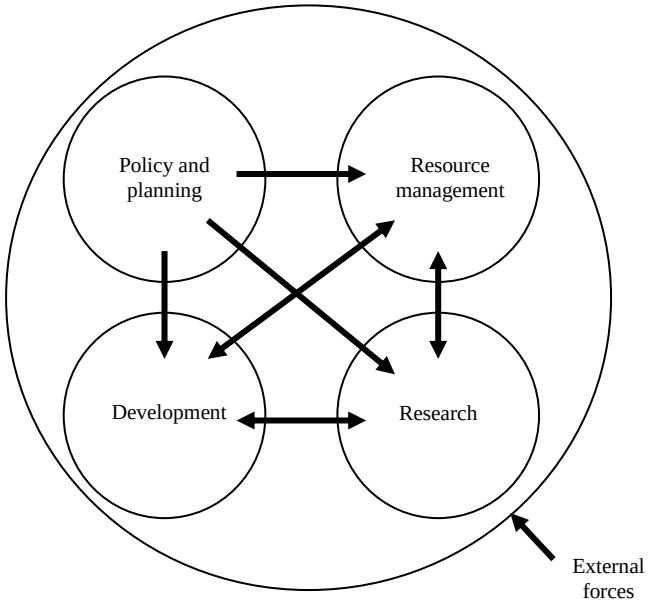

Fig. 4 The structure of the natural resource management system on the basis of Charles (2001).

It is important to notice that the decomposition of a natural resource management system based on Charles' interpretation is not comprehensive and should be taken as supplementary to other kinds of interpretations.

The first element – "policy and planning", or strategic management, can include (Charles 2001):

- overall objectives to be pursued in the system
- policy directions to meet the declared objectives
- legislation related to resource management and regulation
- decisions regarding the structure of the management system.

The next element is "resource management" or tactical and operational management. More or less universal (i.e. for all types of natural resources) a decomposition based on Charles model (Charles 2001) can be the following:

- a portfolio of management measures to control the impact of resource exploitation on the resource depository and the environment
- periodical (e.g. annual) levels for each management measure
- day-to-day decisions to achieve operational plan
- research and data collection to provide the necessary knowledge base.

The "development" can include (Charles 2001):

- measures to improve the physical infrastructure, technological capabilities, institutions and/or human productivity in the system
- measures to improve the flow of sustainable benefits from the resource exploitation, including market development, quality control and improvements to distribution processes
- development of new sources (stocks, depositories, etc.)

And the final component of such representation of natural resource management system is "research". This element consists of (Charles 2001):

- measures to collect, analyse and disseminate relevant data on the various components of the resource exploitation system, to support the resource management and development activities
- measures to assess and conserve resource stocks/deposits.

Another natural resource management view that is relevant for our study is the integrated natural resource management (INRM) concept. According to the Campbell (2001) integrated natural resource management is "a process of incorporating the multiple aspects of natural resource use (biophysical, sociopolitical, or economic) into a system of sustainable management to meet production goals of producers and other direct users (e.g., food security, profitability, risk aversion) as well as goals of the wider community (e.g., poverty alleviation, welfare of future generations, environmental conservation)" (Campbell, Sayer et al. 2001).

The components of an integrated natural resource management system are presented in figure 5.

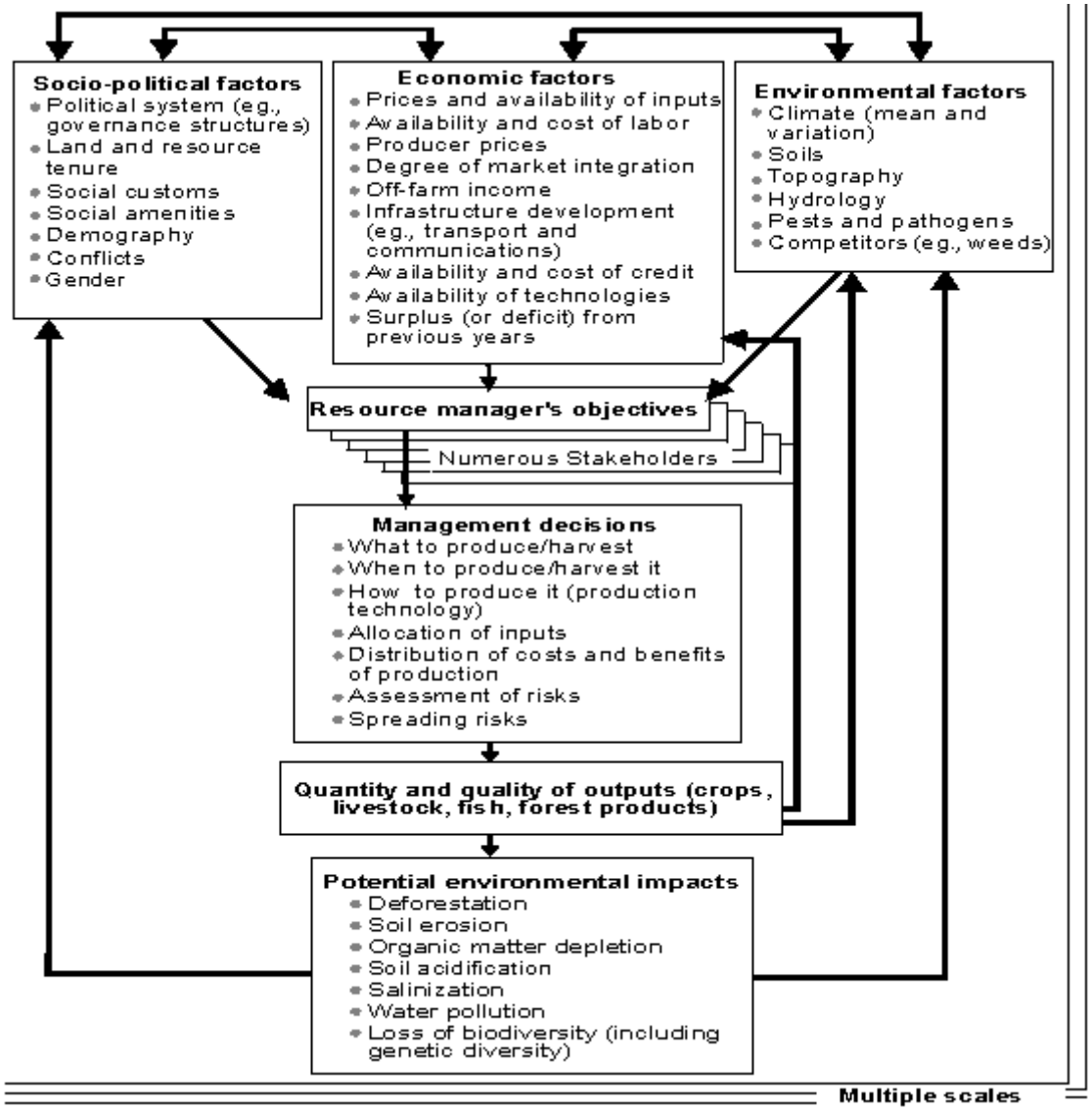

Fig. 5 Components of integrated natural resource management system (Campbell, Sayer et al. 2001).

As can be seen, the natural resource management system takes into consideration the interests of many stakeholders and factors that act on different levels under different circumstances and conditions. These components have an influence on the resource management objectives which define the management decisions. The outputs including environmental impact depend on the quality of the above mentioned decisions.

2.2 Tragedy of the commons and the necessity of resource management

A management system is an important part of any kind of human activity that are aimed at efficiency, sustainability, resource conservation, outputs and inputs optimization (e.g.

maximization and minimization correspondingly). Obviously, the area of activity that is not regulated will suffer from negative consequences related to the conflicting objectives of participants or stakeholders. It is well known that successful achievement of individual's goals not necessarily lead to achievement the society's goals. Life frequently shows the opposite. It is possible to judge about this using the "tragedy of the commons" example.

Dealing with the problem of the so-called "tragedy of the commons" is one of the main tasks of any resource management system. A commons is "a resource to which no single decision-making unit holds exclusive title" (Vogler 2000 from Wijkman, 1982). The global commons is a particular case of commons representing areas or resources that do not or cannot by their very nature fall under sovereign jurisdiction (Vogler 2000). Examples of such commons are oceans, deep seabed, Antarctica, space and the atmosphere. The tragedy of the commons phenomenon implies a conflict for common resources between individuals who are trying to maximise their own benefits. It is assumed that unrestricted access to a limited resource will lead to a over-exploitation and other kind of negative consequences. It happens because individuals acquire the benefits of resource exploitation whereas the costs of exploitation are distributed between everybody. One way to solve this problem is the introduction of resource management mechanisms and systems.

It is necessary to notice that ocean (water) and atmosphere pollution are highly relevant examples for the case of offshore oil and gas activity. But in fact we should use another concept in the case of carbohydrates production – the "common sink" as one of the types of common resources. The interpretation of this term is using seas, watercourses and the atmosphere as waste disposal systems. The complication here is that one type of commons can be closely related to another type of commons. For instance, common sink marine pollution will diminish common pool fish stocks (Vogler 2000).

Thus, it is possible to conclude that natural resource management systems are vitally important for achieving sustainability and preventing degradation of the environment. For instance, renewable common property resources (like fish stocks) can be extensively regulated by controlling access and allocating quotas.

One of the important issues that should be taken into account is scale. It is obvious that "commons" problem of pollution on the local scale normally will be within jurisdiction of a state, which means that the government can take control and regulate collective interests. The situation looks a bit differently in the case of transboundary pollutions since so-called global commons do not fall under the jurisdiction of a single state.

Another issue that plays considerable role in dealing with "the tragedy of the commons" is property rights. Property rights are one of the important elements of any natural resource management system. In general sense, this term refers to any type of right to specific property whether it is personal or real property, tangible or intangible (1985). This term can also be defined as "the capacity to call upon the collective to stand behind one's claim to a benefit stream" (Meinzen-Dick and Knox 1999 from Bromley 1991:15). Property rights over land and other natural resources are often broadly classified (Meinzen-Dick and Knox 1999) as public (held by the state), common (held by a community or group of users), and private (held by individuals or "legal individuals" such as companies). The importance of addressing the property rights issue can be substantiate by the following arguments:

1) property rights offer incentives for management;

2) property right give necessary authorization and control over the resource.

Indeed, property rights provide confidence that the holder of the rights will reap the future benefits of investment and careful management, and bear the losses incurred by misuse of the resources (Meinzen-Dick and Knox 1999). For instance, governments claim ownership of many natural resources on behalf of society since natural resources are of vital importance to a country, and their management has important environmental and economic externalities for others (both in the country and internationally). If we continue this example it is easy to see that when a government lacks the capacity to enforce state property rights or regulations on extensive resources such as forests or marine fisheries, public property becomes open access. Under this situation there is no management, and anyone who can exploit the resource do so, leading to overuse and resource depletion and degradation of the environment.

In order to solve the problem of commons in ocean the Exclusive Economic Zones (EEZ) were extended to 200-miles limit during the 1970s. This formed the background for the introduction of the bilateral management regime in the Barents Sea which can be used as an example of a resource management system on international level. Before 1977 the fishery resources of the Barents Sea beyond 12 miles were subject to multilateral management since these waters were considered international. The introduction of 200-miles exclusive economic zones (EEZ) by Norway and the Soviet Union changed the resource management system in the area. A joint Soviet-Norwegian, and later Russian-Norwegian, Fisheries Commission makes recommendations on regulative measures and quotas. One of the reasons for introducing this Russian-Norwegian regime was the necessity of balancing the concerns for conservation and utilization (Young 1999). It is a well known fact that the individual control of fish resources can cause a race for the fish that leads to inefficiencies and waste in the short

run and to stock depletion in the long run. An international resource management regime, such as the one established in the case of the Barents Sea fisheries, favours proper use of fish stocks over time. The "proper use" term should be understood in terms of the following questions (Young 1999): what types of products are produced, who produces them and how are the gains from production distributed. The over-time element derives from the fact that the amount of catch in any period can affect the amounts that will be available for harvesting in the future (Young 1999).

As a conclusion it is necessary to mention the following consequences which derive from different functions of the environment:

1. The environment is supplier of renewable and non-renewable resources. The environment's ability to produce resources has the character of a capital good. By overuse or investment it can be negatively or positively affected by man.
2. The environment supplies people with many public goods (e.g. commons) available for many different users. Extraction of resources, emission of the waste materials and harmful substances can diminish the quality of environmental goods.
3. The environment is the recipient of waste and it has capability for waste treatment. These environment's properties can also be characterised as the capital good. People can influence this "capital good" negatively by the amount of waste and its constituents, and positively by investment in the environment.

Having a natural resource management system is thus an essential element of any resource consumption process and environment exploitation.

2.3 The management systems as part of governance regimes

It is obvious that any natural resource management system should be analysed in the context of wider governance regimes. There are a lot of definitions and ways to understand the meaning of "regime". One of the definitions states that regimes are "social institutions consisting of agreed upon principles, norms, rules, procedures, and programs that govern the interactions of actors in specific issue areas" (Young 1999). The term "regime" can be used to group a range of state behaviours in particular issue area . It is necessary to mark out that the governance regime can be determined by such factors as geography, size, location, demography, history, culture and many others.

The following regime characteristics can be emphasized :

1. Strength – measured by the degree of compliance with regime injunctions;

2. Organizational form – organisational design and operation;
3. Scope – refers to the range of issues the regime covers;
4. Allocation mode – different regimes can endorse different social mechanisms for resource allocation.

Steering mechanisms can also be considered as one of the most important characteristics of any regimes.

A brief description of Russia and Norway will be presented below in order to give some ideas about the governance regimes in the respective countries.

Russia covers about 17 million square kilometres, which makes it the largest country in the world. It stretches more than 10000 kilometres across Europe and Asia extending over 11 time zones. It is necessary to mention that much of its territory is situated in unfavourable climate conditions. In terms of population, the country ranks seventh in the world with 145 million in 2002 . It is not very difficult to understand that managing such a country is no trivial task.

Russia possesses a vast territory with huge natural resource deposits, maintains considerable cultural diversity, and has a relatively high level of education.

Russia is multi-ethnic federal state with presidential form of government.

The country has experienced considerable reforms in its state structure during past decades. A centralized and communist ideology-driven command-administrative system was changed by market-driven and more pragmatic approaches. Thus, contemporary Russia represents a democratic regime with a growing market economy. One of the reasons for this recovery is the increased export earnings of the resource sectors, including oil, gas, ferrous and nonferrous metals, forest products, and precious stones . In 2003 resources made up about 67 percent of the country's export by value and oil and gas alone 54 percent . In other words, Russia is now experiencing the symptoms of strong resource dependence, and Russian authorities acknowledge the need to diversify the economy and pay more attention to processing and high-tech industries.

It is well known that the Soviet economy was dominated by the state whereas today it is not the case – business activity is not the privilege of the governmental institutions anymore. This fact required the introduction of new ways for controlling industries and enterprises based on indirect intervention. The above mentioned circumstances relating to size and other factors make this task especially difficult. Moreover, it is necessary to remember that Russia still is in a state of transition. Obviously the managing of stable systems and constantly changing systems are two different tasks.

The mainland of Norway covers an area of 323 758 square kilometres. The country's population is 4 604 800 as of 1 January 2005. Norway has been a constitutional monarchy and a representative democracy since 1814. After the country became independent in 1905, no radical changes in the political system has occurred, something which has ensured stable development and predictability of the state.

Norway's topography and climate has favoured fragmentation and certain degree of geographical isolation. The reason is the long and narrow shape of the territory with multiple fjords and mountains. As a consequence, sea-based transport has historically been the best alternative. These natural conditions have formed Norway as a sea-nation with fishery and sea-related industries as important sources of income. The settlement pattern used to be highly scattered. However, the country has seen an increasing depopulation of peripheral areas , and this development has been met by regional policy measures and government subsidies. Most natural resources are scarce in Norway. Tillable land and timber are among the examples. The output of mining industry is without strategic interest. But cheap hydroelectric power has formed the basis of processing industries, and in recent years the oil and gas industry has become the backbone of the Norwegian economy.

Norway's economy is mixed type. Banking and insurance are mainly private whereas state ownership is concentrated in infrastructure and industries of national importance such as oil and gas. Agriculture is subsidized. The major trading partners of Norway are Germany, Sweden and the United Kingdom.

Thus lack of certain kinds of resources and excess of others has made Norway very much integrated in the world economy.

It is necessary to point out that Norwegian foreign policy represents a combination of, on the one hand, strong appeals for more international cooperation and, on the other hand, repeated rejections of proposals to involve Norway more closely in international projects like the European Community .

The relation between management system and governance regime can be easily seen by using the evolution of the fishing industry in Soviet Union and Russia as an example.

The structure of the Soviet fish industry was characterized by a high rate of centralization. The Ministry of Fisheries regulated work of five regional fisheries combines. One of them was Sevryba which included the fishing industries of republic of Karelia, Murmansk and Arkhangelsk counties. This vertically integrated company consisted of (Young 1999):

- two vessel fleet organization (Tralflot, Murmanrybprom)

- Sevrybkholodflot with shipyards, transportation vessels and tankers
- one unit supplying various onshore functions (including port services, processing plants and construction works).

This company represented the model of the soviet command-administrative system: all activities from stock surveys to retail stores were planned, regulated and reviewed centrally. The Fisheries Ministry played the key role in defining the main parameters of industry development. Consequently, Sevryba was one of the tools in this centralized structure and therefore was governed in accordance with ministry plans (Young 1999).

The situation after 1990 looked differently as a consequence of changing from command-administrative to market-based governance principles. For example, all economic functions were transferred from the state to the company level in accordance with requirements of the Law on State Enterprise (Young 1999). In 1992, Sevryba was converted to a joint-stock company and the major part of the fishing industry was also privatized (Young 1999 from Baskakov 1993). At the same time the Committee on Fisheries, previously the Fisheries Ministry, concentrated mainly on a natural resource management activities (Young 1999 from Korelsky 1993).

All above mentioned facts proves that any management system should be considered in the context of wider governance regimes.

2.4 Instruments of resource management

Regardless of who governs a particular resource, it is essential to regulate access to the resources and to enforce the rules formulated to govern its use.

Institutions of different scale and level play key roles in the resource management. The following set of general principles can increase the performance of an institutional design (Dolsak and Ostrom 2003 from E. Ostrom 1990, Tucker 1999, Bardhan 1999):

1. Rules are devised and managed by resource users.
2. Compliance with rules is easy to monitor.
3. Rules are enforceable.
4. Sanctions are graduated.
5. Adjudication is available at low cost.
6. Monitors and other officials are accountable to the users.
7. Institutions to regulate a given resource may need to be devised at multiple levels.
8. Procedures exist for revising rules.

There are a lot of instruments which can be used for resource management. For instance it is possible to mention governmental command-and-control instruments or tradable permits. Well defined and easily enforced property rights is also a powerful tool since markets determine what and how much should be produced, how to produce, how to distribute and how to allocate consumption over time.

Resource management in fisheries can be performed by means of taxes on effort or harvest, and quotas on effort and harvest .

The instruments for pollution control can be broadly divided into regulations and economic instruments . Regulations include different types of standards such as specifications of the types of pollution control equipment that may be used and performance standards. Economic instruments include taxes, subsidies, and tradable permits. Labelling and disclosure mechanisms can also provide signals to investors, consumers, and regulators about how environmentally friendly is a product or polluter and information on how poorly a source or firm is performing .

Thus, there are a lot of different instruments for natural resource management which include regulation of pollution; zoning of land use; improved collection and dissemination of information concerning geology, topography, and resource stocks; effective access regulation; and resource reproduction .

3. CHAPTER
METHODOLOGY

This chapter will give an outline of

- what methodology is
- different methods of investigation and analysis
- main data sources for this thesis
- the ways the information for the thesis was collected
- problems the author has encountered during the project
- the validity and reliability of the data

The scientific methodology is a system of rules and procedures upon which research is based and against which claims for knowledge are evaluated (Nachmias and Nachmias 1987). A major function of methodology is to facilitate common understanding and effective communication between researches. The definitions of this term are diverse but reflect the same general meaning. For example in Lewins (Lewins 1992) methodology is defined as "the systematic scrutiny of what researches do and why they do it", which is another way of saying that methodology is, in general sense, the study of the logical or philosophical basis of any discipline. Another source defines the term as the analysis of, and the broad philosophical and theoretical justification for, a particular method used in research (Gray 2004).

There are the following basic research goals in social science : exploration, description, explanation, and evaluation. Exploratory research facilitates in-depth understanding of a subject area thus producing a lot of qualitative data. Descriptive research is aimed at getting a detailed picture of some phenomenon using a wide range of quantitative methods. The explanatory research tries the answer question "why" or reveals cause and effect relationships of social phenomenon. Evaluation research gives the answer if, for instance, some social program or policy was successful or not.

The choice of research method is determined by the following factors (the list is not exhaustive):

- research objectives,
- data availability,
- resources availability (time, finances, people and others),
- special requirements from the "customer",
- and other factors.

As it was mentioned above, depending on what type of data can be obtained and research objectives it is possible to talk about qualitative and quantitative research. A quantitative research allows getting precise answer using the "language of figures" together with statistical instruments. But the possible problem here is that quantitative indicators are not always available. It is especially true for social science. One of the strengths of quantitative research is the possibility of explaining a phenomenon and making generalizations. The distinguishing feature of such researches is that the scientist deals with a large number of objects and pays attention to a relatively small number of their properties. The qualitative researches are far less structured in comparison with the previous ones but a researcher has small number of objects and is aimed at getting their comprehensive understanding. In practice, these methods are quite often used in combination.

There are the following "standard" methods in the area of social science (Walker 1956):

- direct observation
- the interview and the questionnaire
- historical method
- library methods
- the case study
- statistical methods.

This thesis belongs to the qualitative researches due to the specific character of the data used. The major instrument of research is document analysis. The limitations of this method are related to the fact that the results of research are highly dependent on available sources of information. As a rule, it is very difficult to find the source that gives direct answer on the research question. Another possible problem is superfluity, multiplicity or overstock of informational sources that makes it impossible to process them within the bounds of given limitations (e.g. time and money). The dynamic of modern environment should also be taken into account. The documents are becoming out of date very rapidly. Difficulties related to interpretation represent another challenge, since the same fact can be understood in many ways by different people and only time will eventually put everything right.

Talking about different types of documents it is necessary to clarify the following properties of the source :

1. reliability (is it falsification or true document),
2. is it normative or cognitive,
3. relevance for past, present or future,

4. is it confidential or official,
5. is it personal or institutional,
6. is primary or secondary source (first-hand or second-hand),
7. other relevant properties.

The main source of information for this study is Russian and Norwegian legislation and different regulatory documents related to the fisheries and energy sectors of both countries. Non-structured open-ended interviews with experts also gave some preliminary data. These experts were representatives of one research institution from Norway, Russia and one Russian oil-company. Different type of publications and papers were used as well.

Some interesting information was obtained during an International Summer Camp in Apatity (Murmansk Region, Russia, 13-19 July 2005) where representatives of several organisations (such as Specialized Marine Inspection, Marine Security Service) made presentation of their activities related to oil and gas industry.

Obviously, the most reliable sources of information are legislation and other official documents. But it is necessary to understand that even these types of sources can become out of date in just a few months. Another challenge is related to the fact that Russian and Norwegian sources have different structure and other properties, so it is quite difficult to compare and analyse them.

In spite of the fact that this study does not pretend to be comprehensive and very detailed, it can be used for a better understanding of possible impacts on the fishery from oil and gas activities in the Barents Sea. Probably it will help to define the directions for new research in the same field.

4. CHAPTER
RUSSIA AND NORWAY AS OIL AND GAS PRODUCING COUNTRIES

The following information will be presented in this chapter:

- Basic figures and trends in Russian and Norwegian petroleum production
- Main companies and ownership structures
- Participation of foreign companies
- Public revenues
- The opening of the Barents Sea

4.1. Russia

Russia is important to world energy markets because it holds the world's largest natural gas and oil reserves. Russia is also the world's largest exporter of natural gas, the second largest oil exporter, and the third largest energy consumer (EIA).

4.1.1. Oil reserves

According to the Oil and Gas Journal, Russia has proven oil reserves of 60 billion barrels (or about 6 percent of the world total), most of which are located in Western Siberia, between the Ural Mountains and the Central Siberian Plateau. If about 67 billion barrels of probable and possible oil reserves are added to this figure, Russia will be the richest country in the world in terms of carbohydrates. This is proved by, for instance, a 1998 USGS survey.

4.1.2. Oil production

The Western Siberia region is the main source of Russian and Soviet Union carbohydrates. The peak production was 12,5 million barrels per day in 1988 (EIA). After the Soviet Union collapsed in 1991, Russia's oil production reached about 6 million bbl/d (EIA), or around one-half of the Soviet Union maximum (see Fig. 6). The situation changed in 1999 probably due to

- privatization of the industry following the collapse of the Soviet Union;
- growing world oil prices;
- usage of modern technologies;

- rejuvenation of old oil fields.

The consequences of the 1998 financial crisis also played a role in increasing of the carbohydrates export.

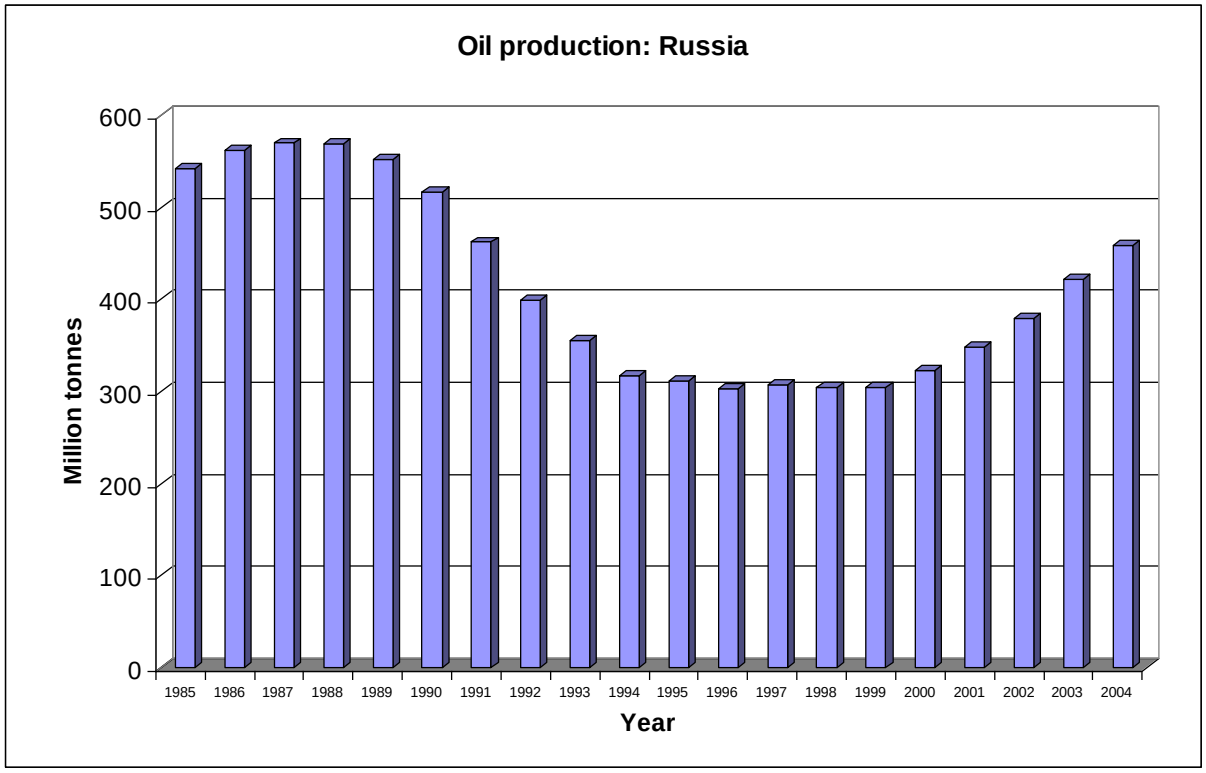

Fig. 6 Oil production in Russia (Source: BP)

The average level of Russian total liquids production by 2005 was about 9.5 million bbl/d which is 2,5 percent more than in 2004 (EIA). This production level have made Russia the world's second largest producer of crude oil, behind only Saudi Arabia (EIA).

It is obvious that mature fields should be replaced by new sources of carbohydrates if Russia wants to keep or increase the production level. According to some estimates, new field developments will produce almost all of Russia's annual oil growth in the next five years and will likely produce more than half of the country's oil in 2020 (EIA). The following projects will probably play an important role in the next 5 years (EIA):

- Lukoil's Middle Caspian project,
- the Sakhalin Island projects,
- the Shell Joint Venture's West Salymskoye project,
- Lukoil/ConocoPhillips's TimanPechora project,
- Rosneft/Gazprom's Prirazlomnoye project,
- Rosneft's Vankorskoye and Komsomolskoye.

The bulk of Russian crude oil goes directly abroad whereas only about 30 percent is processed locally (EIA). The main physical channel for oil export is the multiple-branch Druzhba pipeline. It provides the transportation to Belarus, Ukraine, Germany, Poland, and other destinations in Central and Eastern Europe (including Hungary, Slovakia, and the Czech Republic). Some of the data from November 2005 gives the volume of about 1,4 million bbl/d (EIA). The next important ways to the world markets are maritime ports in the Black Sea and Baltic Sea. Higher oil prices make the railroad transport also economically reasonable. So almost 170,000 bbl/d of Russia's oil is transported by means of this channel.

4.1.3. Gas reserves and production

Russia has the world's largest natural gas reserves, with 1,680 trillion cubic feet (Tcf) which is about two times larger than the reserves in the next largest country, Iran (EIA) and about one-quarter to one-third of the world total.

Russia can be considered as one of the world's largest natural gas producer with 22,4 Tcf natural gas produced and the world's largest exporter with 7,1 Tcf in 2004 (EIA). The data about previous periods are presented in figure 7.

The main sources of Russian gas are situated in Western Siberia. Urengoy, Yamburg, and Medvezh'ye fields give about 70 percent of Gazprom's total natural gas production, but these sources are quite old and so the output tends to decrease (EIA).

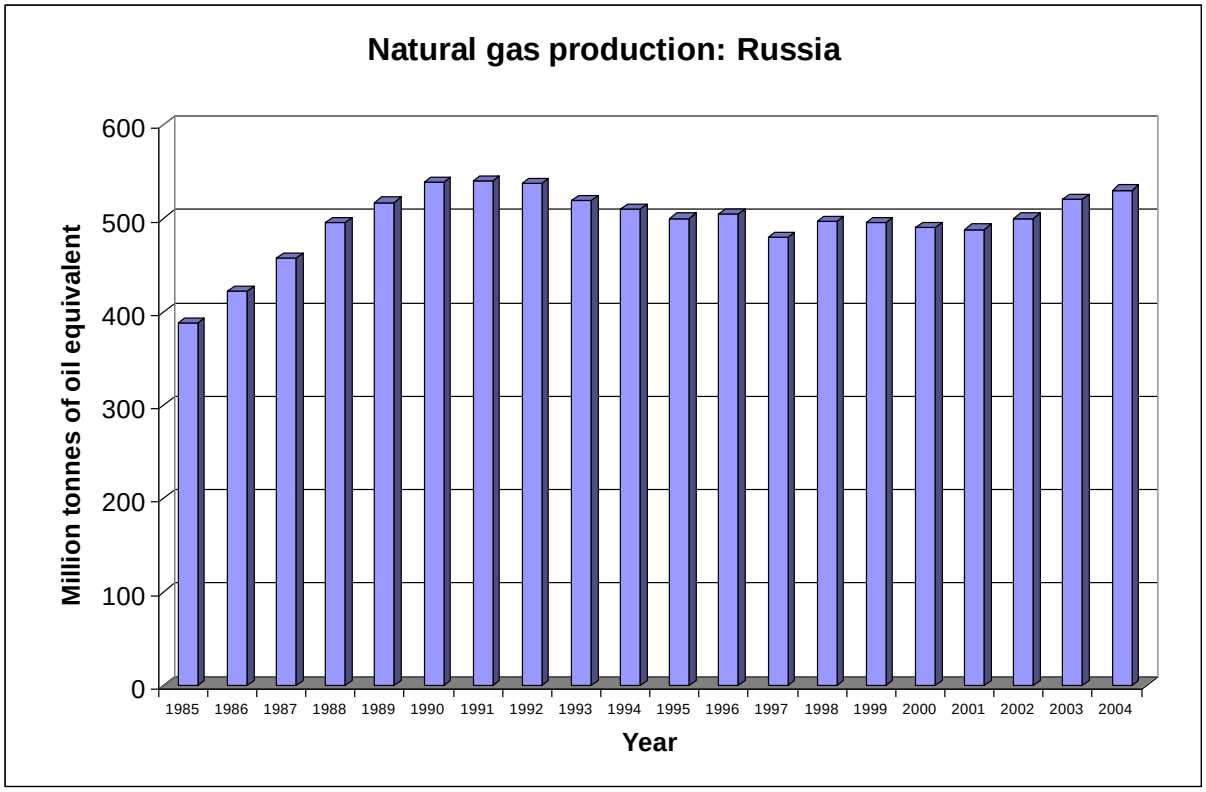

Fig. 7 Natural gas production in Russia (Source: BP)

The main traditional markets for Russian natural gas are in Eastern Europe and former USSR republics. But the producers are interested in diversification of client-network and are trying to involve customers from EU, Turkey, Japan and other Asian countries (see table 1).

Rank	Country	Imports (bcf/year)	Pct of Domestic NG Consumption
1	Germany	1110	44%
2	Italy	777	29%
3	Turkey	473	65%
4	France	470	26%
5	Hungary	378	72%
6	Finland	269	100%
7	Slovakia	261	100%
8	Poland	258	60%
9	Czech Republic	240	82%
10	Austria	201	63%
11	Bulgaria	184	94%
12	Romania	177	24%
13	Fmr Yugoslavia	74	-
14	Greece	74	92%
15	Switzerland	18	17%

Table 1. Major European Consumers of Russian Natural Gas, 2004 (Sources: EIA, BP 2005, CIS and E. European Energy Databook, 2005)

There are quite many petroleum companies in Russia and most of them are private. The largest companies are the following: Gazprom, Lukoil, TNK-BP, Surgutneftegaz, Sibneft, Slavneft, Tatneft, Rosneft, Bashneft (Expert RA, 2005).

Thus it is possible to conclude that Russia is one of the largest net energy exporters in the world with total energy production exceeding domestic consumption by a large margin.

4.1.4. Petroleum activities in the North an the Barents Sea

The Russian part of the Barents Sea is a very perspective and rich area in terms of petroleum resources. One of the most important sources of future carbohydrates production is the Shtokmanovskoe field. This field was discovered in 1988. It is situated in the central part of the Barents Sea on the depth of 280-360 meters and on the distance of 550 kilometres north-east from Kola Peninsula (Rosshelf). According to data from the Gasprom website, explored reserves of this field are the following: gas – about 3,2 trillions cubic meters, natural gas liquids – about 31 millions tonnes. The planned production output will be about 67,5 milliards cubic meters of gas per year (Gazprom).

According to the Gazprom website there are several options for the arrangement of production activities on the Shtokmanovskoe field:

- submarine production facilities and pipelines
- surface platform and submarine pipelines.

There are also different options for the location of the gas liquefying plant on shore of the Kola Peninsula, including a solution with a floating plant.

The production phase is planned from 2010 onwards and maximum output should be reached by 2011-2012.

Another perspective petroleum source in the North of Russia is the Prirazlomnoe field which is situated in the Pechora Sea. This area is very close to the Barents Sea (see fig. 8).

Fig. 8 The Barents Sea and Pechora Sea region (Source: http://maps.grida.no)

The Prirazlomnoe field is 60 kilometres away from the settlement Varandej (Nenec okrug/region), 950 kilometres from Arkhangelsk and 1025 kilometres from Murmansk (Oil and Capital, 2002-2006). It was discovered in 1982 and has about 218,2 million tonnes of extractable oil resources (Rosneft). The license for this field belongs to JSC "Sevmorneftegaz" – a joint company of "Gazprom" and "Rosneft". The exploitation started in 1986 and the dynamic of exploitation is shown in fig. 9.

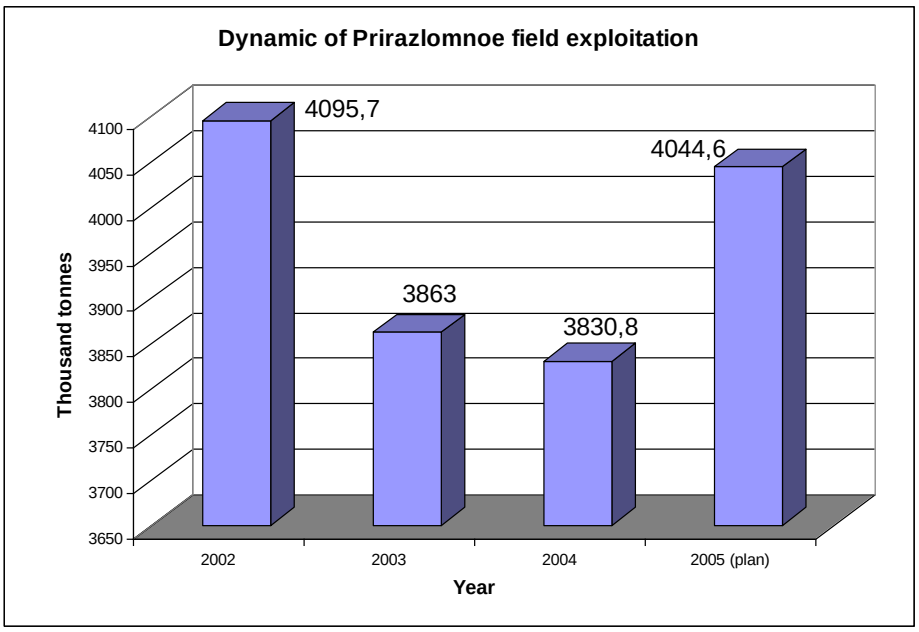

Fig. 9 Dynamic of Prirazlomnoe field exploitation (Source: Rosneft)

The Prirazlomnoe field is the first large offshore petroleum project in the Arctic region of Russia, and according to the words of Mr. Chernov – general director of JSC "Sevmorneftegaz" – it has no precedents in the world (2005).

The ice-resistant platform that is modernized from the ex-Norwegian platform Hutton TLP will be towed to Murmansk oblast in may 2007 for concreting and then it will be installed on the drilling point with a depth of about 20 meters (2005). The full-scale oil-production will start after this moment. Transportation will be carried out by means of special ice-resistant tankers with assistance of atomic ice-breakers. The oil terminal (floater) will be situated in Murmansk oblast (2005).

This project will be analysed from an environmental point of view in chapter 7.

4.2. Norway

The offshore oil and natural gas sector of Norway is the most important source of revenue and the major contributor to the country's GDP. In 2005, oil and gas made up 25 percent of GDP, 52 percent of total Norwegian export and 33 percent of government revenues (Ministry of Petroleum and Energy of Norway). It makes Norway highly dependent on natural resources and presents long-term challenges for the country. Many industry analysts say that the North Sea oil and gas fields are already far beyond the point of maturity (EIA). It means that to increase or even keeping the production level requires new sources of carbohydrates. This issue is of vital importance for Norway as a country.

4.2.1. Oil reserves

According to Oil and Gas Journal (OGJ), Norwegian proven oil reserves as of January 2005 were about 8,5 billion barrels, which is the largest in Western Europe (EIA). The Norwegian Continental Shelf (NCS) contains the major share of all carbohydrates. NCS consists of three parts: the North Sea, the Norwegian Sea and the Barents Sea. The North Sea and the Norwegian Sea provide the main production fields, but the Norwegian government has already begun to grant licenses to blocs in the Barents Sea (EIA) in spite of the high costs and environmental concerns related to activities in this area.

4.2.2. Oil Exploration and Production

Norwegian oil production experienced considerable growth from the early 1970s and until the mid-1990s but has levelled off in recent years (see figure 10). During the first six months of 2005, Norway's oil production was about 2,95 million bbl/d (EIA). Most likely the North Sea production will remain steady or decline, so the main expectations are now associated with the Barents Sea.

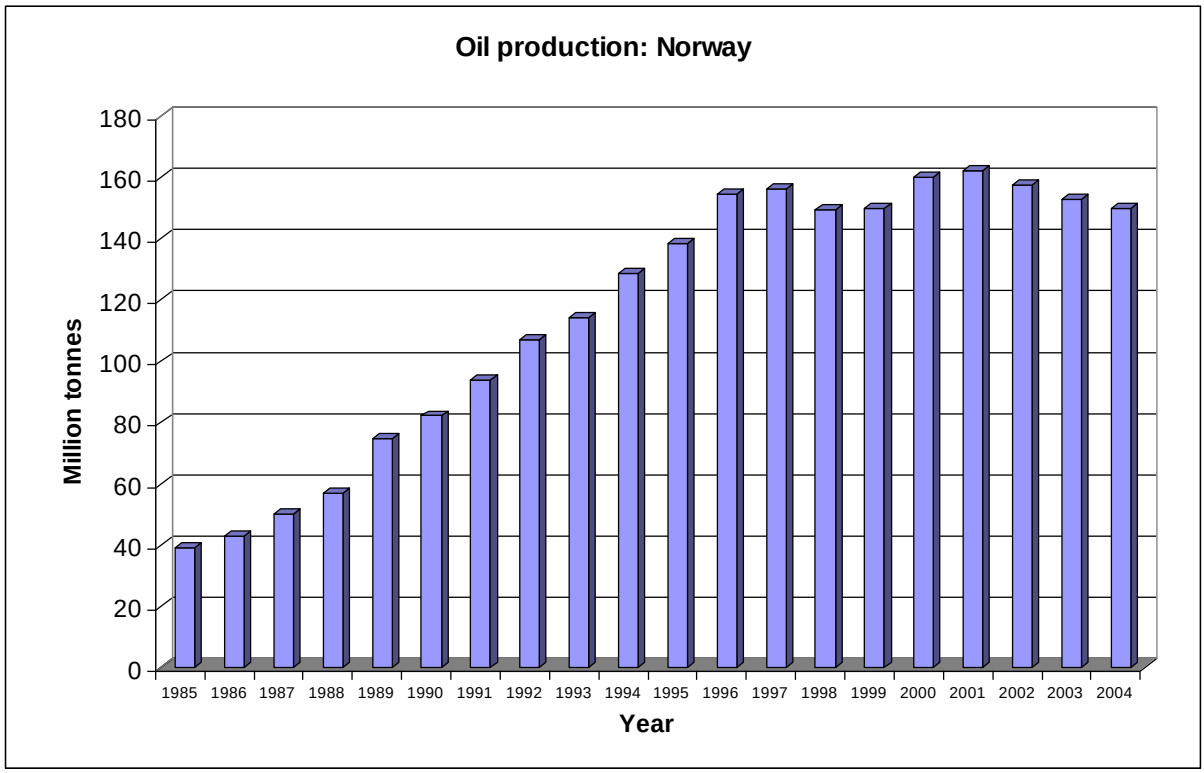

Fig. 10. Oil production in Norway (Source: BP)

The main production field of Norway is operated within the Troll complex of Norsk Hydro. It produced about 306,000 bbl/d in 2004 (EIA). Ecofisk (ConocoPhillips), Snorre (Statoil), Oseberg (Norsk Hydro), and Draugen (Shell) are among the other important fields. The key oil producers of Norway are presented in figure 11.

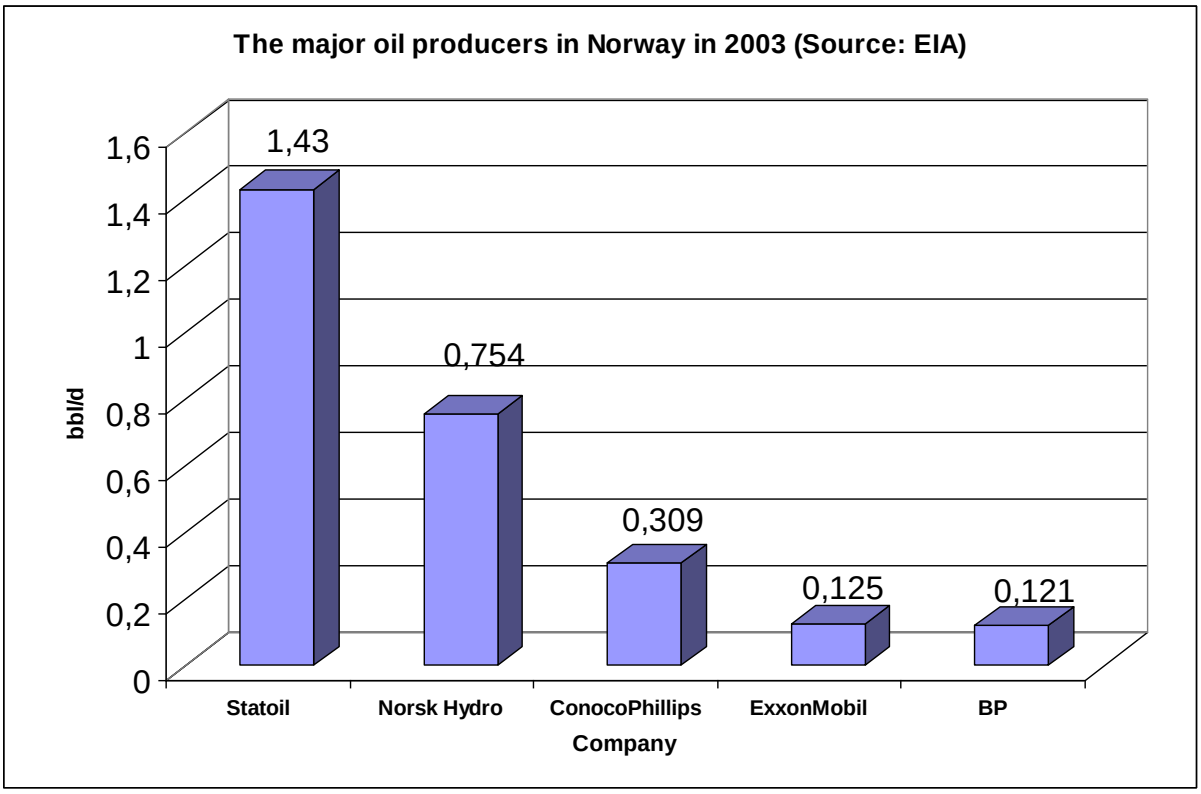

Fig. 11. The major oil producers in Norway (Source: EIA)

Norwegian oil production is largely exported whereas only about 244,000 bbl/d was consumed for own needs in 2004 (EIA). Thus, Norway was the third-largest net oil exporter in the world, behind Saudi Arabia and Russia in 2003 (EIA). The most important customer of Norway is the United Kingdom, which purchased 814,500 bbl/d or 34 percent of Norway's total exports (EIA). Netherlands, the United States, and Germany are also significant markets for Norway (see fig. 12).

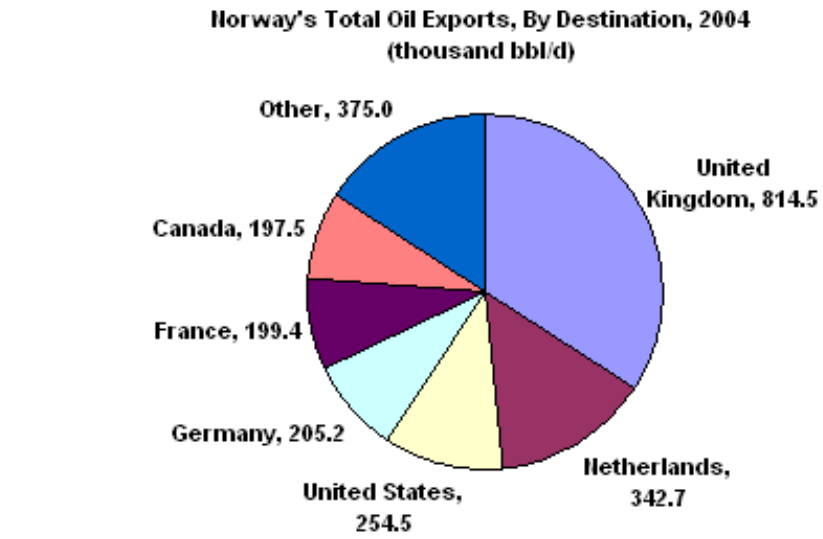

Fig. 12. Norway's Total Oil Exports by Destination in 2004 (Source: Statistics Norway).

4.2.3. Gas reserves and production

Norway's proven natural gas reserves made up about 73,6 trillion cubic feet (Tcf) in January 2005 (Oil and Gas Journal) and constitute more than half of the country's hydrocarbon reserves. As in the case of oil, the major sources of gas are situated in the Norwegian Continental Shelf. The country occupies the eighths position among the world's largest gas producers with an output of about 2,59 Tcf in 2003 (EIA, see also fig. 13). Since the domestic consumption is very low (about 146 billion cubic feet (Bcf) in 2003 - EIA), Norway was the third-largest net exporter of natural gas in 2003, behind Russia and Canada (EIA).

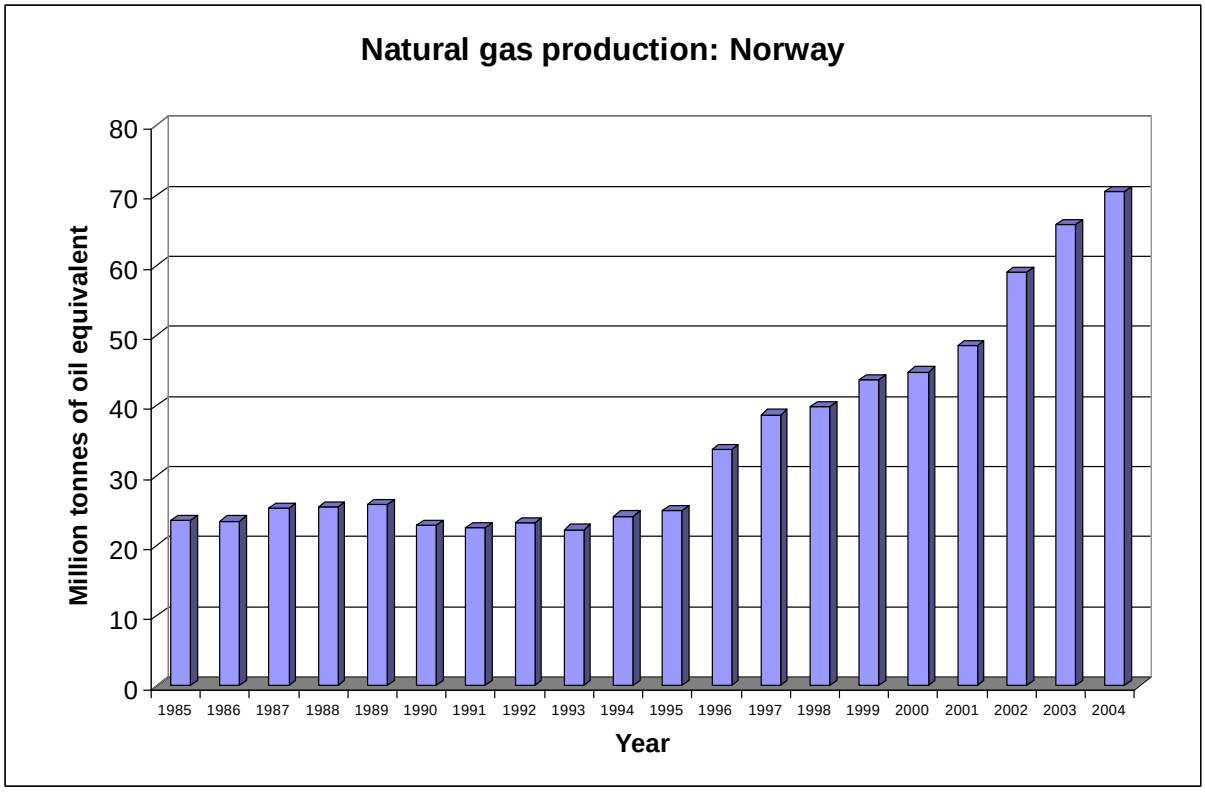

Fig. 13. Natural gas production in Norway (Source: BP)

The main gas producing companies in Norway are Statoil and Norsk Hydro. International companies as ExxonMobil and BP also operate on the NCS in partnership with Statoil or Norsk Hydro. Four fields composing more than 70 percent of Norway's total gas production are presented in figure 14.

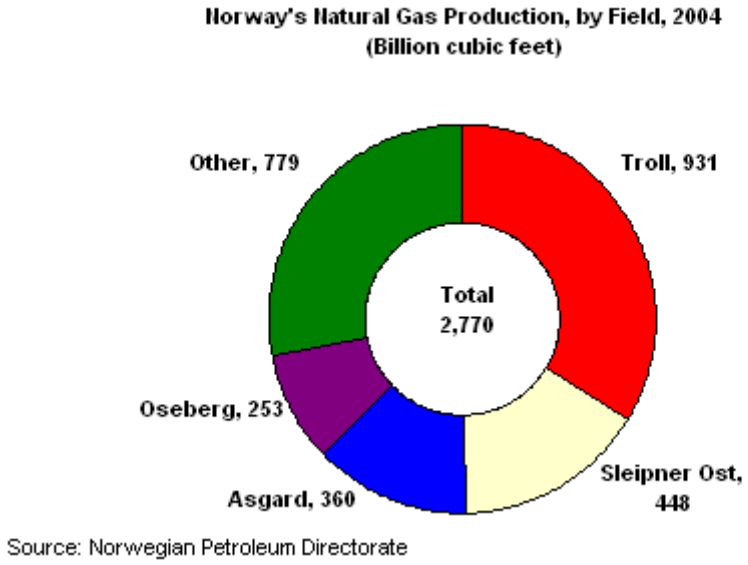

Fig. 14. Norway's Natural Gas Production by Field in 2004 (Source: Norwegian Petroleum Directorate).

It is necessary to point out that gas fields in the North Sea are rather mature, but nevertheless Norway is keeping annual increase of production thanks to new fields such as Kvitebjorn with 710 million cubic feet per day (Mmcf/d) expected production level (EIA). Halten Bank West is Statoil's project with estimated reserves of 1,2 Tcf (EIA). The Ormen Lange field in the North Sea is operated by Norsk Hydro and holds about 14 Tcf of recoverable reserve and will have a full production capacity of 710 Bcf per year (EIA). The Barents Sea is presented by Statoil's Snohvit project with an estimated 5,7 Tcf of proven natural gas reserves (EIA). Snøhvit consists of three gas fields (Snøhvit, Albatross, and Askeladd) connected by submarine pipelines that transport the gas to an onshore facilities near Hammerfest. Here the beginning production phase will start in 2007 (Statoil-EIA).

The main markets for Norwegian gas are situated in the EU. Thus, Norway is the second-largest supplier of EU, behind Russia. The volume of export is about 2,0 Tcf of natural gas in 2004 (EIA). The most important customers are Germany, followed by France, the United Kingdom, and Belgium.

Thus, Norway is one of the important energy producers and the greatest offshore oil producer in the world due to its crude oil export, but gas export tends to grow rapidly and is expected to be more and more significant in the near future.

4.2.4. Petroleum activities in the Barents Sea

The Barents Sea was opened for petroleum exploration in 1989. Until the first quarter of 2006, 41 exploration licenses were distributed and 64 wells bored. The gas field Snøhvit which is situated near Finnmark, is the only field ready for production. The exploration of petroleum resources in the Norwegian sector of the Barents Sea is only in the beginning but expectations about the volumes are very high, as shown figure 15. The graph indicates that the Barents Sea has considerable potential in terms of petroleum resources.

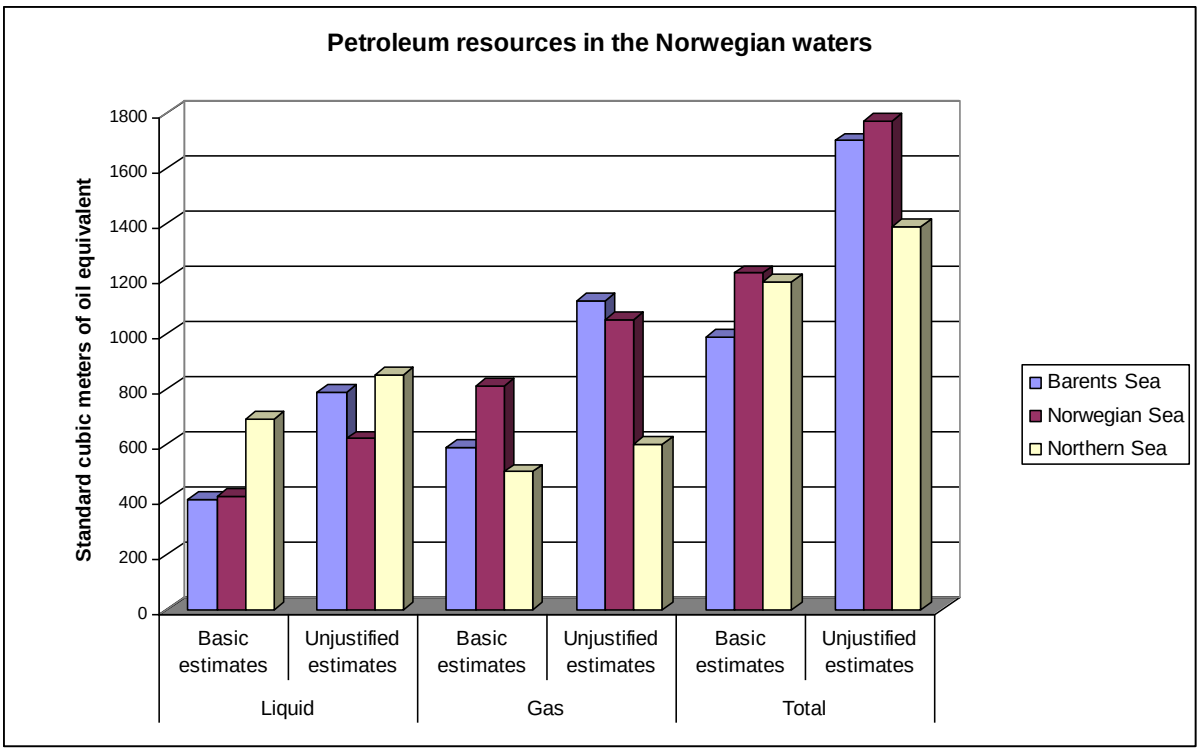

Fig. 15. Petroleum resources in the Norwegian waters (St.meld.nr.8 2005-2006).

According to the Storting report № 8 there are about 35 percent of undiscovered resources on the NCS are expected to be in the area of Lofoten and the Norwegian part of the Barents Sea.

5. CHAPTER
THE MANAGEMENT SYSTEM OF THE PETROLEUM SECTOR IN NORWAY

This chapter is dedicated to the description of the natural resource management system in Norway. The following issues will be covered:

- The basic laws
- Public bodies involved
- Milestones, necessary requirements and permissions on the way from opening of fields, starting of drilling, starting of operations, during operations and final close-down
- Other framework conditions

5.1. Oil and Gas Sector of Norway: general description

The main distinguishing feature of the Norwegian oil and gas sector organization is that the government controls the major part of the activities. Moreover, the Norwegian state is the main stakeholder in such companies as Statoil with 71 percent of the shares and Norsk Hydro with 44 percent of the shares (EIA). Another management instrument is the State Direct Financial Interest (SDFI) that provides direct ownership over about 40 percent of the country's oil production (EIA). Petoro is the state owned organization responsible for the administration of these ownership interests but the management of actual production from SDFI assets is taken care of by Statoil.

In spite of the fact that the Norwegian state and companies have dominant positions in the national oil and gas industry, companies from other countries have the chance to work in the NCS but as a rule they should do it in partnership with Norwegian companies (e.g. Statoil). ConocoPhillips, ExxonMobil, and BP can be mentioned among the largest foreign oil producers in Norway (EIA).

Norway shares the sea regions with different countries so it must coordinate efforts in activities related to carbohydrates production with its neighbours. For example, United Kingdom is partner in the North Sea and Russia – in the Barents Sea.

Currently, main attention is paid to developing new fields in order to keep the production level and satisfy customer's demands. This is why the Norwegian government distributes blocks of unexploited areas and discovered reserves during licensing rounds. For example 46 blocs got their licensees in June 2004 during the 18th licensing round. The next

19th round was in June 2005 and 64 blocs were distributed, something which indicates the increasing interest of government in developing new sources of carbohydrates. Another important feature of this round is that the blocs from the Norwegian and Barents Seas were in the focus although no licences have been granted in the Barents Sea since 1996 (EIA).

5.2. Norwegian resource management model

As it is clear from the previous chapter, the petroleum sector is the largest Norwegian industry and it makes important contribution to economic growth and supporting the Norwegian model of social-oriented state.

The first step in the process of making Norway an oil producing country was the establishment of the right on the area that is now called Norwegian Continental Shelf (NCS) in 1963.

The era of Norwegian petroleum industry began in 1969 with the Ekofisk field discovery . The 9th of June 1971 became the date when the production phase started .

According to the national legislation, Norway's oil and gas resources are the property of the Norwegian people and must be managed in a way that ensures maximum benefit both today and in the future. This fact determines the structure of the Norwegian resource management system where the key role is played by the state. The Norwegian state regulates the industry through legislation, administrative procedures, direct and indirect taxes, and direct ownership, and it saves and redistributes revenues to serve the needs of society.

In order to guarantee the most beneficial way of development the NCS has been opened up gradually, i.e. only certain amount of areas (blocks) have been opened for exploration and production activities in every licensing round.

Initially, foreign companies played the main role on the NCS but over time the national involvement has become dominant due to the establishment of the state petroleum company Statoil.

The present Norwegian resource management model pays a lot of attention to the predictability and transparency of the oil-companies' activities. This is important for ensuring that the value created is beneficial for the whole society, including environmental and safety considerations. Hence, there is a division of responsibilities where the oil companies fulfil the actual (technical) operations on the NCS under constant control of the authorities. This is achieved by means of an obligation to present different kinds of applications and plans to the

state bodies for approval. In such a way authorities are able to prevent any actions from the oil-companies that are harmful or do not correspond to government objectives.

The generalized and simplified scheme of approval process is presented in the figure 16.

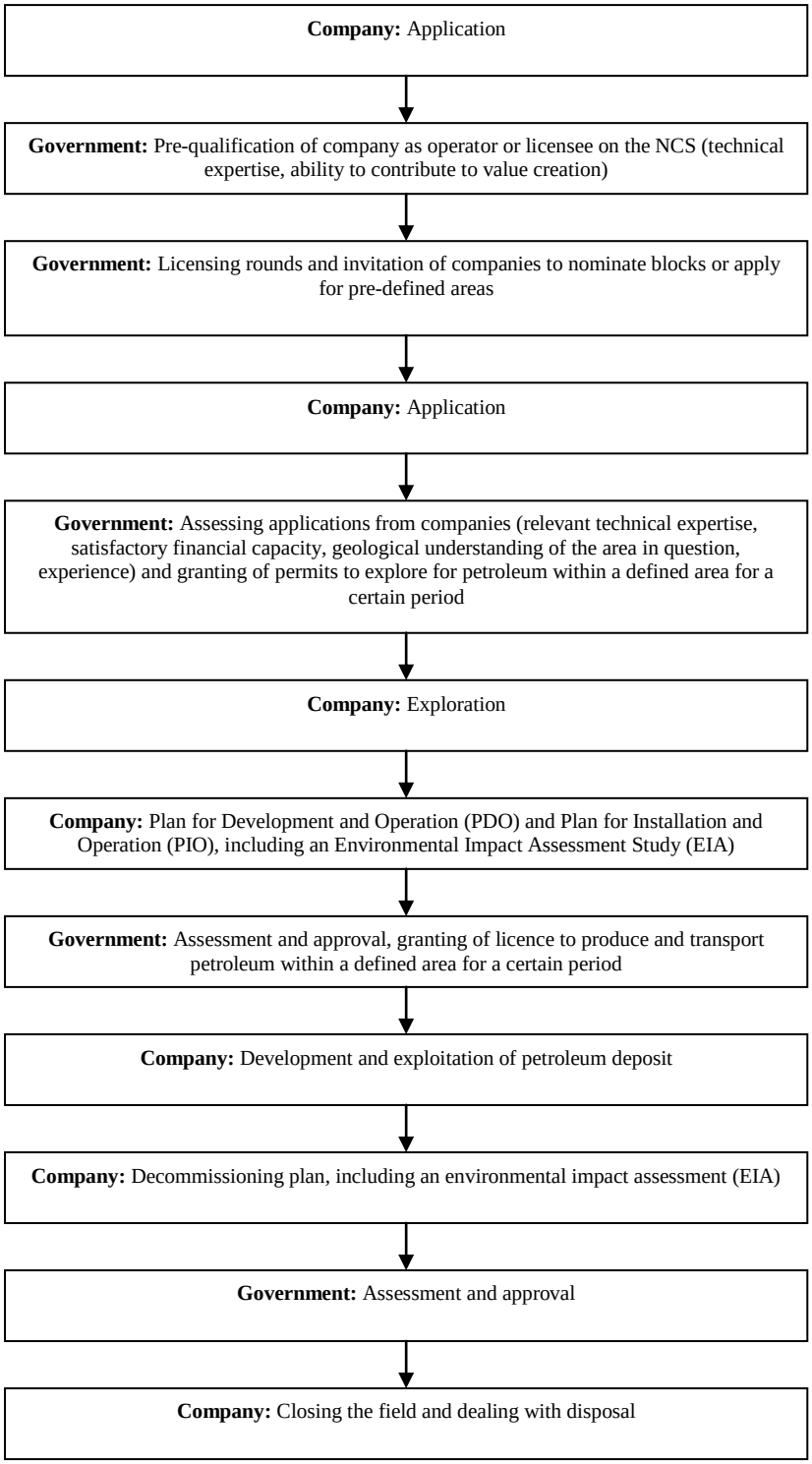

Fig. 16. Algorithm of approval of the oil exploitation in Norway

These stages will be mentioned in the description of the main Norwegian legislative acts related to petroleum industry.

Another important feature of the Norwegian natural resource management system is how competitive and cooperative efforts are combined in the resource exploitation. Production licenses are usually awarded to a group of companies rather than only one company. The following requirements should be met by the applicants: understanding the geology, technological level, financial strength and the experience. Choosing several companies for working on the same field allows combining the best competence available. It is obvious that one company can be good at one kind of processes whereas the other company can be good at something else. Thus the Ministry of Petroleum and Energy organizes licensee group where the oil companies are suppose to share their competence, costs and revenues associated with the production licence. Moreover, such groups create built-in control mechanisms for operator's production license.

It should also be mentioned that the Norwegian authorities actively try to stimulate innovations and technology development in the field of oil and gas exploitation in order to maximise the values on the NCS.

5.3. Structure of the Norwegian petroleum sector

The general structure of the Norwegian petroleum sector is presented in figure 17. This structure displays the leading role of the state in the decision making process and the priorities that guide this process.

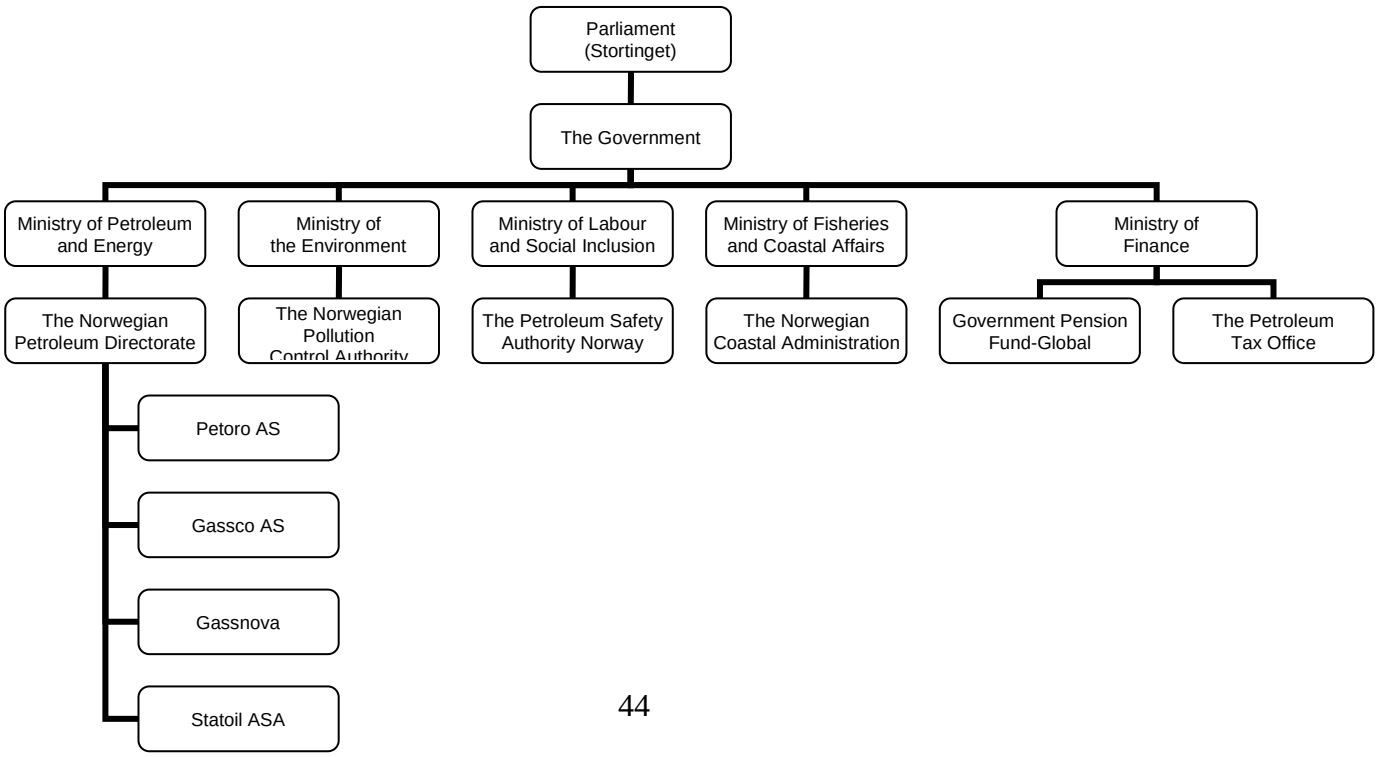

Figure 17. Organisation of the petroleum sector in Norway (Source: Ministry of Petroleum and Energy of Norway)

The vertex of the pyramid is the Storting or Norwegian parliament, which represents the legislative branch of state power. The responsibility of this body is creating the framework for petroleum activities. This is achieved by means of:

- passing legislation,
- adopting propositions,
- discussing and responding to white papers about petroleum activities.

Another important function of parliament is the supervision of the government and the public administration .

The Norwegian government represents the executive branch of state power and is responsible for preparing and implementing the rules that are set by the parliament. Thus the government is accountable to the Stortinget for conducting proper petroleum policy that corresponds to defined guidelines. This job is shared between the bodies presented in table 2, which also shows their areas of responsibility.

Governmental body	Area of responsibility
The Ministry of Petroleum and Energy	Resource management and oil sector as a whole
The Ministry of Labour and Social Inclusion	Health, the working environment and safety
The Ministry of Finance	State revenues
The Ministry of Fisheries and Coastal Affairs	Oil spill contingency measures
The Ministry of the Environment	External environment

Table 2. Areas of responsibilities in resource management of Norwegian governmental bodies (Source: OED).

As indicated in figure 17, the Ministry of Petroleum and Energy has subordinate body – The Norwegian Petroleum Directorate. Moreover, the ministry takes part in the management of the state-owned corporations Petoro AS, Gassco AS and Gassnova, and the company with state participation Statoil ASA. The areas of their business activities are presented in table 3.

Company	Area of business activity
Petoro AS	State's Direct Financial Interest (SDFI)
Gassco AS	Transport of natural gas from NCS
Gassnova	Promotion and supporting innovation and development of environmentally friendly gas power technology
Statoil ASA	Carbohydrates production

Table 3. Description of the state-controlled companies involved in oil-sector (Source: OED).

The Norwegian Petroleum Directorate (NPD) plays a key role in carbohydrates activities by serving as the most important advisory body for the Ministry of Petroleum and Energy. NPD is responsible for the normative support and decision-making process in petroleum activities including exploration and exploitation of carbohydrate resources.

5.4. Main normative acts

The basic legislative document that regulates carbohydrates activities in Norway is the Petroleum activities Act (Act 29 November 1996 No. 72).

The other normative documents that should be mentioned are the following:

1. Acts:

- Scientific research act - act of 21 June 1963 No. 12 relating to scientific research and exploration for and exploitation of subsea natural resources other than petroleum resources.
- CO_2 discharge tax act - act 21 December 1990 no 72 relating to tax on discharge of CO_2 in the petroleum activities on the continental shelf.
- Pollution Control Act - act of 13 March 1981 No.6 concerning protection against pollution and concerning waste, most recently amended by Act of 20 June 2003 No.45.
- The planning and building act - act of 14 June 1985 No. 77 is "intended to facilitate coordination of national, county and municipal activity and provide a basis for decisions concerning the use and protection of resources" (quotation from the section 2 of this act), with amendments in force 1 April 2005.

2. Royal decrees

- Scientific research - regulations relating to scientific research for natural resources on the Norwegian continental shelf etc.
- Petroleum register - regulations relating to the Petroleum Register.
- Petroleum activities - regulations to Act relating to petroleum activities

- CO_2 tax interests - regulations relating to interest on repayment of overpaid amounts of CO_2 tax.
- Norm price fixing - regulations relating to norm price fixing.
- Fishermen-compensation - regulations to Chapter Vl of the Petroleum Act relating to compensation to fishermen.
- Fishing time - compensation - regulations relating to compensation to fisher-men for fishing time lost as a result of localization, recovery and transportation to shore of litter not originating from petroleum activities.
- Facilities - use by others - regulations relating to the use of facilities by others for the production, transportation or exploitation of petroleum.
- Refunding - regulations relating to refunding of expenses in connection with regulatory supervision of safety, working environment and resource management in the petroleum activities.
- Stipulation of tariffs - regulations relating to the stipulation of tariffs etc. for certain facilities (mainly relating to pipeline networks).

3. NPD regulations

- Resource management regulations - provide supplementary provisions within the areas under the Petroleum Act and the Petroleum Regulations which have been delegated to the Norwegian Petroleum Directorate.
- The measurement regulations - forming the basis of the calculation of taxes, royalties and fees etc. to the Norwegian state, including the CO_2 tax, and the income of the licensees.

There are numerous other sources like standards, thematic guidelines and other more detailed normative documents but it is impossible and not necessary to mention them all here.

5.5. Norwegian Petroleum activities Act

The Norwegian Petroleum activities Act document highlights the general principles of the carbohydrates management system in the country.

According to this document the state has the exclusive right to subsea petroleum deposits and resource management. The main role in resource management belongs to the king who should be guided by the Petroleum Act and the Storting's decision. The most important long-term purpose of the resource management is the benefit of the Norwegian society as a whole.

The Petroleum act sets the obligation of licensing of any petroleum activity. There are the following types of licenses: exploration and production. The exploration licence gives the non-exclusive right to conduct exploration activities and it does not guarantee granting production licences. A production licence gives an exclusive right to exploration, exploration drilling and production of petroleum deposits in certain areas.

The important requirement of the Petroleum act is that it sets the obligation to perform an assessment of the consequences of the petroleum activities for trade, industry, the environment (possible risks of pollution), and the economic and social effects that may be a result of the petroleum activities. It should be done before opening of new areas and granting production license. Another detail is that interests of local societies (business, government and others) should be taken into account and all interests group should get relevant information through public announcement.

Norwegian offshore areas are divided into blocks and the act regulates standard size of them.

The Act sets the rule to make application process transparent by means of the public announcements about opening new areas and granting production licenses.

The possibility of state participation is included in the Petroleum Act and depends on the decision of King.

The chapter 4 of the Act requires choosing such technical solutions and economic principles that suppose waste avoidance during the petroleum production cycle. In order to be sure that the future activities will be conducted in proper manner, the licensee should submit to the Ministry a plan which should include economic, resource, technical, safety, commercial, and environmental issues. The plan should have description of decommissioning measures after finishing of petroleum activities. The Ministry has the right to require more detailed assessment of environmental consequences. No works can be started before the plan is approved by the Ministry. Any changes should be also approved by the government.

Chapter 5 "Cessation of petroleum activities" requires submission the decommissioning plan by licensee for approval by the Ministry. This plan should be presented at the latest two years prior to the time of finishing of production activities. The government should make a decision based on the evaluation of technical, safety, environmental and economic issues as well as to take into consideration the interests of other users of the sea. The same chapter sets the liability of the licensee or owner of the facilities for damage or inconvenience caused by decommissioning measures. The state can also participate in these measures with an agreed financial compensation from licensee or owner.

Chapter 7 "Liability for pollution damage" defines the areas which are applicable to liability and imputes the responsibility for pollution damage on the licensee without regard to fault. The liability of licensees can be applied correspondingly to an operator or the party that has conducted the petroleum activity.

Chapter 8 of the Act is "Special rules relating to compensation to Norwegian fishermen". In other words, according to the Norwegian legislation the interests of the fishing industry should be taken into account by the petroleum industry. Thus, any kind of petroleum activities that occupy fishing fields, lead to pollution and waste or damage caused by a facility, and cause financial losses for fishermen should be compensated. In case of fishing grounds occupation the State should recover fishermen's financial losses and has the right to claim these money from the licensee. The licensee is liable for any pollution and waste from petroleum activities as well as if the petroleum facility cause damage.

Special attention is paid to the safety issues in the 9th chapter of the Act. It requires keeping high level of safety, avoidance and preparedness to emergency situations such as pollutions, as well as competence and employee training. In case of emergency the Ministry has the right to mobilize all necessary resources at the account of the licensee. Safety zones should be introduced around potentially dangerous petroleum facilities. The petroleum activities can be suspended if accidents take place. All safety documentation of licensee should be approved by the Ministry as part of the regulatory safety supervision.

Thus, it is possible to see that the Norwegian Petroleum Activities Act gives quite comprehensive description of all aspects that can be relevant for environment and fishery.

5.6. CO_2 discharge tax

Another important legislative document is "CO_2 Discharge Tax" Act with effect from 1 January 1991 (OED).

It is well known that CO_2 emission can lead to such consequences as

- greenhouse effect that is on of the reasons for climate change
- dissolved in water CO_2 can cause a reduction of the pH value in the sea.

Both effects can be destructive for marine biosystems or change them in unpredictable way.

Hence, the CO_2 Discharge Tax Act establishes another instrument of pollution control directed at the petroleum industry. According to this Act oil companies should pay for CO_2 gas emission that is result of the petroleum burning and natural gas discharge from the petroleum activities. As of 1 January 2006, the CO_2 tax is about NOK 330/ tonne CO_2 (OED).

The document defines the areas that fall under regulation. It is explained that the tax does not reduce the amount of production fee that depends on produced petroleum. In other words, this tax should facilitate introduction of modern technologies that minimize CO_2 emission in the environment. It is not allowed to burn more than necessary for keeping safety of normal operation without consent from the Ministry of Petroleum and Energy.

5.7. Pollution Control Act

The Pollution Control Act (Act of 13 March 1981 No.6, amended by Act of 20 June 2003 No.45) is one of the corner-stones of the Norwegian resource management system. It is aimed at preventing and reducing negative consequences from pollution of environment. According to the document pollution is prohibited, unless it is permitted by law, regulation or individual permits (MVD). Thus almost all pollution activities in Norway may be carried out only after individual permission or licensing of the Norwegian Pollution Control Authority or the county environmental agencies (MVD). The 4th paragraph of the act states that it is also applicable to activities on the Norwegian continental shelf.

Thus the pollution control authority has the right to require an environmental impact assessment from the company that is planning to start petroleum activity in certain area. The environmental impact assessment includes the aspects that are mentioned in quotation from the act that is displayed on figure 18.

1. Which types of pollution the activity will generate during normal operations and in the event of all conceivable types of accidents, and the likelihood of such accidents,
2. What short- and long-term effects the pollution may have. If necessary, studies shall be made of natural conditions in the areas that may be affected by pollution. In particular, it shall be ascertained how pollution will affect people's use of the environment and who will suffer particular nuisance as a result of pollution,
3. Alternative locations, production processes, purification measures and ways of recovering waste that have been evaluated, and reasons for the solutions chosen by the applicant,
4. How the activity will be integrated into the general and local development plans for the area, and if relevant, how it will restrict future planning.

Fig. 18. Standard content of environmental impact assessment (Source: Pollution Control Act)

The 14th paragraph of the act establishes the right for any person to examine the results of environmental impact assessment. In other words, the environmental impact statement is a public document. Moreover, public hearings should be organized in order to discuss the possible consequences of activity that can cause damage.

The same document describes duties and responsibilities in case of acute pollutions. The chapter 6 of the act states that it is necessary to have emergency response systems and contingency plans which are approved by the pollution control authorities.

Chapter 8 of the document establishes the rules of compensation for pollution damage. These rules apply within the Economic Zone of Norway. Chapter 10 states the criminal liability for pollution.

5.8. Environmental considerations in the petroleum sector of Norway

All information presented above allows to make the conclusion that environmental consideration is an integral part of Norwegian legislation. It is possible to see that the state has various policy instruments which are employed in order to protect environment and minimize the risks from petroleum activities at every stage:

- licensing rounds
- exploration
- development
- operation
- decommissioning.

As already mentioned, the petroleum activities are regulated by means of the Petroleum Act, the CO2 Tax Act and the Pollution Control Act. The procedure of approving new projects is the most important tool that makes it possible to control and ensure that petroleum activities are performed in an environmentally friendly way.

The White Paper № 58 (1996-1997) Environmental Policy for Sustainable Development to the Storting establishes the objective of zero environmentally dangerous discharges to sea from petroleum activity. This objective is based on a precautionary approach that is employed to minimize or exclude unacceptable risks to health and environment from pollution of sea by, for instance, petroleum activities. One of the instruments for achieving this is mandatory comprehensive assessment of the consequences for the environment, costs, safety and reservoir aspects. This is one of the requirements to the companies on the

Norwegian continental shelf and the government expects them to apply the most advanced solutions for minimizing environmental consequences from petroleum production. Oil companies report about their steps in this direction and according to NPD discharges of environmentally dangerous chemical additives have been considerably decreased in recent years and there has been substantial improvement in the environment. NPD expects to get full effect of the measures in 2007 on all fields .

White paper № 58 (2003-2004) On the petroleum activities to the Storting defines special provisions for petroleum activities in the Lofoten-Barents Sea area. This area is recognized as particularly vulnerable. Hence, stricter requirements should be imposed than those that exist for other parts of the continental shelf (OED).

Another instrument of sea-discharges control is a database jointly introduced by the Norwegian Pollution Control Authority, the Norwegian Petroleum Directorate and the Norwegian Oil Industry Association (OED). This database contains information about all discharges to sea and emissions to atmosphere from the petroleum activities. The operators on the Norwegian continental shelf have been reporting their pollution values directly to the database since 2004 (OED). This helps to make more precise analyses and to plan measures to minimize pollution.

As mentioned before, the CO_2 Discharge Tax Act is among the instruments of Norwegian environmental policy in the petroleum industry. It aims at introducing modern technology that can minimize CO_2 emission to the environment. Thanks to improved energy efficiency and flaring reduction the CO_2 emission per produced oil equivalent has decreased by about 21 percent from 1990 to 2004 (OED). But the problem is that mature oil fields are more energy demanding. Since most Norwegian fields are close to maturation or mature this leads to larger CO_2 emission (OED). This explains why there has been some increase in CO_2 emission per unit in recent years – see figure 19 (OED).

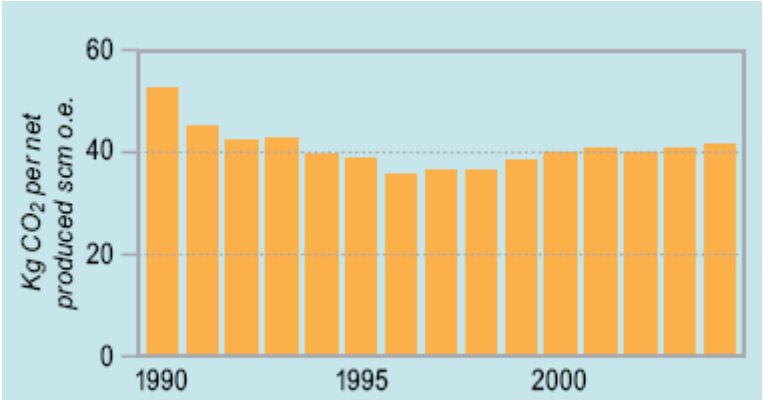

Fig. 19 Emissions of taxable CO_2 per produced unit (Source: Norwegian Petroleum Directorate)

Nevertheless, this example shows that one of the instruments of the Norwegian environmental policy is functioning.

The Norwegian government pays considerable attention to the problems associated with CO_2 emission and the goal is to reduce it as much as possible. In order to achieve this, Norway invests in modern technologies such as capturing, transportation and injection of CO_2. All these operations can form the chain that allows avoiding CO_2 emission in the atmosphere thanks to using it for increasing oil recovery and storing it in oil or gas reservoirs and geological formations (OED). The problem is that there are a lot of technological challenges that must be overcome. But nevertheless, according to some estimates such measures can reduce CO_2 emission by approximately 50 percent (OED).

Another positive effect from the chain derives from using the old oil and gas fields as the storage facilities. Apart from the CO_2 gas utilization it can help to minimize negative tectonic consequences caused by reservoir depletion. This environment-friendly technology will be integrated in the Snøhvit field exploitation in the Barents Sea. Approximately 700 000 tonnes of CO_2 from this area will be separated and stored in a reservoir 2 600 metres below the seabed (OED).

As is well known, mature fields require additional pressure support to maintain production level. Traditional ways of doing this include water or natural gas injection. CO_2 gas injection can be an alternative or supplement to the existing methods. At present time the introduction is difficult because of the considerable costs and some technological challenges.

All abovementioned facts prove that Norwegian authorities are aiming at integrating environment-friendly technologies in the management system of petroleum resources.

5.9. Management mechanisms in the Barents Sea

It was already mentioned that the Barents Sea area is very perspective in terms of petroleum resources, but its ecosystems are particularly vulnerable in the face of any kind of human activities. Norwegian authorities, acknowledging such distinguishing features of the area and understanding that the Barents Sea requires special approaches, took decision to develop a system of measures that will take into consideration all contradictory circumstances related to this northern region. The result of this work is "The comprehensive management of the marine environment of the Barents Sea and sea regions out of Lofoten" ("Management plan") that was proposed the 31st of March 2006 (St.meld.nr.8 2005-2006). This plan clarifies the framework for existing and perspective activities in the Barents Sea. Special attention is paid to the coexistence of fisheries, sea transport and petroleum activities. The main goal of this document is to introduce a comprehensive and ecosystem-based management system (MVD). This is meant to assure that any kind of activities should not produce effects that exceed the natural absorption ability of the environment. The goal is to maintain the structure, functionality and productivity of the ecosystems.

The main instruments of this comprehensive and ecosystem-based management are (MVD):

- area-based management, where measures and activities should be adjusted to characteristics of the area
- protection of the most valuable and vulnerable areas against negative influence, including acute oil-pollution
- reduction of inflow of different pollutant
- improving and intensifying of fishery management
- ensure the control of the state of environment in the area through better coordination and systematic monitoring
- improving the knowledge base through, among other things, better mapping and extended research.

All these measures are supposed to ensure that the nature will not suffer from any kind of human activities or at least the negative consequences will not exceed certain acceptable limits. The document underlines the importance of close cooperation with Russia for environment protection in the North.

Some practical measures related to environment protection against oil and gas industry activities are mentioned in the Storting management plan. For example, petroleum

production is not allowed in the following areas: Bjørnøya, ice edge and Polar front, coast zone along Troms, Finnmark, boarder with Russia and some other regions. No petroleum activities are allowed in Nordland VII and Troms II during the work of the present Storting assembly (until 2010). There will be a new evaluation after 2010 when more data about environmental impacts are obtained.

6. CHAPTER
THE MANAGEMENT SYSTEM OF THE PETROLEUM SECTOR IN RUSSIA

This chapter is dedicated to the description of the natural resource management system in Russia. The following issues will be covered:

- The basic laws
- Public bodies involved
- Milestones, necessary requirements and permissions on the way from opening of fields, starting of drilling, starting of operations, during operations and final close-down
- Other framework conditions

6.1. Oil and Gas Sector of Russia: general description

The oil and gas sector is one of the leading industries in Russia and the country heads the list of largest petroleum producers and exporters in the world. This can be explained by the fact that Russia possesses about one-third of the world's reserves of gas and from 6 to 13 percent of oil (Expert, 1997-2006). Export of petroleum resources is the most important source of income for the state budget, which makes it rather vulnerable and sensitive to petroleum price fluctuations. The Western Siberia is the major petroleum producer in the country and supplies about 68 percent of carbohydrates. The perspective areas for development after 2010 are the Timano-Pecherskaya province, the Kaspian Sea's (South of Russia) and northern (Arctic) seas' shelves, Eastern Siberia and Far East of Russia. The east of Russia is expected to give about 20 percent of production after 2020.

The period of growth in Russian petroleum industry began in 1999. This was due to the following factors:

- increasing national demand;
- increasing world prices for petroleum;
- decreasing costs of companies and their increasing competitiveness as the result of national currency devaluation.

It is significant that these positive changes were not the actual growth, but it was only recovery after crisis. The upswing was based on assets created in the old Soviet Union and was not the result of increased capital investments. Today, production volumes are 20 percent lower than they were in the former USSR (see fig. 20).

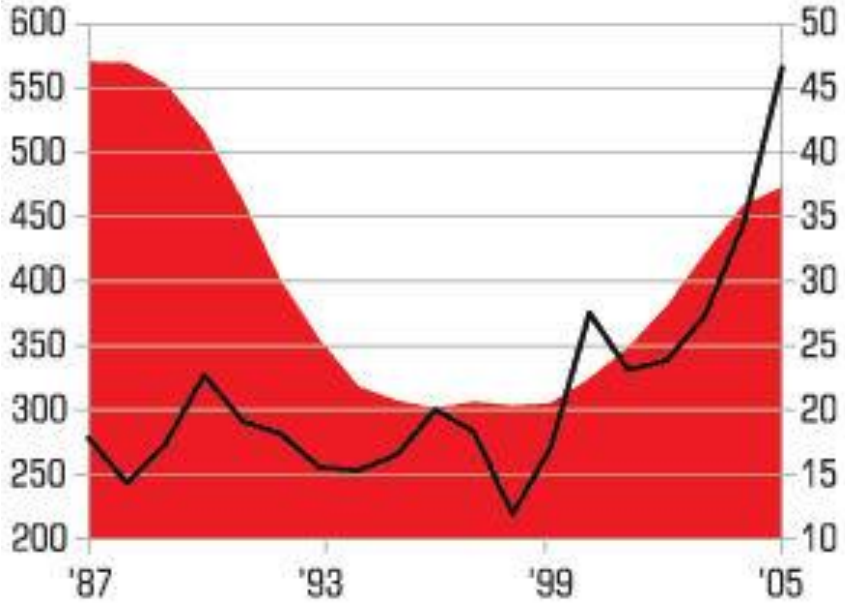

Fig. 20. Russian petroleum production (red, million tonnes) and world petroleum prices (right scale, USD/barrel). Source: Expert RA, 1997-2006

Moreover, some structural problems became clear. For example, the pipeline system was not ready for a sharp increase of export volumes. So, about 20 percents of oil has to be transported by alternative means like railways and rivers (Expert, 1997-2006). This is about two times more expensive than pipelines and economically rational only under high oil prices. Other big problems are effectiveness and petroleum reserves reproduction (see fig. 21)

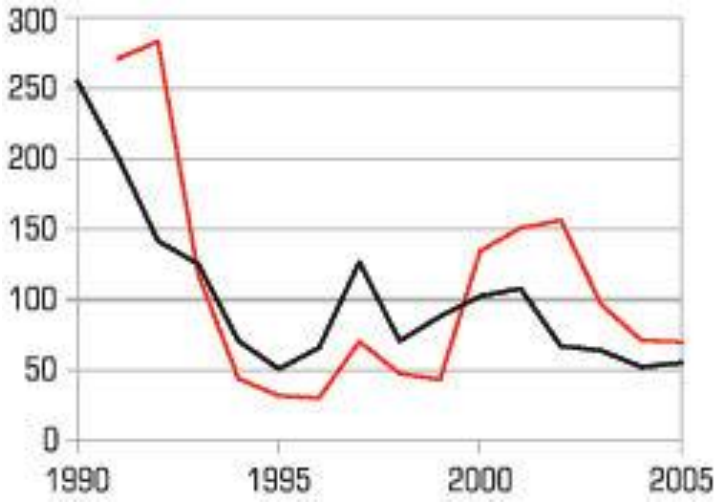

Fig. 21. Petroleum resources reproduction (reserves growth to production ratio) in Russia in percents (red – gas, black - oil). Source: Expert RA, 1997-2006

Because of the slump in geological explorations from the beginning of the last decade of the 20th century the petroleum reserves experienced considerable shrinkage. So, the most of the Russian petroleum companies have exploited resources discovered during the Soviet time.

The distinguishing feature of the Russian gas production sector before 2003 was the tendency to disintegration. Several small companies were established on the basis of Gazprom's assets such as "Itera", "Novatek", "Nortgaz". These "independent" producers had managed to get control over 30 percent of the gas reserves and they produced about 13 percent of gas in Russia to 2004 (Expert RA, 1997-2006). At present time, state controlled company Gazprom aims at integrating lost assets. Moreover, the company heads towards diversification by buying oil-producing assets like "Sibneft" company and try to acquire foreign companies to become a real international company.

6.2. Russian petroleum resource management model

The major role in Russian petroleum resource management system belongs to the state. Russia is a country with federal principles of organization. Power is divided into legislative, executive and judicial branches. The structure of the executive power is presented in figure 22.

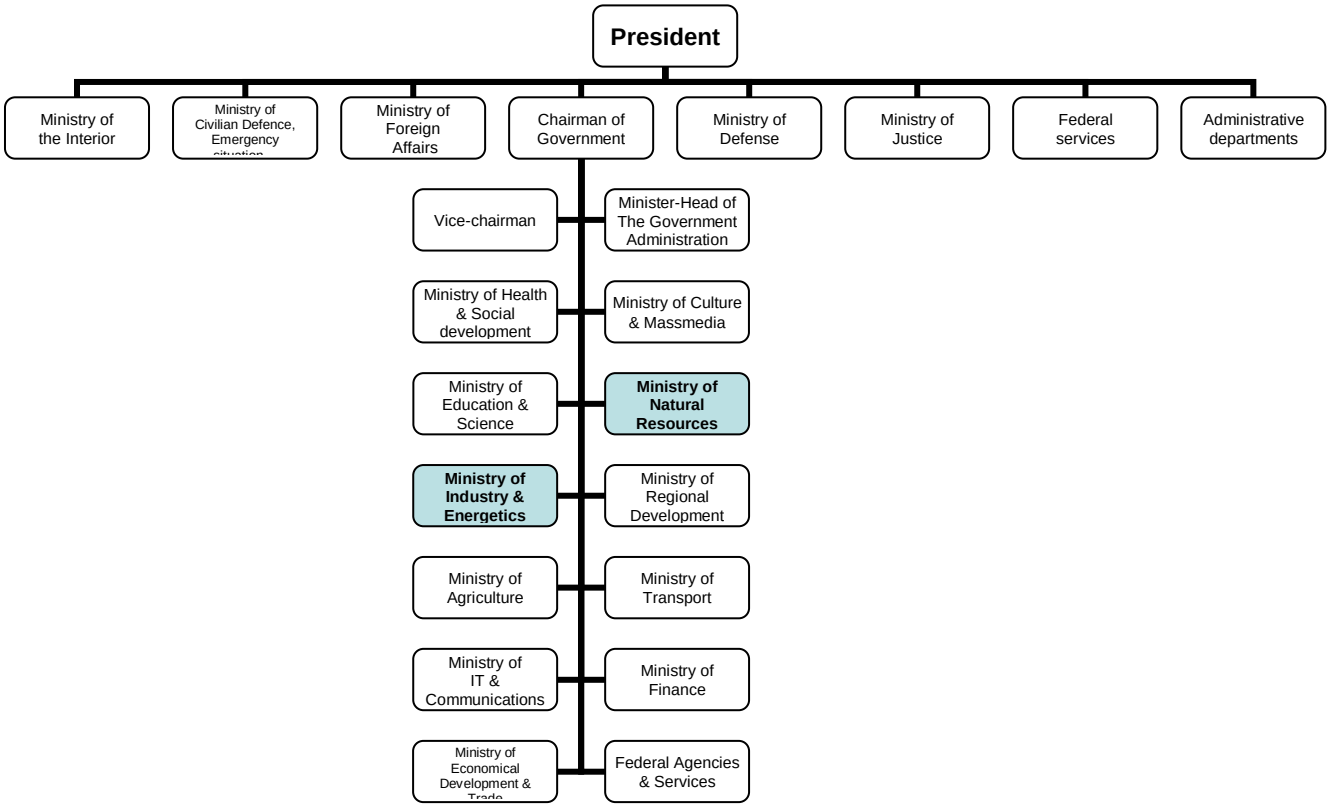

Fig. 22. Structure of Russian government (Source: official web site)

The structural unites directly responsible for petroleum resource management are marked with colour. These are the Ministry of Natural Resources and the Ministry of Industry & Energetics. The structure of the Ministry of Natural Resources is presented in figure 23.

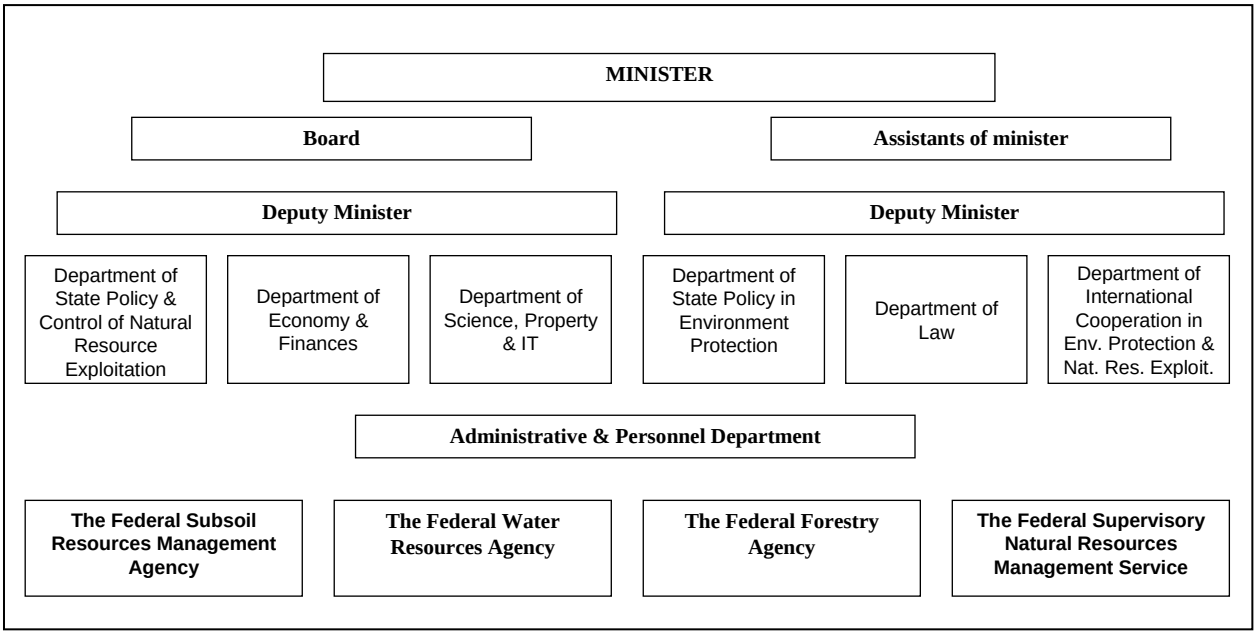

Fig. 23. Structure of the Ministry of Natural Resources of the Russian Federation (Source: official web site)

The Department of State Policy & Control of Natural Resource Exploitation is one of the most important units of the ministry. It includes the following sections:

1. Department of Water Resources Reproduction & Exploitation control
2. Department of Subsoil Resources of Continental Shelf, World Ocean, Arctic & Antarctic
3. Department of Investment Policy in Forestry & Water Resources
4. Department of Forest Resources Reproduction & Exploitation control
5. Department of Mineral Resources Reproduction & Exploitation control
6. Analytical Department.

The Department of State Policy in Environment Protection is another part of the Ministry of Natural Resources. It consists of

1. Department of Regulations for Specially Protected Natural Reserves
2. Department of Wildlife Rational Exploitation
3. Department of Regulations for State Ecological Expertise
4. Department of Bioresources & Sea Environment

The Ministry of Natural Resources of the Russian Federation has several agencies in its structure. One of them is the Federal Subsoil Resources Management Agency. It exercises a wide range of function such as

- organizes the appraisal of geological study projects;
- organizes tenders and auctions for the right to use the subsoil in accordance with the established procedure;
- registers applications for licenses, informs executive authorities of corresponding subjects of the Russian Federation about these applications;
- makes decisions on granting of the right to use subsoil sites;
- considers and approves project and technical documentation for development of mineral deposits.

Another part of the Ministry of Natural Resources is the Federal Supervisory Natural Resources Management Service. This unit is

- an authorized state body for environmental impact assessment within the specified scope of activity;
- a federal executive body exercising State environmental control (State ecological monitoring) in the specified scope of activity.

It exercises control and supervision:

- of the geological study, rational management, and conservation of the subsoil;
- of the observance of legislation of the Russian Federation and international rules and standards concerning the marine environment and natural resources of internal seas, the territorial sea, and exclusive economic zone;
- of the mineral and living resources conservation on the continental shelf;
- of the safety of hydraulic engineering structures.

The Ministry of Industry and Energetics of the Russian Federation is the important part of Russian petroleum industry management system. It consists of the units that are presented in figure 24.

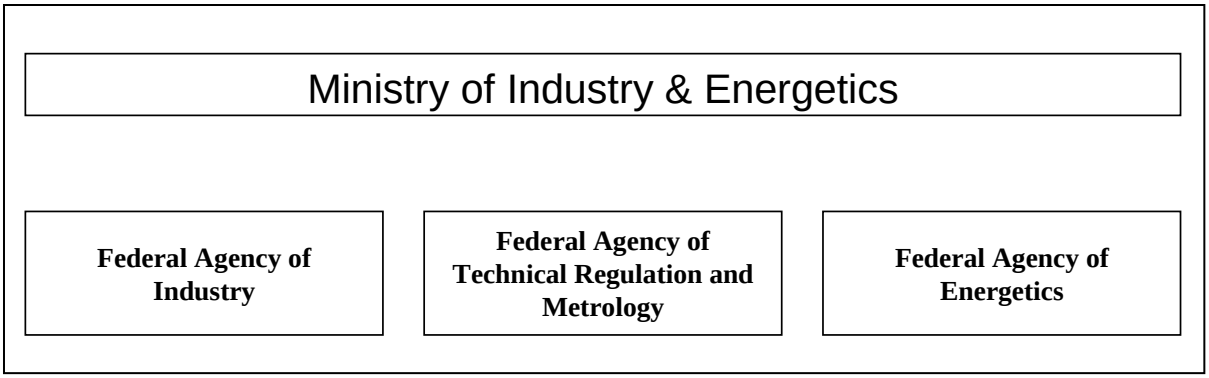

Fig. 24. Structure of the Ministry of Industry and Energetics of the Russian Federation (Source: official web site)

The Ministry of Industry & Energetics of the Russian Federation is responsible for the State policy and regulations in

- industry and fuel & energy complex,
- developing of mineral deposits (oil and gas fields) on the basis of agreements about division of product.

6.3. Structure of the Russian petroleum sector

There are more than 240 oil and gas companies in Russia but only 11 holdings including "Gazprom" make up 90 percent of total production.

Some of the most famous Russian petroleum companies and financial indicators of their activity are presented in the table below.

Rating 2005	Company	Sales in 2004 (million rubles)	Sales in 2003 (million rubles)	Growth rate, %	Sales in 2004 (USD million)	Balance sheet profit/loss in 2004 (million rubles)	Net profit in 2004 (million rubles)
1	Gazprom	976 776,00	819 753,00	19,2	33 892,30	287 865,00	205 684,00
2	Lukoil	830 304,20	593 698,10	39,9	28 810,00	173 150,60	122 427,40
5	Yukos	636 922,00	n/a		22 100,00	n/a	n/a
6	TNK-BP	412 068,40	319 912,60	28,8	14 298,00	152 544,30	115 769,90
7	Surgutneftegaz	308 111,30	235 145,30	31	10 690,90	107 106,90	69 599,70
8	Sibneft	231 220,00	190 437,60	21,4	8 022,90	84 163,00	58 954,20
13	Slavneft	176 493,70	104 315,30	69,2	6 124,00	51 904,80	35 131,60
18	Tatneft	150 793,00	116 631,70	29,3	5 232,20	36 214,40	24 625,60
22	Rosneft	130 125,20	98 373,70	32,3	4 515,10	34 595,50	24 131,00
31	Bashneft	57 449,60	39 571,70	45,2	1 993,40	7 136,30	5 151,00
47	Aljans	34 426,50	22 535,10	52,8	1 194,50	1 319,60	927,8
59	Russneft	27 472,90	6 273,20	337,9	953,3	4 512,80	3 297,70
63	NovaTEK	25 198,00	17 256,00	46	874,3	8 043,00	5 694,00
81	Itera	21 164,70	14 732,00	43,7	734,4	1 776,60	1 252,80
142	Vanjeganneft	12 140,60	9 134,70	32,9	421,3	5 869,20	4 462,50
172	Ufaneftehim	10 711,00	8 957,10	19,6	371,7	3 157,70	2 257,80
363	Aganneftegazgeologija	4 755,00	2 531,90	87,8	165	2 418,10	1 210,50
398	Nortgaz	4 220,10	4 663,80	-9.5	146,4	239,90	226,70

Table 4. Some of the Russian petroleum companies (Source: rating "Expert-400", Expert RA, 1997-2006)

A short description of some of the Russian petroleum company is given below. The main source of this information are official websites of the companies.

Open joint-stock company Gazprom is the largest gas producing company in the world. Gazprom's share in the world gas production is about 20 percent. Gazprom controls almost 60 percent of the Russian gas reserves and produces about 90 percent of Russian gas. The company is responsible for 8 percents of Russia's GDP. Gazprom provides about 20 percents of earnings to the federal budget and supplies gas to generate around 50 percents of electricity in Russia. Gas, produced by the company, is delivered to 68 regions of the Russian Federation, and is also exported to 27 countries such as Germany, Italy, France, Turkey, Hungary, Czech, Slovakia, Poland, Austria, Finland, Bulgaria, Rumania, Yugoslavia, Slovenia, Croatia, Greece, Switzerland, Netherlands, Bosnia, Macedonia, Great Britain, Ukraine, Belarus, Moldavia, Lithuania, Latvia, Estonia and others.

State owned company Rosneft currently comprises over 40 subsidiaries located in almost all of Russia's regions. Rosneft ranks first amongst all Russian oil companies in terms of profits and investments per ton of raw materials extracted and is in the top three in terms of total production volumes. Currently total oil reserves comprise 3.2 billion tons, total gas

reserves 1.9 trillion cubic meters. The shares of this company are now available on the leading stock exchanges. It should increase the effectiveness of management and provide necessary resources for development.

Another company is Lukoil. The figures that are given below can give some impression about it:

- 1.5 percents of global oil reserves and 2 percents of global oil production
- 19 percents of Russian oil production and 19 percents of Russian oil refining
- The second largest oil company worldwide by proven reserves of hydrocarbons
- The 6th largest oil company worldwide by production of hydrocarbons
- The largest Russian oil business group with annual turnover of over $20 billions

Most of the oil production companies are private. Foreign companies are also presented in the Russian energy sector. TNK-BP is example of such company. It was formed by means of assets exchange between British Petroleum in Russia and Alfa Access Renova (Russia). Gas production is concentrated in the state-owned giant Gazprom. This structure owns the major part of the gas transportation infrastructure. The oil pipeline system belongs to the state owned company Transneft.

6.4. Main normative acts

The main Russian normative documents that establish environmental requirements and framework for resource management are listed below.

The law "On ecological expertise" (1995) and law "On environment protection" (2002) will be described below.

Some of the particular requirements are included in "Water code" (1995), law "On wild nature" (1995), law "On protection of atmospheric air" (1999). It is necessary to mention the law "On specially protected territories" (1995) that establishes special requirements for activities in protected areas. The laws "Continental shelf of Russian Federation" (1995), "On sea waters, territorial sea and adjacent zone to Russian Federation" (1998), "On exclusive economic zone of Russian Federation" (1998) have also some requirements when it comes to resource management and environment protection.

6.5. The federal law "On environment protection"

The Federal law "On environment protection" begins with the statement that according to the constitution of Russia anyone has the right on favourable environment, anyone should protect nature and environment and carry out the natural resource exploitation cautiously.

This law regulates relationships in the area of interaction between society and nature, which have place under economic activities, associated with intervention into environment within the territory of Russia, as well as the continental shelf and Exclusive economic zone of Russia.

The first chapter of the law gives definitions of the most important terms such as environment, pollution, environmental impact assessment and many others.

The same chapter article 3 outlines the basic principles of environment protection. Any activities that can have environmental consequences should correspond to the following criteria:

- ensuring a human right on favourable environment
- ensuring a favourable conditions for human activities
- scientific based combination of environmental, economic and social interests of a man, society and the state in order to ensure sustainable development and favourable environment
- protection, reproduction, and rational natural resource exploitation
- responsibility of the state power on federal and local levels for ensuring of favourable environment and ecological safety
- onerousness ("not for free") of natural resource exploitation and compensation of a harm to environment
- independence of control activities in environment protection
- presumption of environmental danger of any economic or other activity
- obligation of environmental impact assessment under taking decision about starting any activities
- obligation of the state ecological expertise of any projects or documents that ground any potentially dangerous activities for environment, human's life, health or property
- taking into consideration natural and socio-economical features of the regions under planning or carrying out of any activities
- priority of conservation of the natural ecosystems, landscapes and complexes

- permissibility of environmental impact from economic or other activities within the limits of legislative requirements
- reducing of activities' negative environmental impact in accordance with requirements set by government on the basis of introducing of the best existing technologies
- obligatory involvement of governmental bodies of all levels in activities related to environment protection, as well as the public and other non-commercial organizations, juridical entities and physical persons
- conservation of biodiversity
- prohibition of any activities with unpredicted or negative environmental consequences
- observance the right of anyone for trustworthy information about the state of environment; participation of citizens in decision making process relating to environmental issues
- other principles

The credentials related to environment protection management of the different state bodies are presented in table 5.

N	State body	Some of the credentials
1	Federal power	Politics, legislation and other regulations (standards, requirements and so on), Federal programmes and projects, Coordination and realization of measures for environment protection under ecological disasters, Establishing the rules for state environmental monitoring and control, Establishing the executive state bodies for environment protection, Protection of environment, including sea environment of the continental shelf and EEZ, Establishing the rules of compensation for pollution, limitation, abeyance and prohibition of activities that are not comply with the environmental regulations, Organization and realization of the state ecological expertise, Advancing the claims for compensation of environmental damage, Establishing environment protecting areas and keeping the Red book of Russia (list of endangered spices), Economical assessment of environmental impact Establishing rules for licensing of activities related to environment protection
2	Regional authorities	Organization and realization of inter-municipal and regional projects related to environment protection

Table 5. Credentials of different state bodies in environment protection management system (Source: the law "On environment protection")

The law describes citizens', public and non-commercial organisations' rights and obligations related to protection of environment. According to the law the state bodies should promote realisation of the above mentioned rights and obligations. It is stated that as well that construction of objects that can cause environmental consequences should be undertaken only after taking into account the public opinion under referendum.

Chapter IV of the law "On environment protection" describes the economical instruments of environment protection. The following methods are listed:

- working out of the state prognoses of social-economic development based on ecological prognoses;
- working out of the federal programmes related to ecological development;
- working out and realization of measures for environment protection and preventing of the negative environmental consequences;
- imposition of fees for the negative environmental impact;
- establishing pollution limits;
- environmental impact assessment;
- granting of tax and other privileges for introduction of up-to-date environmental technologies;
- support of innovations in environment protection;
- other measures.

Article 16 states that negative environmental impact should be compensated according to legislation. Nevertheless, these payments do not give liberation from the obligation to undertake measures for environment protection.

The law mentions so-called obligatory environmental insurance that is aimed at protection of the property interests in case of ecological risks origination.

Chapter V is dedicated to norm-setting in the environment protection. The norm-setting is one of the instruments for pollution control. This chapter contains description of requirements to development of the norms and to the norms itself.

The law "On environment protection" establishes the necessity of environmental impact assessment and ecological expertise for evaluation of economic activities.

Chapter VII of the law describes environmental requirements under certain kind of economic activities such as placement, designing, building, reconstruction, operation, decommissioning and so on of buildings, facilities and other objects. Article 46 of this chapter is dedicated to petroleum industry. It sets obligation for industry to follow environmental requirements under all abovementioned phases and to introduce measures for cleaning and

sterilization of wastes, sewage treatment, associated gas collection, reclaiming, minimization and compensation of environmental impact. Petroleum projects can be started only under the condition of positive conclusion from ecological expertise.

Chapter IX reads about natural objects and areas under special protection. Activities that can lead to negative environmental consequences are prohibited there.

The next chapter of the law is "The state environmental monitoring". This kind of activity should be organized by the federal government and this information is intended for authorities of all levels.

Chapter XI is dedicated to description of environmental (ecological) control. The main purpose of environmental control is providing information for authorities about observance of environmental legislation and requirements. There are the following types of environmental control in Russia:

- state
- industrial
- municipal
- public

The same law covers the following topics:

- forming of environment friendly culture
- amenability for violation of the environmental legislation
- international cooperation in environment protection

As for the last issue, the international agreements have the higher priority than national requirements.

6.6. The federal law "On ecological expertise"

According to the introductory parts, this law is aimed at ensuring of the constitutional right of citizens on favourable environment by means of the prevention of the negative consequences from economic and other kind of activities.

Ecological expertise is investigation that should answer the question in which extent the planned economic (or other) activity corresponds to environmental requirements and it should help to make the decision about possibility of starting a project based on the environmental considerations.

The law "On ecological expertise" establishes its principles such as:

- presumption of potential environmental danger from any kind of economic or other activities
- obligation to carry out the ecological expertise before of any project implementation
- comprehensive evaluation of environmental consequences
- taking into consideration of the environmental safety requirements under expertise
- trustworthiness and completeness of data the is used for expertise
- independence of experts who are responsible for expertise
- conclusions should be objective and based on science and legislation
- publicity, participation of public organisations and taking public opinion into account
- responsibility for quality of expertise of the participants and other stakeholders of the expertise

Different state bodies have different responsibilities (credentials) under expertise. This is displayed in table 6.

N	State body	Some of the credentials
1	President	Ensures compliant functioning and interaction of different state bodies in issues related to ecological expertise
2	Federal assembly	Ensures compliance of other laws to the law "On ecological expertise"
3	Government	1. Approves the procedure of ecological expertise 2. Control the compliance of actions of the state executive power to the law on ecological expertise and ensures rights of people and organisations
4	Regions of Russia	1. Receiving information about the projects that can have consequences for region's environment 2. Delegating of experts that can attend as observers in the expert's meetings under ecological expertise 3. Providing information about expertises
5	Local authorities, city's districts, municipalities	1. Delegating of experts that can attend as observers in the expert's meetings under ecological expertise 2. Taking and implementing decisions within the area of own credentials based on public debates, public opinion researches, referendums, statements of public organisations, information about the project 3. Organisation the public ecological expertises upon demand of citizens. 4. Providing information for federal bodies responsible for ecological expertise about relevant economic and other activities.

Table 6. Credentials of different state bodies under state ecological expertise (Source: the law "On ecological expertise")

The document distinguishes between two kinds of ecological expertise: state and public. The state ecological expertise is the responsibility of federal bodies whereas the public expertise is based on the initiative of citizens, public organisations and local authorities

The law defines the objects of mandatory state ecological expertise. Here we find the following examples (list is not exhaustive):

- project of legislative acts that can lead to consequences for environment
- projects related to production facilities placement and industries development
- interstate (international) investment projects where Russia is going to take part
- projects where foreign investments are higher than USD 500 thousands
- projects that can lead to environmental consequences for neighbouring countries or for natural objects shared with neighbouring countries
- project of documents that regulate economic activities including activities related to natural resource exploitation and environment protection
- documents that describe and ground agreements about product partition ("SRP") and concession agreements related to natural resources exploitation

It is mandatory to get positive conclusion of the state ecological expertise before starting any project that potentially can cause an environmental impact.

As mentioned before, any citizen or public organisation can initiate public ecological expertise that can be carried out before or together with the state ecological expertise.

According to the law, the cost of the state ecological expertise should be covered by the organisation that needs documents approved under expertise.

The cost of the public ecological expertise should be covered by those who initiated it. In other words, from the funds of public organisations and other sources.

6.7. Energy strategy of Russia until 2020

Another important document that can be mentioned is Energy strategy of Russia until 2020. The following aims and priorities are declared in this governmental act (list is not exhaustive):

1. Full and reliable supply of people and economy with energy resources by reasonable prices which stimulate energy efficiency;
2. Reducing risks and preventing crisis situation in energy-generating industry;
3. Reduction of the specific costs of production and consumption of energy resources by means of the rationalization, energy-saving technologies, wastes minimization during production, processing and transportation;
4. Environmental impact minimization by means of the economical stimulation, production structure improvement, introduction of new technologies;

In order to achieve the above mentioned goals the following mechanisms are suggested:

- stimulation of the rational market environment (including coordinated tariff, tax, customs, and monopolistic regulation and institutional changes in energy-sector);
- increasing of effectiveness in management of state property;
- introduction of technical regulations and standards that stimulate energy-efficiency;
- stimulation and support of strategic initiatives of the companies that are active in investments, innovations and energy-efficiency.

Obviously, these mechanisms seems to have a lot in common with the mechanisms which the Norwegian energy-sector is based on.

6.8. Environmental considerations in the petroleum sector of Russia

The environmental impact assessment is required by Russian legislation and displayed in such normative documents as (Patin 2001):

1. Law of Russian Federation "About ecological expertise" (1995);
2. "Water code of Russian Federation" (1996).

These and some other documents establish the principle of taking into account environmental tolerance limits under reasoning of any projects associated with invasion to environment.
According to Russian legislation different state bodies regulate different segments of the oil and gas sector, namely:

- subsoil use;
- tariffs;
- access to pipelines;
- taxation.

Some experts think that nobody personally is responsible for strategic development of the oil and gas industry in Russia (Neftegazovaja Vertikal' 2006). The probability that such situation can have negative consequences for industry and environment is very high. The explanations can be found in the immediate past. In the beginning of the last decade of the 20th -century new way of resource management was introduced that was mainly based on fiscal instruments, whereas technical regulations were ignored. Privatized petroleum companies could choose more or less freely the ways and technologies for production. Moreover, in the beginning of reforms Russia had legislation that was oriented on regulation of access rights but not rational and efficient resource use. Only after 2002 the discussions about technological issues were

started on federal level (Neftegazovaja Vertikal' 2006). Nowadays one of the priorities of the energy policy in Russia is to minimize the negative environmental impacts of the energy-sector. This was stated in the president decree № 472 from 7th of May 1995 "About main directions of the energy policy and structural reorganization of the fuel and energy complex of Russian Federation for the period until 2010". Another document is "The Energy Strategy of Russian Federation until 2020", which already has been mentioned. It is necessary to point out that this "Strategy" is not the law (i.e. it does not oblige anybody to do something), so it reduces the efficiency of this document. As for ecological issues, the Strategy acknowledges that the energy sector is one of the main sources of environment pollution. It sets the goal to limit the environmental impact and to achieve European ecological standards (Neftegazovaja Vertikal' 2006). The following mechanism of the ecological policy are mentioned:

- stimulation of environment-friendly technologies introduction;
- establishing of strict ecological requirements;
- introduction of compensation system for breaking of the ecological requirements;
- optimization of payments for natural resource use;
- introduction of environmental insurance principles;
- toughening of control on observance of the ecological requirements under investment projects realization;
- improvement of the state ecological expertise system.

According to Russian legislation each company that is going to participate in petroleum production should meet certain requirements and pass certain state-defined procedures. There are the following stages of petroleum field exploitation:

1. Declaration of intentions
2. Tender
3. Granting a license
4. Technical and economic assessment of the project (feasibility study)
5. Working draft preparation with the environmental impact assessment and plan for civilian defence and elimination of consequences of emergency situations (like oil spills, etc.)
6. Examination of the project and approval by the state bodies responsible for certain areas
7. State expertise (federal level)
8. Granting permission to install the platform on the drilling point
9. Monitoring in process of operation

Declaration of intentions gives the right to participate in tender where the state's representatives choose the best candidates, which can get the license. After that, licensee should perform technical and economic assessment of their own projects and prepare environmental impact assessments. All documents prepared by licensee should be examined in the state bodies. After successful examination the company has the right to start production. There is requirement to monitor the environmental condition during all production process.

It is necessary to explain more in detail the structure of license agreement (contract) in Russia. This document is the integral part of license and contains the main conditions of natural resource use between licensee and the state body that issues this license. Actually the information given below is not the part of federal law, but the part of the local legislative act of Jamalo-Nenec region (so, it is local legislative act). According to this local requirements it is obligatory that license agreement should contain the following information (Danilenko 2005):

1. the main conditions of the contest (tender or auction) which the licensee won;
2. rules for handling of extracted resources;
3. conditions for division (distribution) of the extracted resources;
4. pattern of ownership after division of resources;
5. conditions and place of the ownership change;
6. types, terms and conditions for payments under the license agreement;
7. obligations of observance of technical requirements;
8. sanctions for environmental pollution and resources wastes caused by violation of the project technical solutions;
9. conditions, terms and volumes of information related to license agreement that should be reported;
10. availability of measuring instruments, way of functioning and service;
11. the program of ecological restoration of the territory;

As is clear, there are no requirements about any compensation to alternative industries working in the same area.

All above-mentioned facts prove that environmental issues are not ignored in Russian normative acts. Another question is if it is the main priority or not. What is more or less clear is that environment protection is situated among the other issues but it does not get any additional attention or priority in comparison with other things.

7. CHAPTER
ANALYSIS and DISCUSSION

This chapter is dedicated to an analysis and comparison of the petroleum resource management system of Russia and Norway. The following issues will be covered:

- What are the similarities and differences?
- How do they work in theory and how do they work in practice?
- To what extent is priority given to fisheries and the environment?
- Systems of safety and emergency preparedness
- Compatibility of the two systems?

Judging by Norwegian legislation it is possible to conclude that there are the following priorities for the state:

- taking into account long-term perspectives and consequences
- maximisation of benefit for the whole society in the form of welfare, employment, improved environment
- revenues to the country
- strengthening of national trade
- industrial development
- taking into account regional and local interests
- taking into account interests of all stakeholders
- environment
- transparency of the system.

It is significant to note that the structure and content of the Norwegian Petroleum Activities Act is aimed at achieving all these priorities. It is written in plain, unequivocal and short manner that allows interpreting it with minimal difficulties.

The structure of Russian environmental legislation is much more complicated and not so easily understandable. Multiple acts are quite comprehensive and cover all relevant aspects but different kinds of interpretations are possible. Many experts recognize that when it comes to practice some issue are not very concrete. In some cases general requirements are not supported by detailed instructions and figures. All these features of Russian environmental legislation make environment protection difficult.

It is necessary to admit that Russian natural resource management system is more bulky and complicated. There are many reasons for that and some of them are: larger scale of

industry and patterns of ownerships where private forms prevail. Actually Russian state formally can control the industry in the same way like in Norway, i.e. through different expertises and requirements. But since a lot of legislative acts are missing the system does not function properly. So, private companies are free to do what ever they like if there are no precise and approved requirements or these requirements are contradictory and do not have uniform interpretation. The state cannot give the orders to the independent private companies. Abovementioned feature of management system, multiplicity and private pattern of ownership of petroleum companies in Russia create some difficulties in management.

The first instrument that helps to integrate and implement all abovementioned priorities is leading role of the state. Thus the common feature of Russian and Norwegian systems is that decisions are centralized. Real power in environmental issues related to petroleum industry is concentrated on the federal level of Russia. Local authorities do not play any considerable role. This is what distinguish Russian and Norwegian resource management systems. It is well known that local communities play important role in decision-making processes in Norway. At least law protects their interests if we take the fishing industry as example. Moreover, local communities have the right to get direct financial compensation for those activities that can be harmful for their business. For example the Petroleum Activities Act includes chapters "Liability for pollution damage" and "Special rules relating to compensation to Norwegian fishermen". It reflects the attention that is paid to coexistence of two industries operating in the same physical environment. It is difficult to find something like that in Russian legislation. Petroleum companies do not have any direct responsibility and they do not have to compensate anything to fishermen. It means that there are not so much stimulus for them to implement additional environment-protection measures and saving fish habitats.

The distinguishing feature of the Russian petroleum industry is that the great bulk of petroleum resources are being produced onshore. It can be one of the explanations why the interests of fishery industry are not considered in relation to petroleum industry.

As mentioned before, the Snøhvit-field is the first large Norwegian petroleum project in the Barents Sea. According to official information (Petroleumsstrategi for Finnmark 2006-2009, 2006) it is based on zero-emission principle and will have minimal consequences for sea environment. Fishery industry is supporting this project since its interests were integrated in it and taken into consideration from the very beginning (2006). The Snøhvit production technology is based on underwater solution but it is guaranteed that submarine pipeline will not affect fishery in the area (2006).

The Prirazlomnoe field is the first marine Arctic petroleum project that can be used to analyse "environmental-friendliness" and existing approaches of Russian petroleum companies to the environmental issues. It is necessary to start with the fact that the production process will take place under very hard ice-conditions. In spite of this it will be based on the surface solution - sleet proof platform (Chernov 2005). Transportation will be carried out by means of ice-tankers and floating terminals. Ice breakers (usual and atomic) will assist in ice fields when it is necessary. This information is enough to display some of the environmentally weak points of this project. Obviously the risks related to the system are quite high. Petroleum production in the ice-free waters is fraught with serious unforeseeable consequence. Ice is making problems even more complicated and dangerous for environment. It was not possible to find out in what extent the interest of alternative industries were considered during the designing phase of this project.

The conclusion that arises is that probably environmental considerations are not the first priority for Russian petroleum industry. This is rather an obstacle for them that should be overcome or an annoying inevitability that has to be accepted. This can be proved using the case of petroleum pipeline project near Baykal Lake. Baykal - is the deepest lake in the world with very unique and vulnerable ecosystem. Only direct decision of Russian president Putin V.V. prevented building the pipeline in hundreds metres from the lake. This option was promoted by business since it would allow them to make smaller investments. The fact of seismic instability and public opinion was ignored. Only the president's decision made them accept more expensive but more environmentally friendly project of the pipeline route.

This case proves that the system is still far from being perfect. But on the other hand it shows that public opinion and public ecological expertise can be a real instrument that allows an influence on projects of financially powerful companies. The prove of that can be found in Murmansk region. The public environmental discussion of gas-pipeline from Shtokman-field has already started in Kandalaksha – city that is situated in the south of region. Kandalaksha is the place where the part of the pipeline will be built.

Some of the sources recognize that the Russian state system does not exploit natural resources in very effective way (Neftegazovaja Vertikal' 2006). There is a lack of transparency in access conditions. The interests of the state as owner are not protected quite well. Those who have the access rights to natural resources are not very motivated to efficient exploitation. There is a wide range of solutions suggested for this problem in "The Program of Socio-Economic Development Program of Russian Federation for 2005-2008" which was approved by the chairmen of the Government 19th of January 2006. Measures put forth in the

documents were: increasing of property rights protection and transparency, onerousness of the natural resource use (i.e. nobody can get it for free), improvement of control over efficiency of resource exploitation, competitiveness, and more reliable and adequate registration system. In other words, all measures are based on centralization of control mechanisms and toughening of state control (Neftegazovaja Vertikal' 2006). Obviously, it is necessary but not enough at all to improve something.

Remarkable difference between Russian and Norwegian natural resource management systems lies on strategic level. The environmental priorities of Norwegian system are clearly defined whereas corresponding priorities of Russian system are not evident. Some experts also believe that responsibility for strategic development of Russian energy sector is not clearly defined (Neftegazovaja Vertikal' 2006). It is necessary to agree that this is a negative factor for environment protection. Illustrative examples that demonstrate these differences in practice can be found quite easily. Long term orientation on environmental-friendly solutions in petroleum industry of Norway is reflected in establishing of the company Gassnova that is supposed to introduce up-to-date environment-friendly technologies. There are no such projects on the federal level of Russia but regional authorities are trying to establish and support some innovative initiative. It is clear that financial resource availability can cause many problems for the development of such projects at regional level in Russia.

As for financial issues, one of the significant differences between Norwegian and Russian systems is mechanism of financing. It is necessary to accept that Norwegian legislation includes much more clear indication of financial obligations of petroleum companies towards environmental damage and fishery industry. And, as it was mentioned above, there is no such obligation in Russian legislation.

The main problem in Russia is disorganization of environment protection bodies on different levels of state power (Neft' Rossii 2005). There are the following examples of such difficulties can be mentioned:

- redoubling of functions;
- low number of employees and lack of competence;
- lack of resources (financing).

According to some opinions, Russian environment protection legislation is not perfect and should be improved (Neft' Rossii 2005). There are no clearly defined mechanisms of environmental damage evaluation and its compensation. It leads to the situation when the petroleum companies can more or less freely choose own approaches to environmental issues. It is possible to cite the situation at the Caspian Sea as an example. The Caspian Sea is the

largest in the world internal reservoir that does not have any communication with the world ocean. It covers an area of about 398000 square kilometers. There are five states have common borders here: Russia Azerbaijan, Kazakhstan, Turkmenistan and Iran. More than 5 millions people inhabit the coastal area. The Caspian Sea has very rich and divers ecosystems and it is very important in climate forming processes. This area is famous for its largest sturgeon population that accounts for 90 percent of the world's stocks. It is home for more than 500 plant species, 850 animal species and important migration site for swimming and coastal birds. Petroleum company "Lukoil", working in this area follows the principle of "zero emission" (Neft' Rossii 2005) whereas actions of other companies can reduce to zero the positive effect of such environment-friendly approach. It means that unification and improvement of Russian environmental legislation is one of the ways to ensure that petroleum activities will not affect ecosystems in a negative way. It is not possible to rely only on responsibility and consciousness of each company and the state should take more care of the environment introducing common requirements and standards. There are more than 500 legislative acts in Russia concerning environment protection. But it does not tell anything about effectiveness of this system: interconsistency rate is quite low, there are many loop-holes and unclear issues, general requirement are not supported by detailed and concrete norms, standards and instructions. The amount of documentation is much higher than in Norway but the way in which it functions in reality is different and leaves much to be desired.

According to opinion of Sandy Stash (vice president of TNK-BP) there are the following weak points in Russian environmental legislation (Neft' Rossii 2005):

1. It is not based on risks. It does not have any methodology for priorities defining in the area of environment and people protection.
2. The system is based on financial penalties. According to S.Stash it is more effective requiring from companies to implement measures and realize projects that are aimed at environmental impact minimization.
3. Lack of transparency in the Russian environmental legislation. It should be open dialogue between all stakeholders and petroleum company should provide all necessary information for that.

It is mistake to forget about context while comparing the Russian and Norwegian resource management systems. First of all, size is matter in this case. The territory (geography, climate) and population differ drastically that certainly influence and complicates the management tasks. So, it is much more easy to implement and control decisions in Norway than in Russia. It is necessary to remember that Russian system is still under process of

formation whereas the Norwegian system is more or less stable. It leads to multiple misunderstandings, uncertainties and loop-holes in the Russian permanently changing legislation. This is also a fertile field for corruption and abuse of power. Russian public non-governmental organisations do not have long history and traditions that leads to small power in decision-making process.

Obviously the Russian and Norwegian natural resource management systems have differences in the ways in which they function. But it is necessary to admit that these systems do not have insoluble contradictions. Moreover, Russian authorities are aimed at the same environmental priorities with Norwegian colleagues. Distinguishing feature of Norwegian system is that it is already more or less stable and formed whereas Russian system experience formation phase. It means that participation of Norwegian colleagues and their experience could help Russian authorities to create environment-friendly resource management system.

8. CHAPTER
CONCLUSION

According to Patin (Patin 2001 from Matishov, Nikitin 1997) the maximum possible damage for bioresources from all stages of petroleum activities can be estimated from about one hundredth to thousandth of percents from stocks in total due to decreasing of feeding sources and increased larvae mortality.

The main negative effect for fishery from petroleum activities are related not to pollution but to decreasing of fishing grounds and creating different obstacles for trawling due to oil-platforms, submarine pipelines and exploration seismology and other kind of activities (Patin 2001). Example of fishermen from Great Britain and Norway shows that losses of profits from alienated fishing grounds accounted of about USD 3-5 millions (Patin 2001 from Buchan, Allan, 1992). Some experts believe that the same losses can occur in case of the 500 kilometres submarine pipeline which probably will be constructed from the Shtokman field in the Barents Sea (Patin 2001 from Matishov, Nikitin, 1997).

Well known fact is that Shtokman field will be exploited together with foreign partners, including one company from Norway. It is significant to note that according to Russian legislation, all projects with foreign participation are subject to ecological expertise. It means that first project in the Barents Sea

- will undergo ecological expertise
- the modern production technologies will be employed

Another positive point is that the Russian authorities are aimed at arranging petroleum sector in the way that it is working in Western countries. In other words - to achieve the best standards.

As it was shown in the previous chapter, Russian environmental legislation is not so attentive to fishing industry as the Norwegian one. But it is necessary to admit that local authorities can compensate some of the uncertain issues by means of the local acts (Danilenko 2005). In other words, more progressive requirements can be introduced from the regional level of Murmansk region that is still influenced by fishermen lobby.

It is possible to conclude that the ecosystem of the Barents Sea is not going to be affected in devastating way as long as cooperation between parties (Russia and Norway) involved in the resource exploitation will be based on free exchange of technologies, competence, information and ideas. Close cooperation and partnership between Russia and Norway will prevent any negative consequences both from fishery and energy sector.

Ecosystems of the Barents Sea are the treasure of Norway and Russia and these countries directly responsible for this area. Russian authorities are aimed at achieving the best environmental standards and it is possible to be sure that the state-controlled companies that will work in the Barents Sea have to share this aspiration. Russian fishing industry is interested in catches at the same extent with the Norwegian fishing industry. The obstacles that can hinder progress in environment-friendly resource exploitation are the lack of technologies, experience and financial resources. The way to remove these obstacles is cooperation between Russia and Norway in the Barents Sea.

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