Sullers!

Royal Norwegian Ministry of Finance

Parliamentary Report No. 25

(1973—74)

Petroleum Industry in Norwegian Society

OUTLINE

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Recommendation by the Ministry of Finance, February 15th, 1974, approved by Royal Decree of the same date.

(Presented by Mr. Per Kleppe, Minister of Finance.)

The aim of this report is to provide the basis for important decisions which will have to be taken in the near future. These particularly concern the allocation of new concessions on the Continental Shelf and guidelines for the use of the increased revenues.

The report attempts to illustrate the main issues raised by the Norwegian petroleum activities, and their impact on Norwegian society, the opportunities they present and the problems they may create. In the Annex, the Ministry of Finance, in cooperation with other Government Ministries concerned, has given a more specific account of some of the issues dealt with in this report.

By means of this report the Government aims at providing the basis for an extensive discussion of the petroleum policy by a wide cross-section of the Norwegian population. Great emphasis has therefore been put on focusing the tasks and problems which will have to be faced, as well as the options available.

The problems dealt with are extensive. It has been impossible to consider all relevant issues. Moreover, new facts continually appear, which may involve a reassesment of the various issues. A comprehensive review of the entire petroleum activity will therefore have to be made at a later stage.

1. Introduction.

1.1 PRODUCTION AND REVENUE

1. The petroleum activities will prove to be more than a passing episode in Norwegian history. Assuming a reasonable pace of exploration activity, only a minor parts of the areas considered promising today will have been explored by the turn of the century. In the North Sea exploration will continue into the 1980s at least, and production from established finds will continue through the 1990s. The Continental Shelf North of Lat. 62°N is several times larger than the areas in the North Sea, and their exploration will take a very long time, also because of the deeper waters.

2. Reserves presently established represent about 300—400 million metric tons of oil and 500 000—600 000 million cubic metres of natural gas. Total exploitable reserves in the Norwegian part of the North Sea are estimated at 1 000—2 000 million metric tons of oil and 1 000 000—2 000 000 million cu.m. of gas. At a time when most European countries are expected to have problems with their supply of energy and other raw materials, the petroleum finds have put Norway in a very favourable position.

As early as 1975 Norway will produce more oil and gas than is required for domestic consumption. In 1978 production is expected to reach 35 million tons of oil and about 30 000 million cu.m. of natural gas (corresponding to an energy content of about 25 million tons of oil). By 1981—1982 production may increase to about 50 million tons of oil and 45 000—50 000 million cu.m. of natural gas per annum.

This estimate takes into account the probability that new discoveries will be made close to those already in production, permitting an extensive use of present equipment. Even if important new finds were to be made during

the next few years, developing production would nevertheless require considerable time. These would therefore hardly be of significance before 1981—1982.

In 1973 domestic consumption was about 9 million metric tons of oil, while consumption of gas was insignificant. Even with substantial development Norwegian domestic consumption of natural gas would only constitute a minor proportion of production. Production of oil and gas will therefore be largely directed towards exports.

Based on these data, Norwegian oil production would only constitute between 1 and 2 per cent of world production in 1980. Exports estimated for 1980 correspond to the annual increase in consumption in Western Europe in recent years.

3. After 1981—1982 production from known fields will decline. If the level of production is to be maintained, new finds will have to be made. Possibilities for making further discoveries appear to be good, although exploration could have negative results. In that case, production of oil would decrease rapidly towards 1990, while production of gas will remain unchanged throughout the 1990s.

On the other hand the probability cannot be excluded that, if exploration activities continue at their present pace, large finds will be made, so that production gradually will double to 100 million tons of oil and corresponding quantities of natural gas. Such a level of production would probably cause greater problems of adaption for Norwegian society than are justifiable. Once discoveries are made, technical, economic and political reasons make it difficult to limit their exploitation. Exploration activities should therefore be regulated by the size of finds already made.

Desiring a long-term exploitation of resources and on the basis of its overall assessment of the social implications, the Government has come to the conclusion that Norway should maintain a moderate rate of extraction of the petroleum resources.

4. Public revenues from petroleum operations will largely depend on developments in prices and on the official taxation and excise policies. Revenue is here estimated to amount to 8,000—12,000 million kroner per annum (at 1974 prices) in 1978 and 10,000—15,000 million kroner per annum in 1981—82. By comparison total public revenue (to the State, national insurance and the municipalities) in 1974 will amount to about 60,000 million kroner.

For the purpose of these estimates, the calculations have been based on a market price for oil of 375 kroner per metric ton ($ 9 per barrel). In many quarters it is felt that prices may later decline. However, it must be emphasized that all assumptions of future price levels are highly tentative.

The trend in prices will partly depend on the policies pursued by the producing countries and the efforts to replace oil and gas with other forms of energy. A strong upsurge in prices now may also lead to a forced rate of exploration and exploitation activity in other parts of the world, and thus to increased supplies and lower prices in the long run.

Along with public taxation and excise revenues, the earnings of the production enterprises may also be considerable.

5. Future developments in the terms of trade with other countries (i.e. the relation between export prices and import prices), aside from oil, are also very uncertain. Both export and import prices seem inclined to fluctuate more strongly than they have in the past 15—20 years. It is difficult to predict how this will affect Norway. We cannot ignore the fact that import prices could climb so much higher than export prices that a part of the income from oil will be offset by unfavourable terms of trade in goods and services other than petroleum products. Other raw material prices may show sharp increases, if for instance the raw material producing countries enter into forms of cooperation on the pattern now evidenced by the oil-exporting countries. Also prices of many of the processed goods which we import, may rise, partly due to the rise in prices for oil and raw materials.

1.2 EFFECTS ON NORWEGIAN SOCIETY

1. The petroleum finds in the North Sea mean that as a nation we shall become richer. The Government is of the opinion that these new possibilities should be used to develop a qualitatively better society. A rapid and uncontrolled growth in the use of material resources should be avoided, unless the social structure is otherwise substantially changed.

The guidelines which are decided for the petroleum activities and for the use of the revenues must, therefore, be a part of a planned restructurization of Norwegian society.

Democratic institutions must acquire genuine control of developments in an increasing number of areas. The economic possibilities must be used to create greater equality in the standard of living, and in other ways to prevent social problems and to develop an industrial production better adapted to the

environment and use of resources. The welfare society must be further developed and must be influenced through an active consumer policy. Local communities must be strengthened and developed with at view to a better social environment. Job opportunities must be created for those groups which today have difficulties in obtaining employment. Norway must show responsibility for the poor countries of the world.

2. The oil and gas discoveries will mainly affect Norway's domestic economy in two ways:

— Directly, by affecting Norwegian labour and Norwegian industry through their participation in exploration, production and base activities, through deliveries of production platforms, equipment etc. and through industrial processing in the form of oil refining, petro-chemical production etc.
— The use of the increased revenues for domestic consumption and investment.

3. Initially the direct effects will have the greatest impact. The most important single factor today is the building of mobile drilling platforms. In 1974 it is expected that such platforms, to a value of 1,300—1,400 million kroner, will be delivered from Norwegian yards to Norwegian owners. In the years ahead it is not expected that deliveries of platforms will be on the same scale as in 1974. However, it is assumed that the yards will receive increasing orders for repairs and maintenance. For 1980 it is estimated that mobile drilling platforms will be delivered to Norwegian owners, and that repair work will be carried out for about 1,000 million kroner at 1974 prices.

For operations on the Norwegian Continental Shelf, it is expected that Norwegian industry will deliver other goods and services amounting to about 450 million kroner in 1974. This includes drilling activities carried out by Norwegian-owned drilling platforms, services by Norwegian supply ships and Norwegian base activities, as well as other goods and services required for carrying on these operations on the Shelf. Towards the end of the 1970s such deliveries may reach 1,000—1,500 million kroner. Deliveries of fixed production platforms are included in this calculation.

Furthermore, it is assumed that about 60—70 million kroner will be earned as income from production enterprises in 1974. By 1980, this figure may be approximately of 150—200 million kroner at 1974 prices.

Besides the deliveries to the operations on the Norwegian Continental Shelf, a large export of goods and services to petroleum exploration and production in other countries has already been built up. For 1974 it is expected that these exports will amount to approximately 850 million kroner. This figure includes the export of one drilling platform to foreign owners. Otherwise exports mainly consist of drilling services carried out by Norwegian-owned drilling platforms on shelf areas of other countries. In 1980 the value of these exports is expected to be 2,500 million kroner at 1974 prices.

It is assumed that in 1974 production activity directly connected with petroleum extraction will amount to 2,500—3,000 million kroner rising to about 5,000 million kroner in 1980 (at 1974 prices). In comparison, the total export of goods (including new ships) amounted to 23,000 million kroner in 1973.

The petroleum operations are expected to employ about 15,000 persons in 1974. Included are persons employed in the manufacturing of production platforms and other equipment, as well as crews on Norwegian platforms and supply ships operating on the part of the Continental Shelf belonging to other countries. By 1980 this figure will probably increase to 20,000—25,000. Even though this will only constitute less than 2 per cent of the total labour force, geographical concentration may lead to major problems of adaptation in some areas.

4. The increased public revenue will be used for easing taxation, as well as for increasing public investment, for example in regional development, protection of the environment, the social welfare sector, education and communications. The use of the increased public revenue which the Government is now planning, will require a larger increase in employment by the end of the 1970s other than the direct petroleum activities. Even if some of the increased demand for goods and services can be covered by direct imports, it will also require a substantial increase in deliveries from a number of domestic sectors. Part of this increase will undoubtedly encroach upon other sectors.

Each thousand million kroner (at 1974 prices) of the oil revenues used domestically may well require an extra employment of 7,000—8,000 persons by 1980 to produce the goods and services needed to satisfy demand. This will particularly apply to industries which mainly supply the Norwegian market, and which meet little competition from foreign production (protected industries). In addition, it is to be expected that the increased demand will lead to a certain growth in production and

employment in some industrial sectors which are exposed to competition from imports.

5. Taking the Long Term Programme of the Korvald Government as point of departure, it has been estimated that, if no oil or gas had been found on the Continental Shelf, employment in industries protected from foreign competition would have risen by 75,000—85,000 man-years during the yars 1974—1980.

As the level of affluence increases, many people will prefer shorter working hours and more time for leisure. The Government proposes that the 40-hour week be introduced during the term of the present Parliament. In the premises for their employment forecast the Korvald Government did not include shorter working hours. Previous experience shows that the decline in production does not correspond in amount to the actual reduction in working hours.

6. Accordingly 85,000—100,000 more persons, employment would be required in industries protected against foreign competition in 1980, even without the petroleum discoveries. With an increase of approximately 10,000 persons employed in petroleum operations, 95,000—100,000 persons employed will be required for these industrial categories. Above this comes employment deriving from the use of Government revenues.

7. Subject to the occupational structure remaining unaltered, up to 1980 growth in employment will be on the order of 0.5—0.6 per cent per annum. Even if Norway, judging by traditional yardsticks, may be said to enjoy full employment, there are many people in the more outlying regions away from pressure areas, especially among the quite young and elderly wage-earners, and among women and the handicapped, who should be offered better opportunities than they have today. The Government attaches great importance to using the opportunities provided by the petroleum operations and the increased revenues to improve employment facilities in these regions and for these groups.

Such a policy may be carried out easily because the petroleum operations strengthen our foreign trade.

Beside such special measures as developing day institutions, vocational training and retraining, regional policy efforts will be made to direct part of the demand and to implement special measures in industrial life. For married women particularly the proximity of the home to the place of work is normally a necessary condition for being able to work outside the home.

By strengthening policies relating to the labour market and the regions, it is estimated that it will be possible to increase employment growth to 0.8 per cent per annum on an average. This corresponds to an increase of about 75,000 man-years from 1,565 thousand in 1974 to 1,640 thousand in 1980.

No provision is envisaged for increased immigration of labour.

8. Without using any revenue from petroleum, the estimated total growth of employment about 75,000 persons will thus require a transfer from other industries of 20,000—35,000 persons employed. If then an amount of about 6,000 million kroner is available in 1980 for domestic use from the increased public revenue, for tax relief and increased public investment, a further 40,000—50,000 persons employed in industries protected against foreign competition will be required, unless it is possible by special measures to put a brake on the employment demand. The decline in employment in other industries must then reach 60,000—85,000 persons from 1974—1980, see table 1.2.1. This means that eventually these industries will lose about one-fifth of their labour force. Correspondingly, use of the increased public revenues to the amount of alternatively 3,000 million or 10,000 million kroner in 1980 will mean a decline in employment in these industries of 40,000—65,000 and 90,000—115,000 respectively.

Table 1.2.1. *Estimated growth in numbers employed 1974—1980 according to main industrial groups.*[1])

Increase in petroleum operations etc.	10,000
+Increase in industries protected against foreign competition	85—100,000
Without using oil revenues	75— 85,000
Supplement for shorter working hours	10— 15,000
=Total	95—110,000
÷Aggregate growth in employment	75,000
=Estimated decline in other industries without using petroleum revenues	20— 35,000
+Supplement for using 6,000 m. kroner	40— 50,000
=Estimated decline in other industries	60— 85,000

1) In Chapter 8 of the Annex a more detailed account is given as to which industries are included in the different main groups.

9. A transfer of production and employees between enterprises and industrial sectors may come about through an increased domestic cost squeeze. The price of goods and services from industries undergoing rapid growth will rise more sharply than prices for other goods and services. The pressure on prices will particularly depend on how much Norwegian industry becomes engaged in petroleum operations and on what part of the resulting revenues will be used domestically. The risk of a strong pressure on prices must carry great weight when these decisions are made.

10. The pressure on the labour market provides wage-earners with greater options for choosing jobs and for getting better paid work. However, if the pressure becomes excessive, it would have detrimental effects on the possibilities for effective production so that enterprise would not obtain sufficient labour, wage-earners would change jobs often etc. Equally important, frequent employment turnover of this nature leads to a poor working environment.

11. Changes in production, employment and settlement patterns are continually taking place in every society undergoing development. Such changes will often entail a great deal of inconvenience. But this is difficult to avoid, if the advantages of economic growth are thought desirable.

These changes may be considerably accentuated through a rapid development of the petroleum activities or through an extensive domestic use of the increased revenues. Welfare gains which may be achieved in the form of better job opportunities, tax reliefs, improved public services etc. must therefore be weighed against such unfavourable effects occasioned by changes in employment patterns and increased internal migration. This is the most important problem which must be considered in connection with the petroleum operations.

2. Democracy and Control.

2.1 POLITICAL DIRECTION

1. Democratically elected institutions must have full control of all important aspects of petroleum policy: exploration, rate of extraction, safety measures and localization. It is important to have public direction and control of the exploitation of resources. In this context great emphasis will also be put on bringing democratically elected institutions at the local level actively into the decision-making process.

2. Norwegian authorities have the full right of disposal over oil and natural gas resources, and it is their responsibility to ensure that these resources are used with due care, both with regard to Norwegian interests and in an international context. Private enterprises, Norwegian or foreign, may be engaged at the exploration and production stages and will receive suitable compensation for their efforts. But in future they should obtain the right to exploit these natural resources in exceptional cases only. The organizational pattern for Norwegian petroleum operations must provide Norwegian authorities with full control of all stages in the operation: exploration, production, processing, export and marketing.

3. Den norske stats oljeselskap A/S (The Norwegian State Oil Company), Statoil, will be an important institution for implementing the authorities' petroleum policy. Guidelines for Statoil's functions will be decided by the relevant political institutions. The necessary facilities will be provided for the enterprise, so that the objectives laid down in the preamble may be attained. Among other functions, the enterprise will therefore be entrusted with the task of acting as an independent operator as soon as possible. This means, that technically the company will be responsible for executing the exploration for and extraction of petroleum discoveries.

4. Regional cooperation is an important feature in petroleum operations. Such cooperation has been started by the three northernmost counties and between the two Trøndelag counties and the county of Møre and Romsdal. To cover these areas Oil Councils have been established at county level. It is desirable that such cooperation be given consideration in other parts of the country as well.

The Government considers it important that this regional cooperation should be subject to the direction of the popularly elected institutions.

5. First and foremost the scope of the operations on the Continental Shelf must be controlled by regulating exploration activities. Once a discovery is made, technical, economic and political reasons will tend to require that the resources be exploited as rapidly as possible. The harsh climatic conditions on the Shelf mean that the individual

fields must be exploited at a relatively rapid pace, before the installed equipment has to be renewed. This reduces the possibilities of regulating the rate of extraction once production has commenced.

In order to regulate the level of production, it is necessary however also to develop regulatory measures, so that the extraction operation itself is brought under control after a find has been made. One appropriate method of control might be to delay the development (build-up) of individual finds. This will be facilitated by increased government participation in the activities on the Shelf. But consideration should also be given to drawing up forms of contract which make it possible to delay the exploitation of discoveries made by private enterprises.

6. The activities connected with petroleum operations have shown the need to set up a system for controlling the establishment of private enterprises. A temporary statute has now been enacted relating to the construction of bases for petroleum operations etc. The Government has given high priority to the work on drawing up a permanent Act covering the control of establishment.

7. Landing in Norway is important from the point of view of providing national direction of production and marketing. The Government therefore firmly maintains that oil and natural gas as a general rule, shall be landed in Norway. Exceptions may nevertheless be made in those cases where considerations of community policy indicate that a better solution may be reached. Work on solving the problem of laying pipelines in deep waters will continue to be given priority.

The question of the industrial exploitation of oil and gas must be seen in the context of the general industrial policy and the pressure problems which are expected to arise. The exploitation of oil and liquid gas in this country is not, however, dependent on landing in Norway. With natural gas the case is different.

8. The petroleum discoveries open up new opportunities for the supply of energy. Oil and gas may be used directly as a fuel or for the production of electric power. Norwegian control over production and distribution ensures that any gas or oil based power installations will receive the necessary supplies of raw material.

9. In order to ensure the democratically elected institutions an increasing control of the restructurization which will follow in the wake of the petroleum operations and the utilization of revenues derived therefrom, it may be considered feasible to use part of the government revenues to buy up ownership interests in Norwegian industry. The increased foreign exchange earnings may make it possible to buy up some foreign ownership interests.

10. The petroleum operations have presented Norwegian industry with a major challenge. The engagement in exploration, production and processing may well reach formidable proportions. Extensive technological know-how is required to make full use of these opportunities, and to provide the popularly elected institutions with the necessary insight to enable them to supervise and regulate activities which are due to be started up.

11. If we are to achieve a broader based Norwegian participation in petroleum operations and keep pace with, or perhaps even be in the vanguard of, developments in certain sectors in the years to come, an intensive effort in research and development is required. But further research and studies should comprise all aspects of community development and should not be tied especially to petroleum operations as such.

12. When it comes to a choice of alternatives, opinions on advantages and drawbacks will depend on the personalities involved in evaluating the situation, their attitudes, their perspectives in time and their personal interests and sets of values. Conflicts of interests and values may arise between Norway and other countries between social groups, between sectors of industry and trade and between the different generations. The individual groups will seek to further their objectives by influencing the shaping and definition of the studies and research tasks to be undertaken. It is therefore important that the direction of these activities should not be dominated by special interests. Groups who are not in a position to formulate their own research requirements, must also have their interests safeguarded.

13. Petroleum operations create the need for re-thinking in a large number of fields. Norwegian society is already well-equipped for this in many of the areas concerned. Even so, the ability to make full use of available knowledge must be improved. These challenges must first of all be tackled by utilizing the apparatus and know-how which we already possess, so that the possibilities may be fully exploited, and so that social problems and an uneven distribution of benefits and burdens may be avoided. Norway intends to acquire a knowledge of the research work going on in other countries, and to participate in certain international research

programmes. But the evaluation and exploitation of the results achieved in this manner will of necessity have to be the task of competent Norwegian institutions.

14. The research which is directed towards the problems of society in a wide sense, and which will form the basis for public policies and social planning, has a much weaker public information and contact service today than other research activites.

The structural reorganization which follows in the wake of petroleum operations and the demands for firm public control of these activities, increases the need for such an apparatus. The Government will therefore propose that a Research Council for Community Planning be established. Provision will be made for close cooperation with the other Research Councils. Guidelines for the new Research Council and its date of establishment will be the subject of a special Parliamentary Report concerning research policy.

15. Research will be required in many fields. It goes without saying that, given the resources which a small country like Norway has at its disposal, especially with regard to professional personnel, it will be necessary to select some research projects while leaving others in abeyance. Taking up new projects will often encroach on work already in hand in other fields.

16. It is clear that certain projects involving research and study must be given a high priority. This applies for example to:

- Understanding of marine life and the factors affecting it
- Knowledge of the Continental Shelf and its resources
- The necessary technology for participation in and control of the exploration and extraction of petroleum
- The necessary technology for participation by Norwegian industry in activities connected with petroleum, but also for selected branches of industry which are faced with strong competition from petroleum operations
- The basis for community planning to achieve a better understanding of and control of restructuralization of industrial life and settlement patterns
- Petroleum as an element in the global resources perspective
- Relations with other countries and constellations of economic power.

2.2 TAXATION OF THE OIL COMPANIES

1. The petroleum operations will in time be the source of very substantial public revenues. Right up to the beginning of the 1980s, revenues will largely be derived from those enterprises which have already obtained licences for the exploitation of these deposits. Later on the revenues will to a greater degree derive from government participation through Statoil. The market rise in the price of petroleum over the last few years means that higher prices must also be expected in future. This will make production on the Norwegian Shelf far more profitable than was estimated at the start of the operations. In addition exploration has shown that the reserves on the Shelf may be considerable.

2. Taxation of the earnings of the oil companies will, according to the rules now in force, make up a very large proportion of the public revenues from petroleum operations. These operations, however, are of such a special nature and on such a scale that they differ radically from other Norwegian activities. The present rules on taxation are not too well suited to these operations, and the practical application of these rules leads to problems of control. There are therefore good reasons for considering in more detail whether special rules should be adopted for these oil companies.

3. The advantage of allowing part of the public revenue to be assessed as an income-tax on the basis of net sales value, is that this may stimulate the exploitation of smaller finds where the profitability for the companies is lower. This is also the reason for having graduated rates for the royalty. By differentiating the share of Government participation, it should also be possible to stimulate the exploitation of smaller finds.

On the other hand major finds are potentially very profitable. Besides the royalty rates being progressive, further consideration should be given to the question of introducing a system of government participation on a progressive scale.

4. The determination of prices for extracted oil and gas as a basis for calculating the companies' earnings, gives rise to very difficult problems. The Government will therefore consider proposing legislation which permits assessments in these cases to be based on prices which are determined by the authorities.

5. Consideration will be given to special measures for ensuring an effective assessment of taxes. Without an effective assessment there is at risk that the

amount of tax which the companies actually pay may prove to be much smaller than originally envisaged.

Because of the many special problems involved in the assessment of oil companies, consideration will also be given to establishing a special assessment board for the oil industry instead of assessment being carried out in the municipality in which the taxpayer has his place of business. As an interim measure steps have been taken to train a group of public officials who are specially qualified to deal with these questions. It is intended that these officials will be partly attached to the Director of the Central Tax Board, so that they may render assistance to the local tax authorities in assessing the tax for these companies.

Owing to the difficulties which will arise in the assessment control, consideration will furthermore be given to the question of whether special accounting rules should be introduced for the oil companies.

It may also be necessary to introduce special rules on depreciation allowances, exploration costs and reimbursement for technical assistance etc. from foreign enterprises.

6. Tax questions arising out of the landings from the Ekofisk area are regulated by agreements between Norway on the one hand and the United Kingdom and Western Germany on the other. According to these agreements, the pipelines in their entire length, i. e. right up to the mainland of these two countries, shall be owned and operated by a company registered in and liable to taxation in Norway. The same applies to certain installations placed ashore and connected with these pipelines.

7. In the Act of June 11, 1965, it was laid down that the Central Tax Board should issue regulations for the computation of depreciation allowances. The regulations which have been issued, are in the main based on the depreciation arrangements applicable to other activities, with such adaptations as have been deemed necessary in view of the conditions applicable to the oil industry. The Government will now review these regulations.

The pipeline company has submitted an application to the Central Tax Board to obtain approval for a special depreciation arrangement covering the pipelines to Teesside and Emden. In principle the arrangement means that the annual depreciations are to be computed in relation to the quantity transported, and with correlated adjustments. The application is now being considered.

At the same time it will be considered whether a similar depreciation arrangement should also be implemented for the production installations being erected on the Continental Shelf. Such an arrangement will mean that taxation will be advanced for the production companies.

8. It might furthermore be appropriate to evaluate the right under the tax laws to allow deductions in the tax assessment for exploration costs and the payment made to foreign companies in connection with their activities on the Norwegian Continental Shelf. These questions should be considered in the context of the general problem of the taxation of multi-national companies.

Another question concerns the interpretation of Norwegian tax laws in cases where a Norwegian registered company engages itself in exploration activities in other countries. It might easily seem unfair if expenditures or losses incurred in such activities abroad, should be deductable from the income for which the company is liable to taxation in this country. But in the absence of such a right to deduction Norwegian companies might well be placed at more of a disadvantage with regard to their activities abroad than companies registered in certain other countries. This question will therefore be given further consideration. In this connection due regard must be given to Tax Conventions entered into with other countries.

9. According to the Act of June 11, 1965, the King may decree that the right to claim deductions in respect of deficits from previous years shall be extended from 10 years to include deficits up to 15 years. The Government has seen no reason to submit proposals for extending this right to claim deductions for deficits, and feels it would be appropriate to evaluate the rules regarding deficits in general in the light of recent developments.

10. The Odelsting proposition no. 65 (1971—72) gives an account of the right of the companies to claim deductions for the purpose of national income tax for dividends paid out of the year's profits, and especially of how this right of deducttion functions in relation to dividends paid out to shareholders resident abroad. As mentioned in the proposition, there is a question of fixing an upper limit to the dividend for which deduction may be claimed in the tax assessment. The question of amending the rules concerning taxation on dividends, will be studied in further detail.

11. According to the Act of June 11, 1965, 3/4 of the municipal tax shall accrue to the Tax Equalization Fund and 1/4 to the municipality where the assessment is made. In this connection it should be pointed out that the operations on the Continental Shelf have little or no connection with any particular municipality. The majority of the private oil companies have established their head offices in Oslo, while the headquarters of Statoil are in Stavanger. It would hardly seem fair that these two municipalities should be the recipients of such large tax revenues for this reason. It will therefore be necessary to take these provisions concerning municipal taxation up for review.

12. For licences for the exploration for and exploitation of petroleum, a number of taxes and fees have been laid down (cf. Royal Decrees of April 9, 1965, and of December 8, 1972). Of these the most important is the production royalty. In pursuance of the provisions of the Royal Decree of April 9, 1965, the royalty is set at 10 per cent of the value of oil and gas produced in the production area. Under the new rules of December 8, 1972, this royalty varies from 8—16 per cent according to the amount of oil produced in the particular field. In accordance with this Decree, the royalty on gas produced is 12½ per cent. The Government assumes that it may be necessary to review the various taxes and fees.

13. Through Statoil the Government has secured for itself to varying degrees the right to a share in the profit derived from oil operations and to direct participation in these operations on a stipulated share-basis. The extent and the nature of Government participation in the various activities connected with exploration and exploitation should be given further consideration, as well as which forms of cooperation and involvement would be appropriate if the Government itself is to direct the entire activity in principle. A considerable proportion of the public revenues may be expected to be derived from the Government's direct participation in oil production and other activities in the same connection.

14. It is very important that the problems relating to taxes and other public revenues from the abovementioned operations, should be studied and evaluated in an overall context. The Government has appointed a committee with a mandate to undertake a general inquiry into and study of questions concerning the public revenues from operations on the Continental Shelf. The committee is expected, among other things, to consider the questions referred to above regarding the determination of accounting prices for petroleum products as the basis for income tax assessment, and to review more closely the current rules on allowances for depreciation, exploration costs etc. It shall also undertake a further survey of the extent and the forms of Government participation in petroleum production, as well as the question of the most effective tax assessment administration possible.

The committee may draw upon the professional expertise which is generally available in the Government Departments, as well as obtain any assistance it may require from these Departments.

3. International Perspectives.

1. The world's stocks of petroleum and other raw materials are limited. The policy now being pursued, will decide how long these resources will last. The Government therefore wishes to make an active contribution to shaping an international resources' policy. It must cover rational exploitation and conservation of the world's energy resources, distribution, transport, trade, pollution etc. The Government will promote international cooperation on energy questions, both globally and regionally and between producer and consumer countries alike. The use of oil for energy purposes must be balanced against the use of the petroleum resources for other high-priority purposes. Norway should advocate a form of cooperation aimed at price levels for different forms of energy and for different uses of oil and natural gas which would enable resources to be used rationally in the long term.

2. The production and marketing of oil are more and more becoming concern of governments. The producing countries are endeavouring to gain more control over these activities, for example through new agreements on government participation and nationalization. In several important consumer countries state-owned oil companies have been established to take charge of the oil ac-

tivities at all stages. The international oil companies must nevertheless be expected to play a considerable role in the production and marketing of petroleum products for some time to come. Moreover, it has become clear that these companies are now investing in other areas of the energy supply field, for example by acquiring ownership interests in the production processes connected with oil shale, coal and uranium.

3. The fact that the multinational oil companies exercise such extensive control over production and marketing, makes it a task of international interest to place them under public control. The Government will increase its endeavours in international organizations, including the Nordic Council and the Organization for Economic Cooperation and Development (OECD), in order to further this objective.

The large oil companies possess technological and economic know-how which is of great importance for the rational production, processing and marketing of oil. The right answer must be a form of cooperation which makes it possible to benefit from this know-how in Norwegian oil operations. For example, cooperation with the state-owned companies in other countries would be a natural development. In the long term view the multi-national companies on the Norwegian Continental Shelf will argely enter the picture as consultants, entrepreneurs and possibly minority shareholding partners.

A special Norwegian marketing organization will be developed for petroleum products. For a long time to come a large proportion of the production from the Norwegian Continental Shelf must be expectet, hovewer, to be marketed in cooperation with the multinational companies.

4. As a net exporter of oil, Norway will acquire interests in common with the traditional producing countries. This applies especially to trends in production and prices. Given the present organizational pattern, the situation on the world market for oil could fluctuate considerably, between relative scarcity and relative surplus. It should be in Norway's interest to secure a stable development of prices, production and consumption. In the Government's opinion, the best way of encouraging development of this nature is by means of organized cooperation. The Government is therefore prepared to establish closer contact and cooperation with the traditional producing countries, including the member states of the Organization of Petroleum Exporting Countries (OPEC).

5. It is natural to expect a broader form of Nordic cooperation within the sector covering energy and industry. The Government will work towards realizing balanced cooperation in these areas. Norway has already become a large supplier of oil products to the other Nordic countries, and this may be extended to products from new refineries and from the petrochemical industry.

6. The international energy situation has been, and will probably continue to be, characterized by an increasing demand for oil and gas. It must therefore be assumed that considerations of foreign policy and trade policy will be taken into account when the general rate of production is determined.

7. Oil production in the most northerly sea areas might create problems of its own. The possibilities open to us for solving such problems will primarily depend upon developments in the international field. Extended cooperation and an easing of tension between the great powers, the effects of which would also be felt in the northern areas, would make it easier to achieve satisfactory solutions for our oil policy.

In view of this, it would be in Norway's best interest to secure the Norwegian direction of exploration for and possible production of oil in the northern areas of our Continental Shelf. But Norwegian national management and supervision in these sensitive areas would also be in the interest of the Great Powers.

8. Petroleum operations on the Continental Shelf increase the possibilities of pollution and other environmental damage. They may also cause difficulties for shipping and fisheries. The extensive fish resources in these waters impose special responsibilities on Norway. The Government intends to play an active national and international role in finding solutions to these problems, first and foremost through regional cooperation between the North Sea States.

9. The Government will actively support the forthcoming UN Conference on the Law of the Sea. The main task here is to arrive at firmer and more precise criteria for delimiting the Continental Shelf area of the respective countries. Norway, together with Australia, has put forward a proposal for economic zones of 200 nautical miles (390 km) in which the coastal states shall possess sovereign rights to the natural resources, including the resources on the sea bed.

In cases where the natural continuation of the mainland extends beyond the economic zone, the coastal states shall however retain the rights they possess under present international law.

10. Norwegian foreign trade will take on a different character when the export of oil and gas gets properly under way. The increased use of goods and services arising from the petroleum revenues, will not be able to be covered by correspondingly increased production in Norway, but must be met by a corresponding increase in the import surplus for goods and services, apart from oil and gas. This requires a new appraisal of our policy on trade and foreign exchange. The pressure on domestic resources will increase. Export incentives must therefore be justified by the fact that such export facilitates a particularly profitable use of domestic resources, or that it serves regional or other social ends.

11. The concession terms for the allocation of blocks include a provision aimed at stimulating the use of Norwegian goods and services. It is not intended to accord Norwegian trade and industry any preferential position. But Norwegian industry should be secured the chance to compete on equal terms within a sector which has been characterized by well-established connections between purchasing companies and traditional suppliers. One of the aims of the Norwegian authorities will be to arrive at a balance which safeguards national interests without contributing to the development of a protectionist policy in the North Sea. Today Norwegian suppliers are already established on the international market, and over half of the deliveries to petroleum operations are made to other countries.

12. In order to preserve the balance in the Norwegian economy, it is not advisable that public revenue from petroleum operations be fully used for increased domestic consumption and investment, at least not if it involves amounts as large as forecast. The result will therefore be a foreign exchange surplus, which will be utilized on the Shelf or abroad. Any foreign exchange surplus which is invested abroad, must be administered according to guidelines drawn up by the political authorities.

Several of the traditional oil producing countries are small, with only limited possibilities of using this large revenue for economic development at home. They therefore have very high savings rates, in the region of 70—80 per cent, which chiefly take the form of a very substantial increase in foreign exchange reserves. As a result of the recent rise in prices, in the course of a few years these countries could build up reserves of foreign exchange so extensive that they may play a quite dominant role in the international exchange and credit market. At present there is no clear view as to the consequences this might have.

13. Despite the difficult problems that remain to be solved, Norway's standard of living is one of the highest in the world. The oil discoveries will raise our standard of living still further. We carry a special responsibility in a world with all the marks of fundamental economic and social inequality. We should therefore let the most needy countries have a share in our increased revenue.

For Norway's part we have made it internationally known that our goal is to grant one per cent of the gross national product to development aid by 1978. The same obligation will apply when the revenue from petroleum operations is included in the national product. In 1978 this will lead to an increase in Norwegian development aid of almost 300 million kroner, compared with previous prognoses which did not take the activities in the petroleum sector and the resultant revenue into account.

14. The developing countries suffer from widespread unemployment. The migration of wage-earners to the industrialized countries has resulted in a number of problems relating to society and the individual, both in the host country and in the developing countries themselves. In the industrialized countries foreign workers are often used to regulate the pressure on the labour market. The developing countries primarily need job opportunities in their own countries in order to utilize their own resources. We should help them to develop their own trade and industry, for example through our export of capital and other measures.

Together with other Western European countries Norway should advocate the opening of European markets to exports from the developing countries, particularly their manufactured goods, as they gradually develop their industries. Cf. Parliamentary Report No. 29 (1972/73) concerning certain key topics relevant to Norway's cooperation with the developing countries, from the previous Government under Mr. Trygve Bratteli.

15. The Norwegian foreign exchange surplus will help to give the Norwegian krone a strong position internationally. In recent years important changes have taken place in the exchange rates of a number of countries. It must be expected that in the future also some countries will find it necessary to make parity changes. Such changes might lead to a relative rise in the value of the krone in relation to other currencies. If so, this should contribute to diminishing the rise in prices at home and in the long run therefore should not adversely affect the industries facing competition on the export market and from imports.

4. The Use of Resources.

4.1 GROWTH AND CONSERVATION

1. Resources are scarce, and nature and the essential conditions for life in the world can easily be destroyed. Pollution, if allowed to continue long enough, can produce extremely unfortunate results. Economic growth must therefore be given a new content and a new composition, so that it furthers the rational use of resources and does not restroy the fundamental balance of nature.

2. The areas on the Norwegian Shelf are among the most important feeding and breeding grounds for fish in the whole world. Every year roughly 6—7 million tons of fish are caught on the relevant parts of the Continental Shelf in the North Sea, the Norwegian Sea and the Barents Sea. The Norwegian share amounts to about 3 million tons at a first-hand sales' value of just under 3,000 million kroner. No corresponding figures for the first-hand sales' value are available for fish caught by other countries. Taking Norwegian first-hand sales prices as a basis, the total catch annually amounts to a value of 5,000—6,000 million kroner.

Fish represent an important food resource, which is replaced year after year. Petroleum is a resource which is not limitless. As far as possible it must be ensured that in exploiting, if we do not create particular difficulties or restrictions for the fisheries.

3. The production rate in respect to the Norwegian petroleum resources must be determined both on the basis of the possibilities and the problems which such operations create for Norway, and with due regard for the world around us. Not least, emphasis must be placed on the fact that oil and gas are finite resources which even today, and possibly even more in the future, are very valuable for a number of uses both as raw materials and as food, and not only as energy.

The petroleum discoveries facilitate a rapid expansion in the use of oil and gas for energy purposes in Norway. The Government feels, however, that strict economization in the use of these resources should be provided for.

4. Even if the Norwegian authorities will have large amounts of oil and gas at their disposal, a prices and sales policy should be followed, in home markets as well, in order to avoid overconsumption and unnecessary waste. The discoveries on the Norwegian Continental Shelf do not in themselves justify lower selling prices in Norway than those which can be obtained by export. This does not prevent an equalization of energy and raw material prices being used as a policy instrument for localization and energy.

5. The petroleum discoveries in the North Sea provide Norwegian society with new opportunities. The increased revenue provides the basis for a rapid improvement of the material conditions of life. Involvement in petroleum operations and use of public revenue at home will, however, lead to increased structural change in industry and employment. Such changes may be desirable, and may contribute to providing solutions in the social sector. But rapid structural change may result in considerable social problems. The Government attaches importance to regulating the rate of development in the petroleum industry and to the utilization of the increased revenues at home with a view to limiting any unfortunate social effects. Importance will be attached to avoiding too rapid changes in population settlement, and to maintaining the main features of the settlement pattern.

6. The authorities will be subjected to pressure from many quarters to accelerate oil operations on the Continental Shelf. Assumptions that the international price level for petroleum might be higher in the first decade than in subsequent decades, might also be used as an argument in favour of rapid extraction. In view of its desire for a long-term exploitation of resources and on the basis of an overall evaluation in a social context, the Government has nevertheless decided that Norway should adhere to a moderate pace of extraction of the petroleum resources.

7. Exploration activity is, in practice, the most important regulatory instrument. It is therefore important to avoid initiating more exploration than a moderate extraction rate would indicate. In accordance with normal practice in the oil industry, plans will be prepared for exploratory activities to provide proven reserves corresponding to at least 10—15 years of production. The Government believes that the aim should be a production level which is not substantially higher than that expected to be attained at the beginning of the 1980s. Thus we ought to seek always to have proven reserves of 1,000—1,200 million tons of oil or of oil equivalents of gas. The figures for proven reserves now stand at 800—1,000 million tons.

Using these findings as a basis of calculation, the drilling of 20—25 wells per year as is now being practised on the Norwegian Shelf, should at a rough estimate provide a

yearly average of proven reserves of 140—180 million tons of oil and gas. If exploration continues to yield such favourable results, it will be possible in the course of a few years to bring the known reserves to a higher figure than would be necessary for maintaining the level of production.

But there is great uncertainty as to the connection between exploration activities and results. There will always be a risk of explorations resulting in much smaller reserves than expected. On the other hand they may also result in much more. It will therefore be necessary to adjust the extent of exploration activities from time to time.

The Government will return to the matter of more detailed guidelines for exploration activities in a special Parliamentary Report concerning operations on the Norwegian Continental Shelf.

8. Since the results of the exploration activity are uncertain, it will also be necessary to be able to exercise direct control over the rate of extraction, so that any largescale discoveries are not exploited faster than the popularly elected institutions consider desirable, based on an overall evaluation.

9. In view of the production licences already issued, the possibilities of directing the rate of exploration are limited. But the Ministry of Industry may at any time issue more specific provisions concerning measures aimed at the proper exploitation of petroleum deposits («conservation»).

In allocating future production licences, conditions may be stipulated to the effect that the exploitation of any discoveries in the concession area may be regulated to a degree beyond that hitherto authorized by Norwegian statutory provisions.

In the long run full control of operations may be secured, so that the State has full charge of all rights and obligations, allowing the companies to operate under different forms of entrepreneur contracts.

4.2 ENVIRONMENT POLICY

1. It is of vital importance to keep a very close watch on the pollution situation in the sea areas affected by the petroleum operations. The Government intends to draw up a systematic programme of supervision for this purpose.

2. The Government will try to strengthen international cooperation on the combating of and emergency preparedness against oil pollution. This would imply further development on the basis of the already established forms of cooperation between the North Sea states, the Oslo Convention and the new regional convention concerning emission into the sea from shore-based sources, which also includes the operations on the Continental Shelf.

3. The necessary measures will be put into effect so that pollution caused by the operations on the Shelf and on land, are reduced to a minimum. It will be a requirement that the most effective and modern methods for combating pollution be employed. Conductors of such operations will be obliged to produce the necessary information concerning the effects on the environment.

Shore-based operations are covered by the ordinary legislation on pollution, and are subject to an office for pollution inspection. Control and supervision of emissions caused by operations on the Continental Shelf, are for the time being coordinated by the Norwegian Petroleum Directorate.

The regulation of emissions caused by these operations should be carried out in accordance with the general guidelines for preventing pollution. Emissions from platforms and from shore-based installations should as far as possible be subject to the same rules, and be considered by one and the same institution.

The Government's aim is to gradually transfer the authority to lay down rules for emissions from installations on the Continental Shelf and the responsibility for control to the office for pollution inspection. The practical work of supervision is to be primarily carried out by the Norwegian Petroleum Directorate.

4. Concessionaries have absolute liability under Norwegian law for damages arising from their operations on the Shelf. The Government intends to submit a proposal for special legislation concerning liability for compensation for pollution damage, in order to define specifically the extent of liability.

5. The operators on the Continental Shelf are today bound to maintain an effective emergency preparedness against contamination by oil. An enquiry is being made as to how an effective public protection system against oil may be developed in addition to the companies' own emergency preparedness.

6. When a well is abandoned, all well equipment must be removed, and no obstacles of any kind are to be left behind. Technical and economic measures which can ensure a satisfactory clearing-up operation, will be given further consideration.

Comprehensive production equipment for the extraction of oil and gas will be built up. When production ceases, the equipment will probably be of no value to the licencees. When the licence is issued, measures will be taken to ensure that there are satisfactory guarantees that the companies can be made liable, if they fail to fulfill their obligations to clear up.

7. With a moderate tempo in petroleum operations, the latter should not create any greater environmental problems than are, in the Government's opinion, capable of being dealt with in a satisfactory manner. Special restrictions and limitations on these operations may be necessary, however, in particularly vulnerable areas, or if the overall pollution situation in the sea areas involved develops in an unfavourable direction.

4.3 USE OF THE INCREASED PUBLIC REVENUES AT HOME

1. The revenues which accrue to the public sector, will represent considerable amounts in a few years' time. Even if no more discoveries are made, the revenues will continue until about the turn of the century. If new finds are made, they will probably last much longer. The right course, therefore, must be to increase domestic consumption and investment beyond previous plans. But in view of the problems of structural change, the increase should be limited, and it should be extended over a longer period of time.

As a point of departure, it has been estimated that there will be an increase in consumption of approximately 750 million kroner in 1975, with a gradual increase to about 6,000 million kroner in 1980 (at 1974 prices). Total domestic consumption in 1980 of goods and services is estimated at approximately 170,000 million kroner. An increase in consumption of about 6,000 million kroner will therefore correspond to an increase of 3—4 per cent. In addition, we have based ourselves on the scheduled reduction in working hours from 42½ to 40 hours per week being put into effect in the course of the period 1974—77, without the consequent drop in production affecting real earnings.

Any use of the revenues beyond this level would appear at the moment to lead to such extensive structural changes, that it would be difficult to get it under the necessary public direction an control. But the question of the utilization of the petroleum revenue will be under constant review in formulating economic policy.

2. Taking future generations into account, only part of the funds made available for use in Norway by the petroleum revenue should be utilized for increased consumption. A certain amount must be invested, so that the income level will not necessarily fall once the oil revenue comes to an end. On the other hand, Norway already has one of the world's highest rates of investment, and studies on the subject suggest that additional domestic investment can add little to future consumption.

In the industries producing for the petroleum industry and the domestic market, increased investment could nevertheless reduce employment requirements, and thereby some of the problems connected with structural change. In the industries which are exposed to strong competition on the export markets or from imported goods, investment would to a certain extent make it possible to reduce employment without a drop in production. From the Government's point of view, part of the increased revenues should also be used for important investments in the field of environment.

3. The Government will give a fuller account of its economic policy in the revised National Budget for 1974, in the proposal for the 1975 Fiscal Budget with the Longterm Fiscal Budget up to 1978 and in the National Budget for 1975. Specific guidelines for utilizing public revenue and for solving certain problems will also be incorporated. Furthermore, a report in the nature of a long-term programme will be presented to the Parliament which assembles in the autumn of 1974.

4. No special system of financing should be set up, earmarking parts of the public revenues from petroleum operations for specific purposes. It is difficult to predict what the public revenue will actually amount to. Priority ratings now considered desirable between different projects, might alter considerably with time, and the need for public measures in any one sector cannot be expected to vary in pace with the petroleum revenue. Allocations of funds at a set percentage for specific purposes might thus lead to undesirable priority ratings.

The role of the Fiscal Budget in the policy concerning economic cycles likewise indicates that one should seek to restrict the tied items in the budget as regards both expenditure and revenue.

On the other hand exploration and any discoveries outside North Norway will confront this region as a whole with large-scale problems. North Norway will be guaranteed a proportion of the concession fees which

corresponds to at least one tenth of the royalties accruing to the government from production off North Norway. These amounts will be used for a special development fund for the region which will be additional to the regular instruments of regional policy.

The production enterprises have absolute liability for damage in connection with petroleum extraction. However, situations may arise in which the rules on compensation do not promptly enough or to an adequate degree protect the various interests which may have been harmed. In such cases consideration will be given to using public funds to cover the interests of the injured party.

5. The Government will utilize the opportunities provided by increased public revenues for effecting, for example, substantial tax reliefs. At the same time the Government will advocate greater public investment in environment protection and cultural activities, in the sector covering health and social welfare, in teaching and research, and in communications and regional development, than would otherwise have been provided for in the general economic plan. Importance will also be attached to utilizing the opportunities provided for increasing employment for women, the elderly, young people and categories with limited vocational options.

Increased investment in the housing sector through the improvement of older dwellings and living environments and an expansion in housebuilding will also be aimed at.

6. Table 4.3.1 illustrates a possible distribution of increased domestic demand. The increased supply of goods and services is distributed more or less as in 1972, with approximately half going to private consumption, and the rest evenly distributed between public consumption, investment in public fixed capital formation, and investment in enterprises, including dwellings. This distribution means that the level for each of these three demand components up to 1980 is increased by 3—4 per cent over and above normal growth. This increased demand will be somewhat less than the annual growth in these levels in recent years.

7. When these revenues are used in Norway, it will create a corresponding increase in domestic demand. Some of the goods and services for which there is a demand, can be imported. But a large proportion of the demand will be for Norwegian-produced goods and services. The proportion directly covered by imports, will vary according to whether increased revenue is used to increase the individual private consumption, public consumption or investments, or both public and private.

Table 4.3.2 gives a calculation of the scale of increase required in the number of wage-earners in those industries which face little competition from foreign production, if each of the demand components (private public consumption and investments) is increased by 1,000 million kroner at today's price levels. Such a calculation is naturally very tentative. The figures must therefore be taken as an illu-

Table 4.3.1. *Possible distribution of the increased demand resulting from oil revenues*[1])
Mill. kroner, estimated 1974 prices.

	1977	1980[2])
Private consumption	1,120	2,500
+ Public consumption and gross investment in public fixed capital formation	570	1,250
+ Housing investment	200	300
+ Investment in enterprises excl. housing	360	950
= Total additional demand ...	2,250	5,000
+ Use of oil revenues incorporated in long-term programme	1,000	1,000
= Use of oil revenues for increased domestic demand ..	3,250	6,000

1) Increased demand as compared with the Korvald Government's long-term programme 1974—1977.

2) For 1978—1980 the additional demand is calculated on the basis of an extension of the development given in the Korvald Government's long-term programme. At the same time it is assumed that the extension of trends in the long-term programme will imply the same use of oil revenues in 1980 as the long-term programme indicates for 1977.

Table 4.3.2. *Estimated increase in number of wage-earners (man-years) in the protected industries*[1]) *by increased deliveries for different purposes.*
Estimated 1974 prices.

1,000 million kroner in increased deliveries to:	Required increase in no. of wage-earners in protected industries in 1974	in 1980
Private consumption	5,000	4,400
Public consumption (civilian)	18,000	16,000
Gross investment:		
Building and construction	8,500	7,600
Machinery and equipment	4,300	3,800

1) In Chapter 8.2.2 of the Annex a fuller account is given of those industries which are considered to be protected against foreign competition.

stration of how the general composition of the demand for goods and services is decisive in its effect on the labour market.

8. If it is then assumed that the additional demand is distributed between the various components as shown in table 4.3.1, an increased domestic use of 1,000 million kroner per annum (at 1974 prices) would require an extra increase of about 7,000 wage-earners in industries protected against competition from abroad.

If, alternatively, we envisage an allocation of 1/3 to each of the three demand components (private consumption, public fixed capital formation and investment in enterprises, including housing), approximately 1,000 extra wage-earners would be required per 1,000 million kroner used in 1980. In addition, a certain expansion in production and employment in industries exposed to foreign competition must be allowed for.

9. It is possible that petroleum operations will represent an important factor in Norwegian economy far into the next century. Nevertheless, it is already at this stage necessary to give thought to the period after the actual petroleum operations have ceased. Given the rapid technological development characterizing international and Norwegian economy, little can be done at this stage to invest directly in production activities which can take over the role played by the petroleum operations in the interim period. To the extent permitted by the employment situation, it is possible at this stage to equip the country with roads and similar permanent construction works which may also be of use far into the future. The development of a good environment for education and for research will also have positive long-term effects.

But a considerable proportion of the public revenues from petroleum operations must be invested abroad. It is important that this is done in such a way that the revenues can be used once the actual petroleum operations have ceased, and that they may help to reduce the problems which may follow the winding-up of petroleum operations.

4.4 INDUSTRIAL POLICY

1. The operations in the North Sea represent the first oil exploration and extraction activity to have taken place on a large scale in stormy waters and at depths of more than 70 metres. Involvement in the development of new technology for exploration and extraction in such waters will be crucially important to Norwegian industry. Active Norwegian involvement in the present phase could secure participation in the years ahead. The production, both in the North Sea and in other submarine areas all over the world, will in time be carried on to a greater degree at depths at which traditional technology is not of much use.

2. The Government will provide incentives to continued active involvement by Norwegian industry in all phases of the petroleum operations, including deliveries to it. But even so consideration for the problems of restructurization will make it necessary to limit the overall involvement. It is not primarily a question of stimulating industry to undertake deliveries on a large scale, but to ensure that Norwegian industry should engage itself in those sectors where there are possibilities for building-up expertise and for further development. Importance will be attached to enabling Norwegian industry to join in technological developments, so that the country will be competitive in other fields as well when the era dominated by oil activities in this country has ended.

3. Norwegian companies which are to participate in drilling operations and production, must possess high technological standards and great financial strength. There is only room for a few companies in this sector, and they should have a national basis. Beyond this, petroleum operations create a large market for a number of special products and services. This provides the basis for the development of a varied industrial life, including both large and small enterprises which can provide good steady jobs. It is important that these enterprises, as much as possible, are closely associated with the regions where the operations take place.

4. The proportion of the public revenue which is available in Norway, will require increased employment in a number of sectors. In particular new industrial developments, housing building and the extension of public services require investments in the building and construction sector. This sector will at the same time be vigorously stimulated through direct deliveries of production platforms (of concrete), the establishment of petrochemical industries, refineries etc. The municipal development of sewage networks and purification plants will also require funds. There is a risk, therefore, of very heavy pressure on the building and construction sector. It is estimated that employment will have to increase from 130,000 man-years in 1973 to 150,000 in 1978.

5. The greater the deliveries of petroleum and the internal use of the revenues are, the

greater will be the number of wage-earners drawn away from certain industries and enterprises, since we already have a tight labour market. We face difficult choices, both between involvement in petroleum operations and use of the increased revenues, and in regard to the degree of pressure we should permit.

6. It would be advantageous if necessary reductions in output and eventual shut-downs of existing enterprises could be effected according to a planned policy. The reductions in output should be preferably effected in places where alternative jobs exist or can be created, so that the minimum social inconvenience results for those who have to give up their jobs. A policy of this nature will primarily demand an active and purposeful industrial policy paying due regard to the social consequences.

It is important that the enterprises and sectors which are able to offer a good working environment do not contaminate the soil, the air or water, and that they do not consume finite resources. In industrial policy, development contracts and other active instruments must be utilized in order to promote such an objective and at the same time achieve the best possible spread of industrial activities connected with petroleum operations. The Government will return to the measures required in this connection, inter alia in a Parliamentary Report concerning the structure of Norwegian industry.

7. Improved employment opportunities in other economic sectors may lead to a more rapid reduction of employment in agriculture and fisheries than would be justified. The instruments used in agriculture and fishery policy, will be developed, so that they may contribute to counteracting this trend and to maintaining the present population settlement pattern in all essential respects.

8. The Government finds it both right and natural that the refining capacity and petrochemical industry should be developed in Norway. Strict requirements in relation to the environment will be made of these industries, so that no major problems should arise either for the wage earners or for the immediate surroundings.

A stable supply situation will give Norwegian industries based on oil and gas competitive advantages. These are industries with great development potentials and with good employment facilities. Once Norway has achieved the necessary know-how in this field, the opportunities for the plastic, and possibly other processing industries, will be much improved. Among other advantages, it is considered that these industries are well-suited to providing favourable solutions to localization efforts under regional policy. The enterprises which are to build petrochemical plants for utilizing the wet gas from the Ekofisk area, are, moreover, bound to sell their raw materials to the plastic industry in Norway at uniform prices and terms, regardless of location.

The basic enterprises themselves will have to be large-scale enterprises, and in addition must often be located near one another in order to be able to make full use of the techniques of large-scale operations. Furthermore, activities connected with any landing terminals for oil and gas will readily develop the characteristics of large-scale industry.

9. It has been proven that a tight labour market in itself is not sufficient to provide more employment for the youngest and oldest wage-earners, women and those with limited vocational options, who want better opportunities for paid work. Beside the special measures in regard to demand, industrial policy must therefore be especially directed towards providing more employment for these groups.

10. A central task for credit policy in the years immediately ahead will be to secure a controlled rate of expansion in those parts of the industrial sector which are connected with oil operations. At the same time attempts must be made to reduce the problems of structural change in other economic sectors. If there is a decline in employment in some sectors, it will be possible to maintain or increase production through a more capital-intensive process of production. By means of the credit policy, it is possible to channel capital to the affected industries.

11. Investments on the Continental Shelf will to an increasing extent be financed from the domestic capital market. These funds will largely be channelled through Statoil.

The reduced need for loans to Government operations will help to ease the situation for increased domestic financing of other economic activities. One way in which this can be done, is by reducing the credit institutions' investment in Government Bonds. By this means, as well as by improved domestic liquidity in other respects, the remaining Bond Market capacity could be considerably increased.

12. In recent years the Stock Market has largely been dominated by special new oil companies. The Government believes that it is necessary to intervene in order to prevent speculation, and it has submitted a Bill on share issues.

5. Equality and the Working Environment.

1. The Government regards the levelling of differences in the conditions of life as one of its chief aims. The petroleum discoveries, together with all the ensuing activity and revenues, may well produce impulses which will tend to widen the gap between the various regions and between population groups. It is important to avoid this. Instead care will be taken to ensure that the opportunities which now present themselves, should be used to improve the lot of those sections of the population which up to now have lagged behind in the development of incomes.

2. Some of the jobs in the petroleum sector involve hazards of both a social and medical nature. They may require burdensome commuting or moving, complicate normal family life and prevent participation in community activities. The working environment in petroleum operations should be improved through labour inspection, public health, and localization measures, etc.

3. Major differences in pay must not be resorted to in order to attract people to hazardous or burdensome occupations, if it is possible to eliminate these disadvantages instead. In connection with petroleum operations, the development of local communities with special groups of wage earners enjoying substantially higher incomes than the rest of the local population, should be avoided. This might otherwise lead to social inequalities, for example through pressure on housing prices.

4. In certain places oil operations will create a new situation, for example in respect to physical planning. The Control of Establishment Act, the Building and Planning Act and the Health Act could become important instruments for directing developments. However, it many prove necessary to review this legislation and the pertinent control apparatus in the light of the new situation. In order to ensure that the political authorities are provided with the necessary information before decisions are made on the plans for future oil policy at central, regional and local levels, the social and public health implications must be studied. Representatives from the social welfare and public health sector must participate in this work.

5. The erection of "barracks towns" is unacceptable, except for short construction periods. At the same time emphasis will be placed on ensuring that important facilities such as schools, health and social services, child and youth welfare projects are planned and developed in a satisfactory manner. To implement this, efforts will be made to coordinate employment and housing policies as well as to develop public services. Development projects will be required to contain plans for a satisfactory programme for housing construction and public services.

6. In connection with the petroleum operations, industrial plants etc. may be established ashore which by their very size will have a considerable impact on the local community. In such cases it will be necessary to stipulate in the permits, granted in pursuance of the temporary Act on the Control of Establishment, a requirement which ensure the financing of the social and environmental measures which may be necessitated by the new operation.

7. The Government does not propose to pursue a policy which requires an increased immigration of labour. If immigrants are to be offered decent conditions, more housing contruction, schools etc., will be required. This in turn would require more labour, with the result that immigration, in the overall view, will only to a minor extent be able to ease the pressure on the labour market.

It has proved difficult to provide immigrants with employment and housing conditions etc. similar to those of Norwegian wage-earners. Increased immigration will therefore tend to produce social problems. To a large extent immigrants take jobs which Norwegians are unwilling to accept. These questions will be the subject of a separate Parliamentary Report.

6. Population Settlements and Local Communities.

1. Petroleum operations provide fresh opportunities for transferring economic activity towards the western and northern regions, as compared with the general course of developments in the last few decades. This is in accordance with the objectives for Norwegian regional policies, cf. Parliamentary Report No. 27 (1971—72) presented by the previous Bratteli Government. On the other hand, the growth in the service industry, coupled with the general effects of a more rapid growth in incomes and consumption, may well lead to an increase in the general centralization tendencies.

The Government will attach great importance to creating a better balance between job locations and residential areas, so that the need for moving or burdensome commuting may be reduced. This makes it imperative to pursue a well-planned regional policy with new and more effective instruments.

2. As already mentioned, the Government attaches great importance to maintaining a moderate tempo in the exploitation of petroleum resources. This is important in order to achieve a long-term exploitation of resources and out of regard for the restructurization problems for our economy as a whole. For the time being, therefore, it will be a question of only a limited opening of new areas for petroleum operations on the Norwegian Continental Shelf.

Following a careful overall consideration of regional policy, in which the economic, population and employment factors have been included, the Government has come to the conclusion that an opening of areas north of Lat. 62° N for the purposes of exploration and trial drilling should commence in North Norway. But the same considerations indicate that an early opening of areas off the coast of Møre and Trøndelag would be desirable. Proposals for specific guidelines for the opening of new areas for exploration and trial drilling will be submitted in Parliamentary Report No. 30 for 1973—74.

In the Government's view, there should not in principle be any opening in the next few years of further areas south of Lat. 62° N, other than of those resulting from the present invitation to submit bids, since the aim should be to shift the main weight of the exploration activities northwards. Nevertheless it may become necessary in special cases to allocate new exploration licences south of Lat. 62° N. The activities in the different areas north and south of Lat. 62° N must, however, be kept within the limitations stemming from the desire to maintain a moderate overall tempo.

3. It will therefore be necessary in the near future to follow up the plans which have been made for base operations in the vicinity of Harstad. The area off Trøndelag and Møre will provide the foundation for the establishment of a base in Kristiansund. The question of establishing more bases will have to be considered further, as the exploration activity increases in extent.

4. With reference to the opening of new areas north of Lat. 62°N, the Government attaches great importance to the establishment of activities which will be competitive with activities already established in South Norway. This also applies to branches of the workshop industry. Industry in these parts of the country should be given the opportunity to prepare themselves for the new challenges offered by petroleum operations as soon as possible.

5. Activities connected with the petroleum industry should be well suited to the process of decentralization. The Government aims at making an analysis of the practical possibilities of splitting up such activities into smaller units than would otherwise be likely, if only considerations of private profit were taken into account.

Furthermore, it is considered desirable to ensure that subcontract deliveries should be allocated to inland areas and to other regions which would not otherwise share in the basic petroleum operations.

6. In the short term view the Government will regulate the localization of activities which are directly connected with petroleum operations by means of active measures in pursuance of the temporary Act on Control of Establishment.

The work on a permanent Act on Control of Establishment will be given high priority. Emphasis will be placed on ensuring that the service industry is also covered by such an Act. Work will be started on a report to clarify the conditions of localization and the opportunities for service operations, especially with a view to decentralizing efforts and to moving government activities away from Oslo.

7. It is estimated that the domestic use of public revenues will lead to a strong growth in those industries which are protected in various ways against competition from imports. This makes it possible and necessary

to pursue a new form of regional policy based to a greater degree on restictive measures applied to pressure areas. The growth in these industries must, considering their functions, take place in Norway. Restrictions will therefore facilitate moving the activity in question, while not leading to lower levels of activity.

8. Restrictive measures vis à vis pressure areas will especially stimulate the surrounding districts which today are saddled with considerable commuter problems. These measures will only to a minor degree be of any use to the most backward of the outlying regions. The petroleum operations will therefore to a greater extent than previously necessitate an active regional policy able to counteract movements away from the outlying regions in straitened circumstances.

The instruments of regional policy must be reviewed at regular intervals, to ensure that it is the more backward regions which shall benefit from such policy instruments. These may also be applied to petroleum operations, but as a general rule these operations should stand on their own feet without government support.

9. Both in order to restrain the growth in some pressure areas, and to stimulate the development of the outlying regions, the Government has appointed an interdepartmental committee to study the implementation of a geographical differentiation of the employer tax to the National Insurance Scheme.

10. Measures taken to boost the more backward regions, should be undertaken in such a manner that employment facilities should also be made available to those interested in part-time employment. If this is to function as a guide-line for localization measures, it is necessary to improve the registration procedure for potential wage-earners. This means that effective municipal employment statistics be reintroduced. In addition analyses should be carried out on the opportunities available for increasing employment in the individual regions.

11. Construction sites for the building of production platforms of concrete have already been established in the countries of Rogaland, Hordaland and Møre and Romsdal. The Government is considering the question of permitting the establishment of an additional one or two sites. Given the small number of production units we are dealing with here, the enterprises and labour exchanges concerned will have to cooperate closely, so that construction work will be divided with regard to the employment situation and seasonal variations in these localities.

12. In many cases agreements are entered into between a firm intending to expand and the municipality in which it shall establish itself. Agreements of this kind may include such matters as the pace of construction, responsibility for landscape care and infrastructure investments, as well as questions connected with land disposal and the rights pertaining to abandoned plants and equipment. Consideration will be given as to how local interests may best be safe-guarded in such agreements.

13. Industrial centres which depend upon one or two major enterprises, are very unsatisfactory as labour markets. Such centres are always very exposed to changes in the marketing and profit-making conditions which apply to the enterprises concerned. Measures will be taken to avoid new centres becoming exclusively dependent on petroleum operations, will be utilized as an element in the which occurs in connection with petroleum operations, will be utilized as an element in the long-term policy for the pattern of population settlement in Norway.

The Ministry of Finance

recommends:

that a copy of the Recommendation by the Ministry of Finance of February 15, 1974, concerning the Position of the Petroleum Industry in Norwegian Society be submitted to the Storting.

APPENDIX

Further analysis of particular questions in relation to the petroleum activities

Prepared by the Ministry of Finance in cooperation with the Ministries concerned.

Appendix

Part 1

BACKGROUND

CHAPTER 1

Global Petroleum Perspectives

Prepared in cooperation with the Ministry of Industry.

1.1 INTRODUCTION

1. Petroleum is an inclusive term for crude oil and natural gas. It contains a long list of substances with many different characteristics, but all of these are composed of the basic elements of hydrogen and carbon. They are therefore known as hydrocarbons. Their basic qualities are determined by the number of carbon atoms combined in each molecule.

2. The simplest hydrocarbon, methane, is a gas composed of one carbon atom and four hydrogen atoms, CH_4. Methane is first liquified by cooling to ÷163° C. Hydroncarbons with molecules containing two, three and four carbon atoms per molecule (ethane, propane, butane) are liquified at constant higher temperatures up towards 0° C.

3. The number of components in gaseous and liquid form, however, is also dependent on pressure. A number of gaseous components which can be liquified at temperatures near 0° C or under moderate pressure will dissolve and be carried through pipelines with the oil. This is known as «wet gas» or «condensate».

4. Oil is similarly an inclusive term for all those components which can be liquified under normal temperature and pressure conditions. It is a complex combination of hydrocarbons, whose basic components have approximately 7 to 50—60 carbon atoms per molecular cluster. Thus it covers a span from the simplest gasoline fractions to heavy asphalt.

5. The deposits of petroleum around the world vary in composition from gas fields which are mainly methane, such as the Frigg field in the North Sea, to deposits with gradually increasing amounts of heavier fractions. The Ekofisk field contains approximately equal amounts of usable energy as oil and gas, but the condensate comprises ca. 8 per cent. Approximately «pure» oil fields also exist. Often these lie at shallow levels, so that the gas escapes. In deposits of shale oil and tar sand the easily liquified components also evaporate.

6. In 1972 oil comprised approximately 60 per cent of the energy consumption in Western Europe (OECD countries). This consumption, amounting to ca. 660 million tons, was divided by product as indicated in Table 1.1.1.

Table 1.1.1 Oil Consumption in Western Europe in 1972 According to Commodity.

		Per cent	Million tons
Gas from oil		13	1.9
Aviation gasoline		17	2.6
Engine gasoline		84	12.6
Kerosene	(Gasoline fractions mainly used as industrial raw materials)	8	1.3
Naphtha		30	4.6
Gas-oil/Diesel oil		200	30.0
Fuel Oil		277	41.8
Other		35	5.2
Total		664	100.0

Source: Ministry of Commerce.

Table 1.1.2 Oil Consumption in Western Europe in 1972 According to Use.

	Per cent	Million tons
Road transport	113	17.1
Railway transport	3	0.5
Air transport	17	2.6
Domestic water transport	6	1.0
Electric power production	65	10.0
Gas production	4	0.6
Iron and steel industry	18	2.5
Petrochemical industry	42	6.5
Other industry	163	24.6
Stockpiles	43	6.6
Residential heating	135	20.0
Other	55	8.0
Total	664	100.0

Source: Ministry of Commerce.

The means of consumption are indicated in Table 1.1.2.

A total of ca. 6—9 per cent of petroleum resources are used as industrial raw materials.

The overall consumption pattern of energy in the various countries varies according to the supplies of other energy. Consequently petroleum products account for ca. 90 per cent of energy consumption in Denmark, ca. 55 per cent in Western Germany (the main alternative is coal), ca. 52 per cent in Great Britain (44 per cent from coal and 3 per cent from nuclear energy) and ca. 45 per cent in Norway (the main alternative is hydroelectric power).

1.2 THE PARTICULAR PRODUCTS

1. Gas is an energy source which is easy to distribute within a concentrated consumption area, and which is suitable for both private and industrial heating and for the production of electricity. Therefore England and many places on the continent have long depended on a conversion of coal to gas and the distribution of this gas via a network of pipelines.

The large gas discoveries in France and later in the Netherlands late in the 1950's hastened this development, so that an integrated gas delivery network now exists over large areas of Europe. Now this network will be supplied from sources in the Soviet Union as well.

The share of gas in Europe's energy balance has increased from 2 per cent to 7 per cent, or to ca. 70 million tons, during the ten year period preceding 1970.

2. The transportation of gas from the source in a cooled state where pipelines are not practically possible, is a more recent development, and today constitutes 8—10 million tons — approximately Norway's oil consumption. Factors such as increased petroleum prices, cheaper freight via refrigerated tankships, and an increased emphasis on preserving resources, indicate a sharp increase in this form of transport. Nevertheless, at sources with a blend of both oil and gas which are situated without suitable access to markets, up to half the energy is burnt of on the spot as unusable gas, while the remainder is shipped out as oil.

3. Of the gas which is exploited, ca. 95 per cent is used as a source of energy, while the remainder is raw material for the petrochemical industry. Gas involves lower investments and operating costs than other petroleum raw materials in the manufacture of simple basic products, such as ammonia and methanol, which in turn are the raw materials for the manufacture of such things as e. g. fertilizers and varnish/glue.

4. Wet gas can be split or cracked into the simplr methane gas, or it can be built up (synthesized) to heavier oil fractions. Wet gas, which can be classified as a medium weight petroleum fraction, is also economically favourable for the manufacture of medium weight petrochemical products such as ethylene, which is the base for a number of plastic products.

5. Wet gas can be transported via pipelines together with and dissolved in oil under high pressure. The wet gas can then be separated from the oil when the pressure is reduced, and can be transported further in liquid form. This is the process for the wet gas which England gets from Ekofisk. At other deposits (e. g. those on land) it may be more economical to separate the wet gas at the source for separate transport. The shipment of wet gas requires less cooling than methane and is therefore much cheaper, but it is still a more expensive undertaking than transporting oil. Wet gas which is transported with the other gas is usually, though not always, distributed further with the other gas and used for heating since, it is too expensive to separate the components.

6. Crude oil is nearly always refined before use. Since the rise in transportation by large tankers, particularly after the Suez crisis in 1956, it has been cheaper to transport crude oil than refined products. Refineries are therefore usually built close to the markets. Thus the capacity in Western Europe tripled to ca. 700 million ton crude oil between 1960 and 1970. In recent years, however, there has been a mar-

ked tendency towards building refineries near the sources since the producing countries regard this as a means of industrialization.

7. Gasoline and oil from refineries are used as raw materials for the production of the same petrochemical products as are made from gas and condensate. The investments are greater, but cheaper raw materials, access to markets, etc., can make the process economical. Oil and gasoline are also the bases for heavier petrochemical products such as benzene, toluene, propylene, etc., which are in turn raw materials for other industries, like the manufacture of fibres (rope, carpets), plastic foam, synthetic rubber and nylon.

1.3 PRODUCTION AND CONSUMPTION

1. The international pattern of sea transportation of oil in 1972 is depicted in Figure 1.3.1. The diagram illustrates the dependence of Western Europe and Japan on oil from the Middle East, Nigeria, Libya, the Carribbean and Indonesia. On the other hand, the United States is well on the way to being self-sufficient in petroleum, while the Soviet Union is self-sufficient and also exports some gas and oil.

2. The production and consumption of important countries and areas in 1970 is shown i Table 1.3.1, together with prognoses for 1980. Among other things, the table indicates that the dominant position of the Middle East in oil exportation is expected to be even more marked in the years ahead. According to the same assessment the North Sea is expected to produce 150—200 million tons in 1980, of which ca. 50 million tons will come from the Norwegian sector. The prognoses are based on the assumptions that

Table 1.3.1 Estimate of Possible Production and Consumption of Oil.

	1970			1980		
	Prod.	Cons.	Bal.	Prod.	Cons.	Bal.
Western Europe	20	667	÷647	170	1 225	÷1 055
North America	590	771	÷181	775	1 165	÷ 390
Japan	—	191	÷191	—	435	÷ 435
Latin America	266	115	+151	325	225	+ 100
Africa	270	55	+215	500	100	+ 400
Soviet/Eastern Europe	400	340	+ 60	700	750	+ 50
Other	56	53	..	100	200	÷ 100
Middle East	750	160	+590	1 830	300	+1 530
Total	2 352	2 352		4 400	4 400	

Source: «A Study from the Oil Committee of OECD», Paris, 1973.

Figure 1.3.1 Patterns of Ocean Transport for Oil 1972.
Source: OECD, 1973, adapted by the Ministry of Industry.

Table 1.3.2 Need for Primary Energy (Million tons oil equivalents).

	1970	1980	Per cent annual increase
1) OECD — Europe			
Total	1 041	1 757	5.4
Oil	620	1 113	6.0
Gas	70	231	11,9
2) North America			
Total	1 763	2 869	5.0
Oil	763	1 209	4.7
Gas	598	870	3.8
3) Japan			
Total	266	635	9.1
Oil	190	466	9.4
Gas	4	14	14.5

Source: OECD, Summer, 1973.

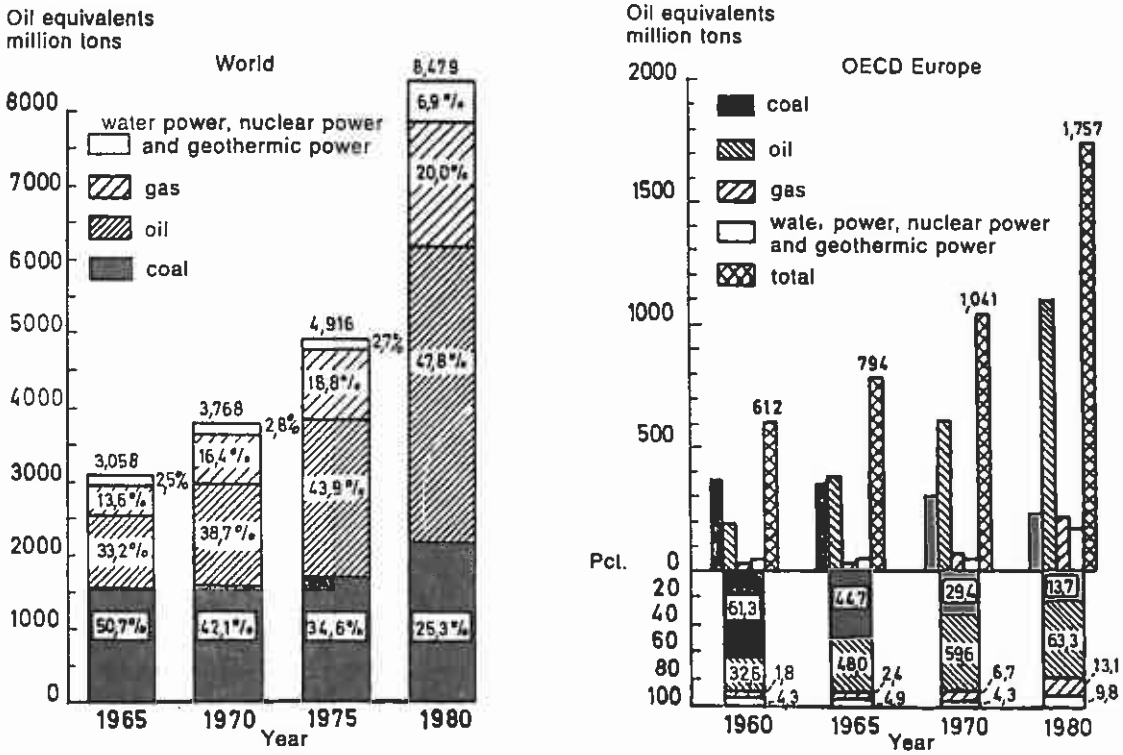


Figure 1.3.2 Energy Prognoses. (Consumption calculated in million tons oil equivalents.)
Source: OECD, 1973.

the production of petroleum at any time will satisfy demand, and that prices will vary only moderately around the 1970 level. Today it is evident that these assumptions must be subjected to reevaluation.

3. Up to 1970 energy consumption in the world increased by ca. 5 per cent annually to 4—5 milliard tons calculated in oil equivalents. Of this, sligthly over half was petroleum. However, petroleum consumption increased by ca. 8 per cent annually, and it can be assumed that the demand will continue to increase at the same rate with a continuation of table supplies and only moderate price increases. The long term effects of the present situation, where neither of these conditions remain valid, must be evaluated against a background of the possibilities for reducing the growth in the total energy consumption of the industrialized countries and the possibilities of replacing petroleum with other forms of energy. At present there is no reliable forecast of this problem situation.

4. In 1970 Western Europe con-

sumed ca. 1 milliard tons of oil equivalents, of which ca. 700 million tons were oil and gas (70 million ton gas). Her own total production was an estimated 30—40 million tons. Table 1.3.2 indicates the need for energy in Western Europe, North America and Japan. Figure 1.3.2 illustrates the growth in energy consumption in the OECD countries from 1960 to 1970 and a prognosis for 1980. It shows how the consumption and production of solid fuels (coal) has declined 25—30 per cent, while the consumption (import) of oil has increased by ca. 300 per cent.

1.4 OTHER ENERGY RESERVES

1. The continued development of water power resources has definite limits in Western Europe and North America, so that the relative importance of water power is expected to be halved by about 1985. The large usable waterways in Africa and South-east Asia represent over 40 per cent of the world's total resources in this area, or almost three times the combined potential in North America and Western Europe together.

2. Western Europe's coal deposits are considerable. At present these are considered more expensive to utilize than the coal deposits in the United States, Australia and South Africa. However, we should not ignore the possibility that extraction and exploitation might be easier in the future than it is today, e. g. by converting coal directly to gas in the mines, thereby reducing the need for conventional, labour intensive coal mining. Coal could then become equally as important as oil is today, and those areas of the world which have the largest and most accessible deposits, would be of comparable importance.

3. To the degree that the increased demand for energy cannot be met by fossilized fuels and water power, nuclear power is the only meaningful alternative for the remainder of this century.

The exploitation of heat from the earth, or geothermal energy, evidently has great potential, but the difficulties involved in a practical exploitation of this energy source in the foreseeable future make it of very limited importance. It is used to some degree today in New Zealand, Italy, the Soviet Union and Iceland.

The amount of solar energy radiating on the earth is enormous, but the exploitation of this form of energy will hardly be realized in the foreseeable future except in very special areas. Some research projects have been initiated to investigate the exploitation of solar energy on a large scale by using solar batteries, partly in satellites, with wireless relay to earth.

The fusion reactor («the tamed hydrogen bomb») will exploit deuterium from the sea, and when realized will mean an infinite source of energy, but it is not known whether or when the technical problems will be solved.

1.5 PETROLEUM RESERVES

1. A study by the National Academy of Sciences in the United States in 1969 predicted that ca. 80 per cent of the earth's extractable gas resources will be depleted by about 2000 A.D. Correspondingly, oil resources are estimated as satisfying ca. 30 years' consumption at the 1972 level, while coal reserves are assumed adequate to satisfy 150 years of steadily increasing consumption.

2. Rising energy prices will make it profitable to extract oil fram deposits of tar sand and shale oil, especially in the United States and Canada. (Shale oil is a solid hydrocarbon which can be mined.) In addition, it will be feasible to extract petroleum from deposits under the ocean and from other deposits which have been uneconomical until now.

Table 1.5.1 World's Possible Exploitable Petroleum Reserves.

	Thousand million tons		
	Ocean areas	On land	Total
Oil — primary extraction	108	205	313
Oil — secondary extraction (increased degree extraction)	49	137	186
Oil from tar sand	27	96	123
Natural gas (in oil equivalents)	55	110	165
	239	548	787

Source: Weeks, L. G., «Marine Geology and Petroleum Resources», 8th World Petroleum Congress, Moscow, 1971.

Table 1.5.2 World's Assumed Petroleum Reserves, 1972.

	Oil		Gas	
	Milliard tons	Per cent	Milliard tons oil equivalents	Per cent
Middle East	50	57.2	9	19.9
Africa	7	9.1	5	11.2
USA and Canada	7	8.6	9	18.8
Latin America	4	5.0	2	4.1
Far East and Australasia	2	2.4	2	4.0
Eastern Europe, Soviet and China	13	15.4	15	32.4
Europe without the North Sea	0.5	0.4	3	6.6
	83.5	98.1	45	97.1

Source: B. P. Statistical Review, Oil and Gas Journal.

3. All such estimates of possible or potential reserves, however, are based on very approximate assumptions. Thus the world's possible petroleum reserves in 1971 were estimated in the neighbourhood of 800 milliard tons (se Table 1.5.1). The probability of discovering petroleum in areas which have not as yet been explored, were taken into consideration. In addition, there are deposits of shale oil which contain an estimated 300 milliard tons. That same year the world's presumed reserves, i.e. reserves which are known to some extent, together with those which will probably be discovered in known petroleum producing areas, were estimated at ca. 140 milliard tons (oil and gas). (Table 1.5.2.) The consumption for that year was ca. 3.5 milliard tons. The last table shows that the oil reserves in the Middle East countries were estimated at ca. 50 milliard tons, or over half the total reserves. The estimated oil reserves in the North Sea now appear to be at least 5—6 milliard tons, with a corresponding amount of gas.

1.6 PROGNOSES FOR THE PRICE AND CONSUMPTION OF PETROLEUM

1. The growth in petroleum consumption occurred during a period when the prices of oil and gas went down, and there were no difficulties in delivery. The price fall was a result of, among other things, the offer of oil on the market by smaller companies, where previously there had been a balance between supply and demand. The price of fuel oil, converted to price pr. kWh, has thus been a half to a third of the price of Norwegian electricity for heating purposes.

2. The growth in consumption means, however, a more rapid depletion of the resources than the producing countries appear to be willing to accept in the long run. One means of reducing consumption is to gradually raise prices towards a level where petroleum is replaced by other forms of energy, such as coal and nuclear power. In recent months such a goal has been clearly expressed by several producing countries.

3. There is no unambiguous «world market price» for crude oil. A great deal of the transactions (buying and selling) takes the form of internal sales within integrated, multinational companies, and the account prices are not determined on any «market». The prices for crude oil realized outside these companies depends, among other things, on the global supply situation at a given time (in the short run). In recent months the sale of such oil at very high prices has been reported, but it is uncertain to what extent transactions have actually taken place under the stated conditions.

4. The fixation of taxes and levies in the OPEC countries are made on the basis of a stipulated price or «posted price». The price for crude oil delivered in the Persian Gulf in February, 1974, was ca. Kr. 480 per ton ($ 12.00 per barrel). (The posted price varies slightly according to the quality of the crude oil.) This quotation remains valid up to April 1, 1974. With this as a departure point, the cost level (production costs plus taxes and levies) for crude oil delivered in the Persian Gulf is calculated as slightly over Kr. 280 per ton ($ 7.00 pr. barrel). In order to get some picture of a conceivable «market price» for crude oil in Europe, the transportation costs (ca. Kr. 60 per ton or $ 1.50 per barrel) and profit must also be taken into consideration.

5. At present it is difficult to comment on the delevopment of the world oil markets in the years ahead. For illustrative purposes it is estimated in this report that crude oil from the Norwegian continental shelf will be

sold for refining in Northern Europe in a few years time for a delivery price of Kr. 320—400 per ton ($ 8.00 10.00 per barrel), expressed in 1974 kroner. The market price for gas in the places of consumption will be related to the oil prices.

6. The production cost for most of the crude oil from the Middle East is less than $ 30.00—40.00 per barrel. The production costs for the oil fields now under development in the North Sea, will amount to ca. $ 1.50 per barrel, but the production costs could easily increase to $ 5.00 per barrel at new fields located at a greater depth under the sea. Transportation costs will vary with the location, and will depend on whether ships or pipelines are used, but the transportation costs from the areas south of Lat. 62° N will be comparatively lower because of their proximity to markets.

Oil produced in the United States, and especially in Alaska, is substantially more expensive than Middle East oil. Oil from slate and tar sand or synthetic oil from coal is even more expensive.

7. The suggested price level is an expression of the fact that oil will become a scarcity. Technically it will be possible to increase production to satisfy demand for a long time to come, should the producing countries, particularly in the Middle East, wish to. They could then, for example, underbid North Sea oil or other energy sources. However, this is not thought probable. But if alternative sources of energy (coal, synthetic oil and gas from coal, nuclear power, etc.) come into wider use, the price of oil could go down.

8. The producing countries now determine their price policies and production quantities independently, and it is to be expected that they will continue to do so in the future. It is therefore assumed that the prices could rise to a level where it would be profitable to develop other forms of energy. Several independent observations imply that this level will correspond to a market price of Kr. 400 per ton crude oil ($ 8.00—10.00 per barrel) for a number of years, compared to Kr. 100—120 per ton ($ 2.00—2.50 per barrel) in 1972, all expressed at today's price level. In the longer view, when the capacity of these alternatives is developed, the energy prices can drop, and the price of oil will again be lower, at an estimated Kr. 250 per ton ($ 6.00 per barrel) measured at today's price level.

9. Such prices will continue to give good profits in oil production in most places. This will probably stimulate an accelerated exploration in various parts of the world. Should large deposits be discovered, there would be an excess supply compared to the demand. In such circumstances prices could drop considerably.

In addition, it is not only oil prices which will be determined by how rapidly other forms of energy are developed. It is expected that all industrialized countries will make great efforts to develop new forms of energy, regardless of short term profit considerations.

The Organization for Economic Cooperation and Development (OECD) is undertaking an energy analysis where the possible developments in oil prices over a long period constitute the central theme. The report will be available in the summer of 1974.

10. Increased prices for energy will lead to a gradual alteration in the energy economies of industrialized societies and probably to a lower rate of consumption increase. This could take place due to better insulation of dwellings becoming economical, increased collective transportation, smaller and more economical automobile engines, certain alterations in industrial production, etc. However, all this will be a time consuming process of conversion which could spread over several five year periods. For the time being it is difficult to estimate to what degree increased petroleum prices will result in the replacement of oil and gas by other forms of energy. But to suggest one dimension, it can be approximately estimated that today's price level will reduce consumption by the beginning of the 1980's by 15—30 per cent in comparison with earlier prognoses. Still, the growth of petroleum consumption in the next ten years will be considerable. The industrialized countries must therefore expect to remain depedent on oil as the dominant source of energy well into the 1980's even with strong increases in prices.

CHAPTER 2

The Continental Shelf

Prepared in Cooperation with the Ministry of Fisheries and the Ministry of Industry.

2.1 INTRODUCTION

1. The continental shelf is geologically defined as an area between land and the deep ocean with rock formations of continental type. Beneath the ocean depths are rock formations of oceanic type. The continental shelf can be divided into a plateau and a slope. The boundary between the slope and the seabed can be determined by geophysical measurements. In large part of the area north of Lat. 62° N the boundary goes to a depth of 2000 meter.

2. In the Geneva Convention on the continental shelf of April 29, 1958, the following definition is given:

«For the purpose of these articles, the term «continental shelf» is used as referring (a) to the seabed and subsoil of the submarine areas adjacent to the coast but outside the area of the territorial sea, to a depth of 200 meters or, beyond that limit, to where the depth of the superjacent waters admits of the exploitation of the natural resources of the said areas; (b) to the seabed and susoil of similar marine areas adjacent to the coasts of islands.»

3. The extent of the Norwegian continental shelf is contained in the Royal Resolution of May 31, 1963. Under this Norway claimed her sovereign right of exploration and development of the natural deposits to feasible depths, although not beyond the median line in relation to other nations. Norway has furthermore concluded agreements on the delimitation of the continental shelf with Great Britain (March 10, 1965), Denmark (December 8, 1965) and Sweden (July 14, 1968). All of these agreements were based on the median line principle and imply a precise delimitation of the Norwegian continental shelf south of Lat. 62° N.

No corresponding agreements have been concluded for the continental shelf north of Lat. 62° N. Here the problem of delimitation towards the deep-sea is still outstanding, a problem which is expected to be handled by the coming United Nations' conference on the laws of the sea.

2.2 FISHERIES IN THE NORTH SEA AND ON THE CONTINENTAL SHELF NORTH OF LAT. 62° N

2.2.1 Fishing Grounds

1. The North Sea must be regarded as one of the richest fishing grounds in the world, and is a very important fishing area for the European fishing nations. The North Sea covers a vast plateau at an average depth of 100 meters. There are both deeper and shallower fishing banks. The fishing banks of most consequence to Norwegian fishermen are on the western side of the Norwegian Channel, where we have the important fishing grounds of Revet (off Jæren), the Patek Bank and the Viking Bank. Among other fishing grounds which are situated relatively near the Norwegian coast and within the Norwegian continental shelf area, can be mentioned the Great Fishing Banks, the Ling Bank and the Coral Bank. Fish are found at all depths in the North Sea, usually between 75 and 150 meters, but in the Norwegian Channel there are fish at depths down to 400—500 meter. In the deeper areas of the North Sea with soft floor areas fishing for deep sea shrimps takes place.

Fishing in the North Sea is carried out by an international fishing fleet, consisting mainly of vessels from Norway, Denmark, Sweden, Great Britain, Poland, Western Germany, Eastern Germany and the Soviet Union. There is year round fishing in the North Sea for herring, mackerel, shrimp, Norway pout, and sand eel, as well as for ground fish like cod, coalfish, haddock, flounder and other types. Trawling is the common type of fishing used by most countries, although ring nets, running trawls and Danish seines are also used.

2. Off Møre and Romsdal the coastal bank forms an extensive plateau stretching 70—100 km. out from land, with a steep slope to the depths of the Norwegian Sea.

The banks farthest offshore have the general name of «Storegga» or «Great Reefs», but different stretches of the reef have their own specific names. The southernmost part of the Great Reef stratches out in a point called «Aktivnesset». Farther north lie «Korallneset», «Skateneset», «Nordegga» and «Storeneset», the latter situated approximately west of Smøla.

Off Trøndelag are the Frøya Banks, situated 25—70 km. west of Frøya. Further north the Halten Banks stretch 40—80 km. west of Kya lighthouse. Nortwest of Sklinna is a third shallow bank which stretches 20—50 km. west of Sklinna lighthouse.

The structure of the fishing off the coasts of Møre and Romsdal and Trøndelag indicate that this bank plateau is an area which is naturally rich in fish.

Along the edge of the reef off Møre—Trøndelag and on the extensive bank plateau within it year round fishing is carried out with lines, trawls, ground nets and Danish seines. The types of fish caught are cod, coalfish, ling, cusk, haddock, halibut, dogfish, skate, angler, porbeagle shark and besking shark. Quantitatively coalfish is the most important.

3. The coastal banks off Nordland can be divided into two natural fishing areas, the Helgeland Banks from Nord-Trøndelag to Lofoten, and the Vesteråls Banks from Røst to Andenes.

The coastal bank is divided into several areas with special names. In the north it tapers off, and off Andenes the edge of the reef cuts in towards land in a deep curve known as Bleikdjufta.

The most important fishing activity in the stretch between Vikna and Lofoten is winter catches of cod (spawning cod). Most of this is carried out near land, inside the fishing limits. Off Lofoten it is carried out from February to April, mostly beneath the cliffs on the north side of Vestfjord.

4. Off Troms the coastal bank stretches 25—100 km. out to sea, and is divided into separate bank floes. To the south lie Sveins Shallows and Malang Shallows, both with depths under 100 meter, and the Northwest Bank with depths of 100—150 meter. Off the Lopp Sea lie the extensive Fugløy Banks with depths under 200 meter. These stretch some 100 km. out to sea.

Individual parts of the Fugløy Banks have their own names. Within the Fugløy Banks, near the fishing limits, are a series of shallows with depths under 100 meter which also have their own names. They are all important fishing grounds. To the north in the Norwegian Sea the Fugløy run into the Tromsø Floe with depths of 200—300 meter. This far-reaching bank extends north almost halfway to Bear Island.

Sveins Shallows, Malang Shallows and the Northwest Bank are among the richest fishing grounds along the Norwegian coast. Winter is the most important fishing season. Fishing begins in October with net fishing for coalfish along the edge of the reef. This is mainly concentrated on the outer side of the Northwest Bank and in the Malang Shallows. Fishing for coalfish goes naturally over to catching spawning cod from New Year's to March/April. The cod are taken with both line and net, with the activity concentrated in the Malangs and Sveins Shallows. In winter large fishing vessels from the Tromsø district fish with lines off the Northwest and Fugløy Banks. During the cod season from January to April there is also a large concentration of foreign and Norwegian trawlers on the Great Banks off Troms. Sveins and Malang Shallows are also very crowded trawling areas at that time of year.

There is also important summer fishing on the sea banks. This is of a different type than the winter fishing. The most important fishing on the banks in summer is for coalfish and blue halibut.

5. Off the hills (200 m. contour) along the coast of Finnmark there is a wide, deep channel, «Leira», with depths up to 300 meter. This channel runs through Tanafjord and Porsangerfjord, in towards Revsbotn and Kvenangen. These deep channels form a natural division between the coastal banks on the east and west sides of the reefs. The Leira forms the divide between the coastal banks and the nearby sea banks beyond. The inner slope of these sea banks lies 30—40 km outside the shallow line. They form a chain which stretches from the East Bank off Vardø, through the North Bank, Nysleppen and the North Cap Bank to the Helmsøy Bank. North of the North Cap Bank lie the bank plateaus around Hope Island, Bear Island and Spitsbergen. These fishing banks are trawled year round by an international fishing fleet, mainly from Great Britain, Norway and the Soviet Union.

From the Lopp Sea north to the area off Sørøya runs a deep channel with good grounds for line and net fishing. There are good fishing grounds stretching from the north and northeast parts of Sørøya to the North Cap. Just west of Nordkyn the incline dips to the Sværholt Sea. This open area of sea forms a natural boundary between the fishing grounds of East and West Finnmark. From the heights and down over Leira, along the entire coast from Nordkyn beyond Vardø to the border with the Soviet Union, are excellent fishing grounds for all types of tackle.

Along the coast of Finnmark spawning cod and cappelin cod are the main seasonal fish from January to March, with spring cod predominating from then until the beginning of May. There is also considerable fishing

for cod, coalfish and haddock in the spring and summer. Some years there is also fishing for summer cod.

Thus fishing in Finnmark is very varied and goes on more or less continuously throughout the year, with fishing vessels from all parts of the coast taking part.

2.2.2 Catches

1. In 1973 the Norwegian fishing fleet had a catch of 2.9 million tons with at «first hand» value of 1.9 milliard kroner. Approximately ¾ of the Norwegian catch was taken in Norwegian waters, within 80 km. (50 nautical miles). The remaining ¼ mainly represents Norwegian fishing beyond 50 nautical miles in the Barents Sea, the Norwegian Sea and the North Sea. For the fishing in the coastal waters and fishing grounds of other countries, that carried out east and west of Great Britain is especially important.

2. The total fishing catches south of Lat. 62° N from 1970 to 1972 in the North Sea, Skagerak and Kattegat were 3.0—3.6 million tons, of which Norwegian fishermen took 560,000—660,000 tons or slightly under 20 per cent. (See Table 2.2.2.)

Norwegian fishing south of Lat. 62° N was predominantly for herring, mackerel and Norway pout, but coalfish, shrimp and dogfish were also important. The fishing activity was divided with an estimated one half in the Norwegian sector, somewhat under half in the British sector, and a smaller part in the Danish sector.

The «first hand» value of the Norwegian catch south of Lat. 62° N in 1973 was over 500 million kroner.

If the catches of cusk and ling taken off the Faroes, Rockall and the Hebrides, are included in the cath taken south of Lat. 62° N the value for 1973 clims to an estimated 600 million kroner.

For future fishing in the area south of Lat. 62° N is expected that kolmule (a type of cod) will be a catch of considerable value. The same will apply to catches of Atlanto-Scandinavian herring, when the stock situation has improved.

Table 2.2.2 Total Catch and Norway's Share, 1970—1972. 1,000 tons round weight

	Herring, Brisling, Capelin, Norway pout, Sand eel, Arctic cod, Horse mackerel			Cod, Coalfish, Haddock			All types of fish		
	1970	1971	1972[1])	1970	1971	1972[1])	1970	1971	1972[1])
All Countries:									
Kattegat and Skagerak	144	158	138	81	92	100	225	250	238
North Sea	1,536	1,698	1,655	1,499	1,062	1,176	3,035	2,760	2,831
Total	1,680	1,856	1,793	1,580	1,154	1,276	3,260	3,010	3,060
Barents Sea	972	790	645	615	361	484	1,587	1 151	1,129
Spitsbergen and Bear Island	326	72	6	205	184	93	531	256	99
Norwegian Sea	344	912	1,132	725	715	634	1,069	1,627	1,766
Total	1,642	1,774	1,783	1,545	1,260	1,211	3,187	3,034	2,994
Norway:									
Kattegat and Skagerak	42	27	12	5	5	5	47	32	17
North Sea	562	477	467	50	48	79	612	525	546
Total	604	504	479	55	53	84	659	557	563
Barents Sea	725	441	449	136	96	103	861	537	552
Spitsbergen and Bear Island	325	69	—	12	15	14	337	84	14
Norwegian Sea	343	912	1,132	512	553	561	855	1,465	1,693
Total	1,393	1,422	1,581	660	664	678	2,053	2,086	2,259
Norway's share of the catch in per cent:									
Kattegat, Skagerak and North Sea	36.0	27.2	26.7	3.5	4.6	6.6	20.2	18.5	18.4
Norwegian Sea, Barents Sea, Spitsbergen and Bear Island	84.8	80.2	88.7	42.7	52.7	56.0	64.4	68.8	75.5

[1]) Provisional figures.

Source: The International Council for Exploration of the Seas (ICES).

3. The total fishing catches north of Lat. 62° N in the Norwegian Sea, the Barents Sea and off Bear Island and Spitsbergen in 1970—1972 were 3.0—3.2 million tons, of which Norwegian fishermen took 2.1—2.3 million tons, or 64—67 per cent.

For Norwegian fishing north of Lat. 62° N cod, haddock, coalfish and cappelin are the most prominent fish, both in quality and value, but other types of fish like blue halibut, cusk, rosefish and shrimp, among others, are also important. In this area as well the catch of Atlanto-Scandinavian herring will be important when the stock situation has improved. The «first hand» value of the Norwegian catch north of Lat. 62° N in 1973 is estimated at 1.1 milliard kroner.

4. Approximately 6 million tons of fish are caught annually on the Norwegian continental shelf (see Table 2.2.2). The «first hand» value is estimated at roughly 5—6 milliard kroner. These estimates are in part based on incomplete information.

2.3 EXPLOITATION OF OTHER NATURAL RESOURCES

The Royal Resolution of June 12, 1970, established rules for the exploration for certain other underwater natural deposits other than petroleum on the Norwegian continental shelf. Only a very few permissions to explore have been granted under this Resolution, and no meaningful discoveries have yet been made. (Reference Parliamentary Report No. 76, 1970—71.)

At present it is mainly sand and tar which can be exploited on a commercial basis. Underwater sand deposits can be used in large concrete constructions, among other things. Tar is used in the produciton of alginate.

2.4 EXPLORATION FOR PETROLEUM AND ESTIMATES OF RESERVES

2.4.1 Introduction

1. Petroleum essentially consists of hydrocarbons formed of organic material. The organic material was originally buried in clay, together with finely ground sediment, and subsequently converted into hydrocarbons by slow processes under favourable conditions of temperature and pressure. Some of the hydrocarbons thus formed were then pressed out of the finely grained rock formation and collected in porous and permeable reservoir rock formations, such as sandstone, lime and dolomite, where they are covered over by non-porous rock formations.

2. By means of seismological exploration it is possible to chart the geological formations beneath the seabed and to detect structures where hydrocarbons may have accumulated. Comprehensive seismological explorations are therefore made before drilling projects are undertaken. Such explorations in themselves are not adequate for detecting oil deposits. For this drilling is necessary.

3. In the North Sea there are rock formations where hydrocarbons have formed, mainly in the Carboniferous, Jurassic, Cretaceous and Lower Tertiary periods. The most important potential reservoirs are found in the Permian (sandstone and dolomite), the Triassic and the Jurassic (sandstone), as well as in the Cretaceous and the Tertiary periods (limestone and sandstone).

A geological timetable is presented in Figure 2.4.1. The time origins of the oil and gas discoveries in the North Sea are also given. The geology of the North Sea is described in greater detail in a Parliamentary Report on the operation on the Norwegian continental shelf, which will be presented later in the spring session.

4. The Norwegian continental shelf consists of several areas with large sediment «parcels».

Farthest south is the North Sea Basin. This is divided into several smaller basins with ridges between. Exploration has revealed that there are two main areas with thick layers of sediment north of Lat. 62° N. Between Lat. 62° N and Lofoten sediments to a thickness of several thousand meter have been detected. The area between Lofoten and Lat. 69° N has its «basement» on a ridge, so that the sediment there is very much thinner. Further north, off Troms and out towards the Barents Sea, another layer of sediment several thousand meter thick has been detected.

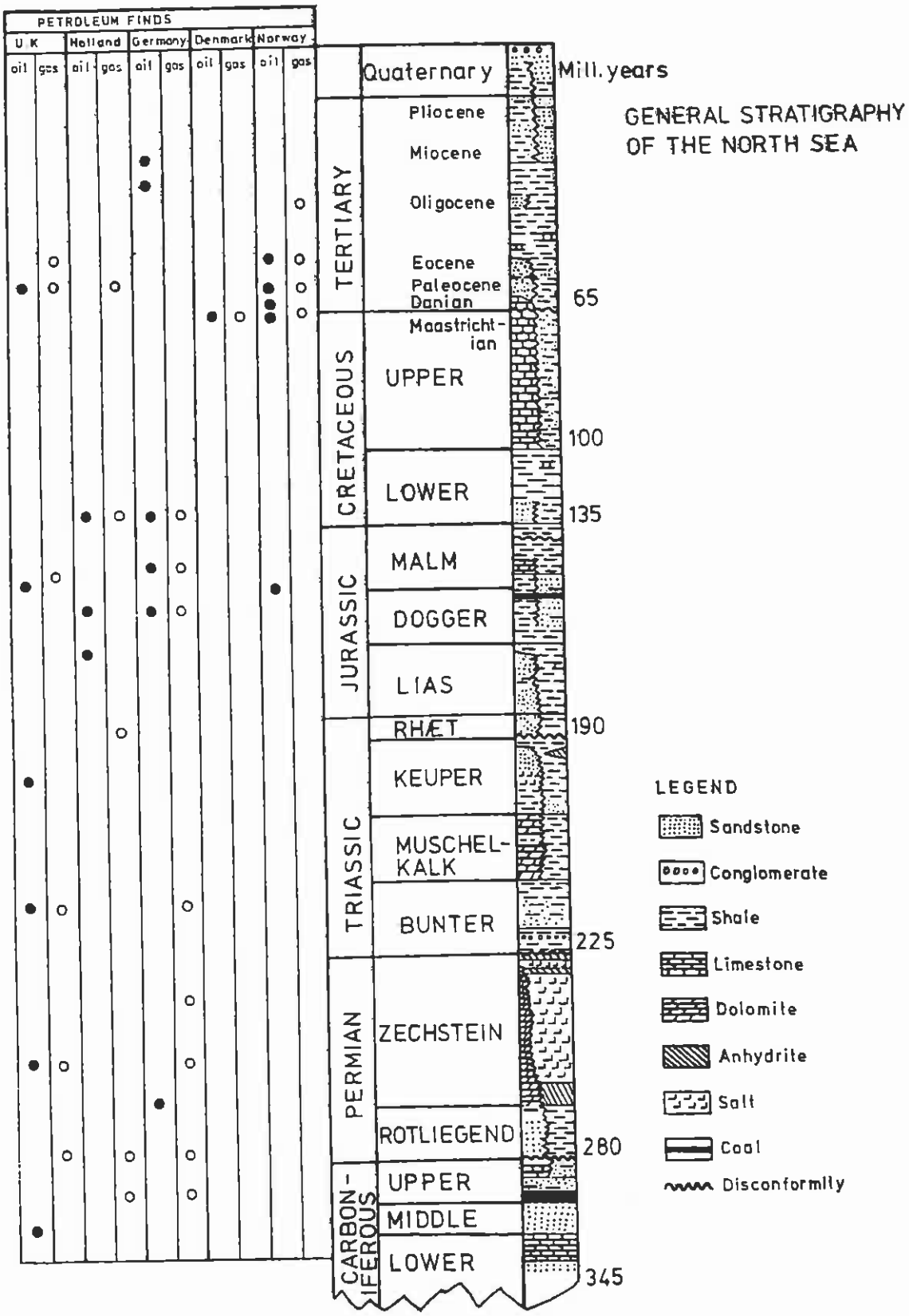
5. All in all, sediment basins which are several times larger than those south of Lat. 62° N have been discovered. It should be noted that the areas of geological interest stretch out towards much deeper ocean depths than where drilling has been carried out up to now. This applies to the North Sea as well.

This is especially true of the areas off Trøndelag/Nordland, where there are areas of geological interest at depths down to 1000 meter.

2.4.2 Estimates of Reserves

1. An evaluation of the information available at present, together with realistic assumptions of the possibilities in the unexplored blocks, does not give the Norwegian Petroleum Directorate any grounds for essentially alter-

Figure 2.4.1 Geological Timetable with Specification of Petroleum Deposits in the North Sea.



ing the estimations for the total reserves on the Norwegian continental shelf south of Lat. 62° N given in Parliamentary Report No. 51, 1972—73. These estimates are:

Total exploitable reserves of oil 1—2 milliard tons.

Total exploitable reserves of gas 1—2 milliard Nb^3, or ca. 1—2 milliard tons of oil equivalents.

These reserve figures express an estimate of the sediment basin and known prospective horizons on which there is information from both Norwegian and British sources. Final judgements cannot be made without drilling, but it is assumed that should the estimates alter, it will be in a positive direction, as a result of new prospective horizons, new types of traps, new sediment basins and the like.

2. Correspondingly, the reserves on the British side are estimated at ca. 4—5 milliard tons of oil and approximately the same amount of gas. As far as Great Britain is concerned, eventual discoveries are expected in the Irish Sea (where gas has already been found) and in the English Channel.

3. At present it is not possible to make an approximate, well-founded estimate of the reserves north of Lat. 62° N. However, the preliminary seismological exploration offers grounds for optimism.

CHAPTER 3

The Operation In The North Sea

Prepared in cooperation with the Ministry of Industry.

3.1 SHORT HISTORY

1. In 1958 the United Nations adopted the principles for the division of the continental shelf areas for the exploration for and extaction of minerals and petroleum. I 1963—64 the North Sea countries adopted a convention to the effect that the North Sea, recognized as a continuous area, be divided on the median line principle. The pace of development on the Norwegian and British sides since that time has been quite different.

2. On the British side in the autumn of 1964 concessions were given in a considerable number of blocks. New concessions were granted in 1965, 1970, 1971 and 1972, until at present concessions for 112,000 km² have been distributed among ca. 75 oil companies. Of the total number of blocks only 15 per cent have been explored with drilling up to now.

3. On the Norwegian side extraction concessions for 78 blocks was given in 1965, and for 14 blocks on the southern part of the continental shelf in 1969. In 1973 two blocks were allocated after the discovery of the Brent fields on the British side of the boundary. The total covers 34,00 km².

Under the concession terms, 25 per cent of the area allocated in 1965 was to be returned to the State after the first six year period. In fact, the total returned was somewhat more. Another section is to be returned in 1974.

3.2 THE OPERATION IN AREAS OPEN FOR EXTRACTION

1. Since 1962 121,000 km. of seismic profiles have been taken or «shot» south of Lat. 62° N. (North of Lat. 62° N 18,000 km of profiles have been taken since 1969.)

South of Lat. 62° N both the oceanic measurements and the processing (arrangement of data), as well as interpreting have been carried out by foreign firms. North of Lat. 62° N the measurements have been made under government auspices by Norwegian technical experts, with the processing done in cooperation with foreign firms. Up to now the total work has cost ca. 200 million kroner, or ca. 1,400 kroner pr. profile-kilometre.

2. As of today approximately 100 holes have been drilled in the Norwegian area, or between 10 and 20 per year, to search for deposits in, geologically speaking, new areas (wild cats), or to attempt to examine the extent of existing discoveries (step outs). All such investigations are carried out from mobile drilling platforms, which represent an investment of 150—200 million kroner each. The total cost of a drill hole, including rental of the drilling rig, maintenance, etc., has amounted to 20—30 million kroner. So far more than 2 milliard kroner has been spent on this activity.

In 1973 22 drill holes were started on the Norwegian continental shelf, and at the end of that year 7 mobile drilling platforms were in operation.

3. The investments in production platforms and equipment, drilling of wells in the Ekofisk, West Ekofisk, Cod and Tor fields, the pipelines to Teeside and Emden, together with the contructions on land will reach a cost of ca. 10 milliard kroner in 1976. Of this the pipelines will account for about one third, the production equipment on the fields for approximately a half, while the remainder will go to facilities on land.

At current prices the development of the Frigg field on both the Norwegian and English sides will require an investment of 6—7 milliard kroner by 1977—78.

4. The development in the North Sea has entailed the establishment of several supply bases on land in the Stavanger area. The combined investment in building these bases is estimated at 40 million kroner so far.

5. Approximately 400 persons were employed on Norwegian owned drilling rigs and supply vessels in 1973. Another 400 worked on the establishment of production equipment at sea. Base activities, including supply services, diving services, and technical services, including instruction, etc., involved at the most 700 persons. About 4,500 persons work in industrial and contruction activities directly connected with the oil operation in the North Sea. They are concerned with stationary concrete platforms, and other production equipment, mobile drilling rigs, etc.

All told, ca. 6,000 persons are involved in activities directly concerned with oil discovery and extraction. Of these ca. 1,000 are foreigners.

6. Exploratory activity has so far resulted in 14 discoveries (strikes). Ekofisk is a very large oil and gas field, even by international standards. Frigg is a

very large gas discovery, with some oil, which will hardly be extraced. At this stage reserves are estimated on the order of 300—400 million tons of oil and 500—600 million m^3 of gas. (The gas reserves correspond to 450—550 million tons of oil equivalents, calculated according to energy potential.)

7. The more rapid allocation of blocks in the British sector has resulted in three to four times more activity there than in the Norwegian sector.

Consequently the British have drilled almost 400 holes from mobile platforms, with about 20 rigs active in 1973. About 20 strikes have been made, several of which are under development for production. Some tens of fixed production platforms are already in place, and several pipelines for both oil and gas are being laid. Some gas fields have begun production.

Temporarily the production of oil, and to some extent gas, is modest because the equipment is not completed. However, the reserves are cautiously estimated at 500 million tons of oil and 600—800 tons of gas in oil equivalents. The total investments necessary to support this production are estimated at more than 40 milliard kroner up to 1980. These estimates were made in the summer of 1973 and will probably be adjusted upwards.

3.3 CONTROL OF THE RATE OF EXPLOITATION

The future operation on the continental shelf must be kept within the framework deemed desirable by a complete appraisal of the issues from the point of view of social development. The direction of the rate of exploitation is concerned with regulating exploratory activities and determining the rate of extraction after strikes are made.

3.3.1 Control of Exploratory Activity

1. The administration of the extent of exploration is relatively easy. The authorities themselves have every opportunity to select which areas will be opened for investigation and drilling. Among the technical factors which must be considered, are the possibilities of reserves in boundary blocks which could be emtied from the British side. This will be examined in more detail in the Parliamentary Report on the operation on the continental shelf, which will be presented in the spring session.

A further element in assessing the opening of a new area is the so-called «site-owner strategic consideration», according to which both promising and unpromising blocks are allocated together in the same announcement of block allocations. By coupling high priority blocks with those of lesser promise, better terms will be obtained for the latter than if they were allocated individually. Thus it is possible to obtain a balanced investigation of the shelf. Smaller fields, which otherwise might not have been commercially profitable, can be extracted together with larger deposits. This could be especially important at great depths where the costs are extraordinarily large. Such couplings are not unreasonable, in that projects often do not fulfill expectations, while large strikes have been made in areas which originally were thought to have little promise.

2. It takes many years from the time a strike is made until it is in full production. The Ekofisk field was discovered in 1969, but it will hardly come into full production before 1976. Although the development of possible new fields could progress at a faster pace, it is realistic to expect that the Norwegian production of oil and gas up to 1980 must be based on the discoveries already made, i. e. the deposits in the Ekofisk and Frigg areas.

3. The production of gas from these fields will be more or less constant over a 15—20 year period. The oil production from Ekofisk will decline in a few year's time, but it will still be considerable for 10 to 15 years. In any case, exploration activity will continue south of Lat. 62° N through the 1980's. If new discoveries are made, they will come into production in the 1990's, and could continue to produce long after the turn of the century. With a moderate rate of activity only a small part of the area worth investigating north of Lat. 62° N, will be explored by the turn of the century. Consequently, the contours of the operation appear to extend far into the next century.

4. Great uncertainties are necessarily connected with an appraisal of the possibility of making strikes which are worth developing. However, it must be assumed that the rate of new discoveries will depend in the long run on the drilling activity, and this in turn depends on the number of blocks allocated. Thus the blocks already allocated, and those which will be allocated, will to a large extent determine the future rate of production on the shelf.

5. As noted above, 15—20 holes have been drilled on the Norwegian continental shelf. An average of 1 to 8 million tons of oil equivalents per hole have been discovered for the ca. 100 holes which

have been drilled so far. However, this figure must be assessed against the fact that the companies have, until now, been able to select the most promising blocks, and have only drilled the largest structures. Therefore no direct conclusions with a view to a more balanced investigation can be made on the basis of these figures. The figures only apply to the operation south of Lat. 62° N. Because the geology north of Lat. 62° N is more complicated, it must be expected that the reserves per drill hole will be less on the average.

6. Ordinarily it is desirable to have established reserves for at least 10—15 years' production. In order to maintain the present level of production on the Norwegian continental shelf in the beginning of the 1980's, it is necessary to have available established reserves of at least 1,000—1,200 tons at any one time. Reserves of 800—1,000 tons are now established.

7. With the results up to now as a base, the drilling now underway on the Norwegian shelf could provide, schematically, annual detected reserves of 140—180 million tons of oil and gas. If exploration continues to have comparably favourable results, within a few years the detected reserves could be higher than is necessary to maintain the production level. However, the greatest uncertainty lies in the relationship between exploration and results. There is always the risk that the exploration will reveal appreciably smaller reserves than indicated, but it could also reveal considerably more. It will therefore be necessary to adjust the volume of exploration accordingly.

8. In the near future it is reasonable to assume that the companies will continue to drill ca. 5 holes per year in the blocks already allotted. A continued total exploration of 20—25 holes will result from the additional opening of an average 8—10 blocks per year, or 25—30 blocks every third year. It will therefore be necessary to precise that there is no guarantee of success. Detected reserves could be lower (down towards zero) or considerably higher than counted on.

It is not yet known whether there is any oil on the shelf off North Norway. In any case, it must be expected that possible discoveries will be few at first, while the geological formations are gradually being charted. More than 30 holes were drilled in the Norwegian part of the North Sea before the first profitable strike was made.

9. When the areas north of Lat. 62° N are opened, there ought to be an increase in production beyond that which can be sustained by the detected reserves south of Lat. 62° N. In order to extract resources simultaneously in several geological provinces which turn out to yield petroleum, it may be feasible to extend the build-up of the operations in the districts in time for a given total level of production.

10. The guidelines for administering the regulation of exploration are based on the basic geological characteristics south of Lat. 62° N, which are now becoming known.

Similar guidelines for the area north of Lat. 62° N cannot be drawn up before considerable exploration has been undertaken. Ten to fifteen times the annual production must also be detected in this area before steady production can begin. Thereafter it will be sufficient to detect reserves at the rate the known ones are developed.

3.3.2 Direct Control of Extraction

1. There is no assurance that a high level of exploration will increase the possibilities for discoveries and therefore the rate of extraction. On the one hand, extensive exploration can be fruitless, while on the other hand large discoveries can be made with very little exploration. Therefore, it is preferable to directly administer the rate of extraction, so that possible large strikes are exploited no more rapidly than deemed desirable by governmental bodies.

2. Once extraction concessions have been awarded, the possibilities for administering the extraction rate are limited. At any time, however, the Ministry of Industry can put forth more detailed regulations about measures aimed at a responsible exploitation of the petroleum deposits (conservation).

A condition can be included in the extraction concessions allocated in the future to the effect that possible discoveries in the concession areas can be regulated to a greater extent than has been warranted under existing Norwegian regulations.

3. It must be a goal to stipulate the rate of production which, in the opinion of the authorities, provides the best possible exploitation of a field. Therefore, a balance must be achieved between the purely economic advantages and the maximum amount of petroleum which may be produced within an acceptable time period. Consideration must also be given in this respect to the use the petroleum is to be put to.

4. In assessing a field's most effective rate of exploitation, factors

such as the lifespans of the technical installations, the increased costs of extraction in the final years of a field's productivity and the best possible exploitation of the resources (extent of exploitation) during the field's lifespan must be considered. The assessment of such factors can change with time. Therefore, a standpoint cannot be taken once and for all on the justifiable exploitation of a field when commercial production begins. It is a continual process from the drilling of the first hole until the last hole is plugged and abandoned.

5. There must be an attempt to find a framework for the allowable production which enables the operator to plan economical operations, and at the same time allows the authorities the opportunity of regulating the undertaking, should there be an unsatisfactory delevopment in production.

6. To attain the most effective exploitation of the reserves, the Ministry of Industry will make a total appraisal of the production presentation of those fields which have already received landing permission, i. e. Ekofisk, West Ekofisk, Cod and Tor, before approval is given. The Ministry of Industry will not bind itself to rates of production before all the production wells are drilled, and production has been underway a certain time. However, it is desirable that the Phillips group be able to fulfill its obligations under the gas contracts entered into at any time, to the extent that this does not reduce the degree of extraction of the reserves.

7. The obligations under the gas sales contracts with British buyers will also be decisive for the production of gas from the Frigg field, if permission should be given to land the main flow of gas in Scotland. Should it become possible to land gas for use in Norway, as extended a production profile as possible would be desired by the Norwegian authorities, so as to protect the Norwegian recipients as long as possible.

8. It might be preferable to regulate the exploitation of possible discoveries in the concession area by delaying the production from new discoveries. The advantages obtainable under such a policy, must be weighed, however, against the economic consequences of allowing investments in exploration, drilling, etc. to lie dormant for some years.

The decreased profitability of a petroleum discovery which was subject to restrictions imposing postponement of production, would be felt first by the relevant claim holder, and could result in less favourable terms for the State in other areas. This problem might be solved in the long run by having the State assume charge of all rights and obligations, and allowing the companies to operate under various forms of entrepreneur contracts. The rate of exploitation could then be more easily directed in consonnance with socio-economic considerations, which can be at variance with micro-economic considerations.

9. Statoil will be an important organ for carrying out the authorities' petroleum policies. Directives for the company's operations will be drawn up by the competant political bodies. Conditions will be established for the company, so as to permit it to realize the objectives which are laid down in the article formulating the purpose of the company. The company will therefore be given tasks as an independent operator as soon as possible.

10. Western Europe could be heading towards a situation of tight energy supply for several years. This could continue until alternative sources of energy can ease the pressure on oil as the most important source of energy. General foreign policy and trade policy considerations could therefore play a role in directing the rate of exploitation and the regulation of production.

3.4 FUTURE DEVELOPMENT

1. An annual production from the Norwegian continental shelf of ca. 35 million tons of oil and 25 million ton oil equivalents of gas is assumed for 1977. This is expected to increase to 50 million tons of oil and 40 million tons oil equivalents of gas in 1981—82. It is assumed in this connection that there will be new strikes near those already in production, so that much of the same equipment can be used.

2. For development after 1981—82 a high alternative can be envisaged, whereby the production of oil and gas will increase steadily to 100 million tons of oil and 80 million tons oil equivalents of gas in 1990, with this level maintained up to 2000 AD.

A middle alternative would be the maintenance of the 1981—82 production level to the turn of the century. These alternatives are based on varying expectations of new discoveries in blocks already alloccated, as well as discoveries in new blocks yet to be allocated.

As a low alternative, no new discoveries are assumed, so that production will gradually decline from the 1981—82 level as

early as 1985—1990, and will become insignificant by the turn of the century.

3. So far in the British sector there have been 8 large gas discoveries in the southern part of the North Sea and 7 large oil discoveries in the central and northern parts of the area. Production is estimated at ca. 100 million tons of oil and ca. 35 million tons oil equivalents of gas in 1980. This could climb to 200—300 millions tons of oil and ca. 100—150 million tons oil equivalents of gas by 1985—87.

The number of drilling rigs is expected to double during 1975 from the approximately 20 which are in operation today. Exploration will also begin soon west of the Shetlands and in the Irish Sea.

This expected that a total of 40 production platforms and 1,500—2,000 km. of pipelines will be installed by the end of the 1970's. In addition there will be the storage facilities and terminals on land.

Servicing this operation, requires 200—250 supply vessels of different sizes, together with ca. 10 barges for laying pipeline, considerable helicopter service, diving assistance, etc.

As stated, it has been estimated that equipment worth about 40 milliard kroner will be needed up to 1980. The delivery of services will come on top of that.

CHAPTER 4

Possibilities For Norwegian Engagement

Prepared in cooperation with the Ministry of Industry.

4.1 A SHORT SURVEY OF THE OPERATION CONNECTED WITH THE PRODUCTION OF OIL AND GAS

1. The production of oil and gas in the North Sea can be naturally divided in three: exploration, extraction and landing. Each of these three operations affects existing production in Norway through demands for capital equipment, consumption goods and services.

2. The oil and gas discoveries in the North Sea now offer possibilities for Norwegian producers. The establishment and management of the operation in the North Sea will demand large deliveries. Deliveries directly to the petroleum operation comprise a long list of considerably different goods and services. Among other things these involve services connected with seismic exploration, leasing of mobile drilling platforms for drilling exploratory and boundary holes, permanent platforms, storage tanks at sea, supply and base services, transport of the oil and gas, and banking and insurance services.

3. Such an operation also requires deliveries from other industries, oil platforms for exploring for oil, ships and helicopters for supply services, building and contruction of base installations, elements for oil and gas pipelines, ships for laying the pipe and so on.

The effects of the operation in the North Sea will further branch out to reach smaller sub-contractors. The building of platforms, ships and pipe elements will require deliveries of machinery and special equipment from the workshop industry, steel and concrete from the metal and cement industries, while the construction of base installations will need deliveries of building materials, which will affect a number of industries. In this way the operation will spread to various subcontractors. Norwegian concerns have possibilities for engagement on all levels. There are opportunities both in new activities such as extraction, pipeline transportation, the operation of drilling rigs and base installations, and through existing industries like shipbuilding, the machine industry, building and construction activities and numerous other businesses which to a lesser degree can provide the petroleum operation with goods and services.

4. The operation in the North Sea is the first oil exploration and extraction undertaken on a large scale in waters with a difficult climate and depths over 70 meters. It will be decisively important for Norwegian industry to be in on the development of new technology for the exploration for and extraction of oil in such waters. Active Norwegian involvement in the current phase could assure participation in the years ahead, because exploitation in the North Sea, as well as in other underwater areas around the world, gradually will take place where the traditional technology is less suitable.

It will also lay the foundation for the exportation of such services and products. Activities directed towards export could also serve to lessen the adjustment when the North Sea operation is finished, or if the expectations for the North Sea are not met to the degree envisaged. In addition, it will be a good preparation for participating in possible new operations, such as the extraction of minerals from the seabed.

5. The new development markets for deliveries to the North Sea will be more attractive to many businesses than the traditional ones. However, it is not possible for Norwegian industry to take part in this new production to a large extent, meet the demands resulting from the expenditure of the profits from the oil operation, and still maintain the present production level for traditional products. This can be illustrated by an example from the building and construction industry. There is practically full employment in Norway today, and it is therefore difficult to utilize large resources to build oil platforms and tankers without affecting other building and construction activities.

6. An attempt will be made in this chapter to outline the opportunities confronting various industries, either through direct deliveries or deliveries closely affiliated with the petroleum operation. In many instances companies will be confronted with the choice of producing for traditional export or for the petroleum operation. Production for the North Sea could be a springboard for some companies to become involved in oil extraction around the world. The goal must be to emphasize the production which will be most advantageous in the long run.

4.2 NORWEGIAN PARTICIPATION IN EXPLORATION, EXTRACTION AND LANDING

1. The first extraction concessions for oil and gas on the Norwegian shelf were awarded in 1965. One Norwegian company and a Norwegian group composed of twenty companies were included. Several other Norwegian companies have since then become active, so that today there are six Norwegian companies and groups engaged on the Norwegian continental shelf. A survey of these will be given in the Annex of a Parliamentary Report on the operation on the Norwegian continental shelf, which will be presented in the spring session. It should be mentioned especially that Norsk Hydro A/S held 6.7 per cent in the Phillips group discovery in the Ekofisk field and 32.87 per cent in the Frigg field. Hydro also has shares in Eldfisk, Edda, Tor, Albueshell, Cod, West Ekofisk, East Frigg, Bream, Brisling and Heimdal. These fields contain all the oil and gas discoveries which are so far considered commercially profitable on the Norwegian shelf.

In 1972 96 Norwegian companies formed Saga Petroleum A/S & Co. So far the company's engagement on the Norwegian shelf has been modest. A number of «peoples' holding companies» have also been formed. Altogether these have half a milliard kroner worth of share capital.

Private Norwegian companies are also active in oil exploration abroad. A survey of this involvement will also be given in the Annex to the Parliamentary Report on the operation on the Norwegian continental shelf.

2. Norwegian companies intend to increase theirs participation in the exploration for and extraction of petroleum in the near future. According to information they have given, the companies' engagement, apart from Statoil's, could entail exploration activities to an expenditure level of 200—300 million kroner per year. Approximately ⅔ of this will go to activities on the Norwegian continental shelf. The government has not yet appraised this question.

When commercial discoveries are made, the Norwegian companies will be faced with greater expenditures for developing the discoveries. Expenditures during the development phase are significantly heavier than during the exploration stage. The total expenditures for extraction on the Norwegian continental shelf are estimated at between 1—2 milliard kroner per year from now until 1980. The participation of Norwegian companies can prepare them for operations on the shelves of other countries.

3. Norwegian participation on a State basis is connected with The Norwegian State Oil Company A/S (Statoil) and Norsk Hydro A/S, of which the State owns 51 per cent of the shares. Statoil, which was established in 1972, aims at becoming an integrated oil company, i. e. participating in the different stages of the oil operation, such at exploration, production, refining and marketing. A more detailed explanation of the company's activities will be given in the Parliamentary Report on the operation on the Norwegian continental shelf, which will be presented in the spring session.

Statoil has a 5 per cent participation in the Frigg field. In the Heimdal discovery the company has an option on up to 40 per cent participation. The State will participate up to 50 per cent in the Brent blocks on equal terms with the other claims holders, when the extraction concessions are granted. Statoil is also a claim holder on the Rutch shelf, with 7½ per cent participation in four blocks.

In contrast to the other Norwegian companies, Statoil's participation on the Norwegian continental shelf does not entail any expenditures before a discovery is made.

4. Several Norwegian companies have expressed the view that over a period of time they will accumulate enough know-how to be able to undertake the search for oil and the extraction of discoveries in a purely technical sense (operational responsibility).

5. Two corporations have been formed for landing oil and gas from the Ekofisk field. The one, Norpipe A/S, will own and operate both the oil line to the Teesside and the gas line to Emden.

The other, Norpipe Petroleum UK Ltd., will own and operate the receiving installations in England. Statoil has 230 million kroner worth of shares (50 per cent) in these companies, which corresponds to the Norwegian involvement. There is no participation in the receiving installations on German soil.

4.3 DELIVERY FROM NORWEGIAN PRODUCERS

4.3.1 Drilling Services — Operation and Building of Drilling Platforms and Drilling Vessels

1. As of January 15, 1974, there were five Norwegian owned mobile drilling platforms and one drilling ship in operation. All the platforms were drilling in the North Sea. This number will increase. At the end of January, 1974, Nor-

wegian companies had contracts for 26 drilling platforms, 15 with Norwegian shipyards and 11 with foreign yards. In addition, Norwegian companies have ownership interests in 8 platforms, which will be registered under foreign flags. Each drilling platform under order represents an investment on the level of 4 milliard kroner. The deliveries will take place in 1974, 1975 and 1976, with the majority in 1974.

The drilling platforms are adapted for work in the North Sea, but most of them could be operated in oil fields around the world. The income from the rental of a drilling platform is in the neighbourhood of 50 million kroner for one year.

2. Since a Norwegian shipyard received the first contract to build a mobile oil platform in 1965, such production has resulted in considerable activity in Norway. The first Norwegian built drilling platforms were built under foreign licence. Today they mainly build Norwegian constructions. In 1973 Norwegian shipyards delivered one platform for a value of ca. 170 million kroner. In addition to the 15 platforms ordered by Norwegian owners, Norwegian shipyards have orders for one platform for delivery in 1974 and one for delivery in 1975 for foreign owners. Norwegian shipyards also have a direct income from their design and development work in the form of licence royalties. Several more Norwegian designed mobile drilling platforms will be built under licence in Finland.

3. It is estimated that close to 2,000 workers were employed by shipyards in the production of platforms in 1973, and that in 1974 and 1975 there will be an employment of over 3,000, i. e. ca. 10 per cent of the shipbuilding industry's total employment.

This will only form a small addition to the employment in the shipbuilding industry as a whole, but it will constitute a transfer from traditional shipbuilding. In 1974 it is estimated that ca. 5,000 workers will be employed above the level of 1972.

4. The demand for drilling services and drilling platforms will depend significantly on the rate of exploration and extraction established by the North Sea countries. It is estimated that 50—60 platforms and drilling ships will be required on the British shelf in 1980. Today there are about 20 platforms and ships at work. With the rate of exploration and extraction planned for the Norwegian shelf, it is estimated that 7—9 drilling platforms will have to be in operation in 1980. The drilling services required on the Norwegian shelf after 1980, will presumably be met by this number of platforms and ships. However, drilling at greater depths, more rational techniques, etc. will necessarily demand a steady further development in platform design, and there will presumably be a great need for replacements. The maintenance of mobile platforms will also be important for the shipyards. The annual maintenance costs have been estimated at ca. 2—4 per cent of the investment costs.

5. In 1974 the capacity of the Norwegian owned drilling platforms alone will already exceed the requirements on the Norwegian part of the continental shelf. The Norwegian drilling platforms will continue to operate mainly on the international market. Other parts of the North Sea and more distant waters are both possible markets.

6. Today the profitability in building drilling platforms is considered to be greater than that in building ships. There is therefore reason to believe that Norwegian shipyards will continue to be interested in building platforms. Technically it is comparatively easy to shift production from ships to platforms and back again. The capacity of the larger shipyards is almost completely exploited up to 1977. Possible further expansion must therefore lie predominantly in the establishment of new facilities for platform production, and not with the readjustment of operations at existing shipyards. The possibilities of sub-contracting for outfitting platforms will be of interest to smaller shipyards.

4.3.2 The Building of Stationary Platforms and Storage Tanks

1. Stationary platforms for use in the North Sea are built of both steel and concrete. These platforms are used for drilling series of production holes, for lodgings, pump stations, terminals, etc. Stationary steel platforms have not been built in Norway so far, but this will soon be possible at the works at Verdalsøra.

Concrete stationary platforms are now under construction. A Norwegian consortium has taken orders for two platforms of the Condeep type (Concrete Deepwater Structure). This is a purely Norwegian construction. The platforms will be delivered for use on the British shelf. The contract sum per platform is 300—400 million kroner, of which half is for the hull and half for the deck and outfitting. Building a platform today requires ca. 500 man years. Discussions are also

taking place between Norwegian and British interests about building Condeep under licence in Scotland.

A contract has also been signed to build the concrete hull of a pumping platform. The contract sum is ca. 150 million kroner.

2. The opportunities for the Norwegian producers of stationary platforms will be determined by the activity in the North Sea and the capacity in Norway. It is estimated that there will be a need for a total of 100 platforms on the British shelf between now and 1980. The demand on the Norwegian shelf is not expected to rise above 50 from 1973 to 1980.

Concrete platforms are thought to be favourable for oil extraction in deeper water. Therefore, there should be good opportunities for Norwegian concrete platforms when the extraction in the North Sea moves to deeper waters.

3. Norwegian companies were in charge of building the Ekofisk tank, which is of foreign design. This is a storage tank for oil for use at sea. Today the tank is also being used as a platform for a number of technical installations. The sale price of the tank was in the area of 115 million kroner. The contruction of this tank was a breakthrough for the use of concrete as a material in the extraction of oil at sea.

The future need for tanks of this type will depend on which system of landing is used. If pipelines are used, the demand for such constructions will be small.

4. Both concrete platforms and tankers are produced by companies in the building and construction sector which previously produced mainly for the home market. A strong increase in the building of concrete constructions for the petroleum operation could lead to a capacity problem in this sector. Disregarding the use of foreign labour, the traditional building and construction activity can only be replaced by imports to a small degree. The profitability in building concrete constructions is considered high, and therefore there will be a great deal of interest in investing in it. There could be the danger of undesirable competition with other building and construction activity.

5. Concrete platforms and tankers must be built at locations with favourable conditions with regard to area and sea access (deep water). Such production may consequently be localized away from the congested areas. Investments in such production could have favourable consequences for regional policy.

4.3.3 Supply Services — Operation and Building of Ships and Helicopters

1. Norwegian shipping companies are engaged in operating supply vessels, and today almost 60 ships are in operation or under contract. The total investment will be almost 1 milliard kroner. The ships operate both in the North Sea and other fields. There were 25 Norwegian ships in operation at the beginning of 1974. A supply ship has a crew of 15—20 men.

2. Norwegian companies are also involved in the helicopter transport of men and supplies to platforms in the North Sea. Under the aviation law and the principles on the rights to fly domestic routes, foreign helicopters have not been permitted to participate in the transportation to platforms on the Norwegian continental shelf. In order to assure a Norwegian supply of the highest quality, this service, in a special exception from regular practice, has mostly been reserved for one Norwegian helicopter company. The possibility of allowing another company to participate in this activity, is now being considered. In 1972 about 25,000 persons were transported by helicopter.

3. Helicopters for supply services must be imported, but Norwegian shipyards are strongly engaged in building supply vessels. Three supply ships were delivered by Norwegian yards in 1972 at a value of 41 million kroner, and 11 in 1973 at a value of 170 million kroner. As of the beginning of 1974 the Norwegian yards had orders for 12 ships for delivery in 1974 for a value of ca. 250 million kroner, 14 ships for delivery in 1975, as well as 3 ships for delivery in 1976. The total orders, as of January 1, 1974, were thus 30 ships at a combined value of ca. 600 million kroner. Of these 7 ships are for foreign contracts. The shipyards have options on a further 8 ships for delivery in 1975 and 1976. It is mainly the medium sized shipyards on the west coast which are involved. Norwegian shipping companies have a share in almost half the supply ships presently under contract in Northern European shipyards. Approximately one quarter are being built in Norwegian shipyards for Norwegian shipping companies.

The North Sea, with its harsh climate, requires relatively large supply ships. There is therefore little possibility of utilizing supply ships from other waters. The ships contracted from Norwegian yards, have been on the order of 500—1,000 gross registered tons.

4. The need for supply services will be determined by the number of stationary

and mobile platforms in operation and by the pipeline activity. It is estimated that a mobile drilling platform must be supplied by two ships. A stationary platform needs ca. two supply ships in the installation phase and one in the production phase. The need for supply ships will sharply increase in the future, and will comprise a considerable larger number than are on order in European shipyards today. It is estimated that the British sector will need ca. 200 supply ships in 1980, of which ca. 60 are in operation today. According to the assumptions on drilling and production platforms in the Norwegian sector, there will be an estimated requirement for 40—50 ships by 1980.

There will probably not be much of an increase in the supply requirements in the North Sea after 1980. Increased Norwegian engagement would then have to be transferred to other fields for extraction at sea.

5. Norwegian participation in helicopter transportation will be mainly determined by the operation on the Norwegian shelf. There will be little opportunity for Norwegian companies to become involved to any great extent with freight from bases abroad. Therefore the number of platforms operating within the Norwegian base supply area will determine the Norwegian effort. With the planned rate of exploration and extraction about 15 helicopters will be required in operation in 1980 — 8 large and 7 medium sized. Today a total of 45 helicopters operate in the North Sea, divided as follows: England 30, Germany 3, Denmark 3, Holland 3 and Norway 6. By 1980 it is expected that 50—60 helicopters will be operating in North Sea traffic.

6. Helicopter transport raises questions of concession policy, including whether possible exceptions will be made to the aviation law's nationality requirement. The Ministry of Transport and Communications has so far not undertaken an assessment of the need to operate irregular air service operations according to § 107 of the aviation law, except for extending operating permissions for helicopter flights to oil drilling platforms on the continental shelf.

This capital intensive and operationally complicated transport service will not become free. However, the Ministry of Transport and Communications intends to break the actual monopoly which now exists, when the market situation and demand for transport make this justifiable. For the foreseeable future it is not practical to award operating permission to more than one other company.

7. The production of supply ships deviates little from ordinary shipbuilding. Consequently investments in the building of supply ships do not raise any special capacity problems, since individual yards can realign production.

8. The profit in building supply ships compares favourably with that in other small ship building. Medium sized shipyards have invested considerably in building supply ships in 1973 and 1974. This type of ships will account for ca. 40 per cent of gross production and an estimated 25 per cent of employment at these yards.

9. Medium sized yards have a total employment of ca. 4,000. But due to the location of such yards a large production of supply ships would have very positive consequences for regional policy. The engagement of medium sized yards could also mean that much of their traditional work will go to smaller yards.

4.3.4 Base Operations

1. The most important function of the base operation is to serve as a storage and reloading centre for the equipment used during drilling, such as drilling mud, cement, chemicals and tools. The operation also normally involves leasing warehouses and offices to service companies and special firms within the oil business, repair operations, arrangements for and transportation of men to the rigs, etc. Also closely connected with the base are diving services and laundry and cleaning services. Thus the operation has wide dimensions. It requires large investments in storage and dock facilities, and provides comparatively few jobs. At present ca. 600—700 persons are employed in base activities.

2. It will be primarily the operation on the Norwegian shelf which will be serviced by bases in Norway. Exploration and extraction north of Lat. 62° N will be especially dependent on Norwegian bases.

The base operation will provide a number of Norwegian businesses with new opportunities for their products and services. All in all, however, it will have little impact on most businesses. Locally, though, the base operation will stimulate substantial growth. This will especially apply to diving services and concerns which produce ready-made foodstuffs. There is a great need for divers, both on the drilling platforms and for assembling the production equipment for oil extraction, including pipelines.

3. Since Norwegian companies lack special expertise to some degree at present (e. g. deep sea diving), they have only been able to

enter into contracts with the oil companies to a limited degree. There has been cooperation between Det Norske Veritas, the Ministry of Defence, the Ministry of Industry and Norsk Hydro, among others, since 1972 to establist a centre for the development of Norwegian competence in underwater technology and deep sea diving. There is a concrete proposal on hand for the establishment of a Norwegian Underwater Institute, which is now being assessed by the Ministries concerned.

4.3.5 Banking and Insurance

1. The costs of exploring and drilling for oil have so far largely been financed by the oil companies. The tendency is now towards increased credit financing of the operation. For new oil fields now going into production, including those in the North Sea, the extraction and landing of petroleum require large investments. There can therefore be a very large demand for credit in the next few years. However, it should be mentioned that a sharp rise in the price of oil could make it possible for the oil companies to continue financing the operations themselves.

Norwegian banks have only been involved to a small degree. However, the five largest commercial banks have initiated cooperative measures to finance petroleum projects, and they have participated in the financing of the pipeline company, Norpipe, and Statoil's share of the stocks in this company.

2. Institutional conditions at present limit the possibilities of the banks for extending credit. Among other things, the provisions under the credit law on reserves investment obligations restrict the banks' opportunities to extend loans vis-a-vis foreign banks. Possible exceptions to the credit law for certain foreign transactions are under examinition in the Ministry of Finance. This must be considered in relation to the question of what form of engagement the banks will have in petroleum financing. A position must be taken on the possible effects the various alternatives will have on internal money and credit policy. It must also be considered that Norway could become a capital exporting country. In that event borrowing abroad will be of little interest.

3. Up to now Norwegian insurance interests have only taken a small part in the coverage of risks on the continental shelf, but a group of insurance companies carry the insurance on some of the Norwegian mobile platforms. This undertaking involves new forms of risks for Norwegian underwriters. The insurance premiums are considerable, and this is one reason that the owners of drilling platforms have mainly acted as self-assurers until now.

The liability for pollution damage is excepted from ordinary liability insurance for oil operations at sea. There has been little insurance against such damage, but now it is possible to get limited insurance coverage with high deductions.

4. With more credit financing there should also be more business for the insurance sector. When North Sea production for Norwegian accounts comes into effect, there will be relatively greater possibilities for Norwegian insurance companies to assume part of the risk coverage. To meet these tasks, the largest marine insurance companies have begun a cooperative venture (Norwegian Oilriskpool) to establish a market for underwriting oil operations on the continental shelf. The merger is based on extensive reassurance cooperation with foreign underwriters in this field.

5. The insuring of services connected with the operation on the continental shelf (e. g. land bases and supply bases) will involve traditional insurance problems, which can be covered by existing forms of insurance. Although the insurance sums could exceed what is normal for Norwegian companies, it is expected that such tasks can be accommodated within the framework of the present capacity.

4.3.6 Various Deliveries from Norwegian Industry

1. Mechanical and engineering industries outside the shipbuilding industry act as subcontractors to the shipyards in the building of platforms and supply ships. The equipment for supply ships and platforms is mainly the same type as for conventional ships. This includes a number of advanced products, such as engines, forward thrust machinery, propellors, winches, pumps, compressors, electrical equipment, etc.

The Norwegian workshop industry is weak in a number of products needed for oil operation at sea, such as pipe, pipe-laying ships and drilling equipment. For these foreign companies command better expertise.

Deliveries to the oil operation are often of a large volume. This creates problems for the Norwegian workshop industries, because individual enterprises are usually small. Recently, however, several groups of firms have entered into cooperative agreements to enable them to take on larger accounts.

2. The most important deliveries from other industries are cement and steel for platform construction. Norwegian producers delivered cement and concrete for over 20 million kroner for the Ekofisk tank. The raw materials for the Norwegian produced concrete platforms will also mainly be supplied by Norwegian producers.

The Norwegian deliveries of ship steel to the shipbuilding industry are relatively small today. Most of such deliveries must be imported.

Norwegian producers can also deliver cement for the reinforcement of drill holes. In 1973 this was in the neighbourhood of 9,000 tons or ca. 80 per cent of the consumption on the Norwegian shelf. One drill hole requires cement with 300,000 kroner. Therefore, if Norwegian producers were to supply cement for two concrete platforms and ten drill holes per year, it would require an estimated 2 per cent of the total Norwegian cement production in 1973, or almost 4 per cent of the present domestic consumption.

4. The petroleum operation also requires products from the chemical industry. These include paint, plastic, rubber and asphalt, which are all used as protection against corrosion. Large amounts of drilling mud, which is used for cooling the drill crown, and transporting drilling waste are also required. In a «normal hole» in the North Sea drilling mud will account for 5 per cent of the drilling costs, or approximately 1.5 million kroner. Today drilling mud is chiefly imported, mainly from American producers. Certain components of the mud are delivered by Norwegian producers. Ligninsulphonate comes from the wood products' industry, which supplies over half the consumption on the Norwegian part of the shelf.

5. In addition, public and private research institutes provide services by acting as consulting firms for the operation on the shelf, as well as for foreign clients. Possibly the most interesting in this respect is the contract the Phillips group has given to Norwegian consulting firms concerning the design and specification of the installations on the Cod and Tor fields. There will be increased opportunities, as the Norwegian consulting firms build up competence in this field.

6. Norwegian industry has cooperative plans with foreign companies to expand their existing engagement to new groups of products and new geographical areas. Among the projects which are or could be of interest, are the production of stationary production platforms in steel, protection of pipe, drilling of production holes from stationary platforms and new production methods, such as underwater installations.

4.4 PRODUCTION IN NORWAY BASED ON OIL AND GAS

4.4.1 Landing

1. Oil and gas from Ekofisk could not be landet in Norway first and foremost for technical reasons. The main problem involved, is laying pipelines of large diameter at depths up to 350 meter. Today there is no justifiable technical-economic basis for laying pipeline systems from the known fields on the Norwegian shelf to Norway, but there is development underway in this area, and conditions could change rapidly.

2. Landing of oil and gas in Norway would entail a rather considerable expansion of activity at the point of landing. This includes storage tanks, gauging constructions and separation equipment. Since not all oil can be utilized on the spot, export terminals with access to the ocean must be built. In Parliamentary Report Nr. 51 on the landing of petroleum from the Ekofisk area, it is stated that to handle the oil from the four main fields covered by the application, it would be necessary to build a harbour with the capacity to handle ca. 250 ship calls per year and large enough to accommodate ships of at least 100,000 dwt.

3. Landing in Norway could stimulate processing industries in this country. However, as indicated in the agreement between the Phillips group and the State on the return of the wet gas, it is also possible to secure a raw material base from landings abroad. The advantage in this connection of landing in Norway lies in the opportunities for direct control over raw material supply.

4. Even if large amounts of oil were landed in Norway, most of it would have to be exported. Norway alone is too small a market. From a technical point of view, it is possible to establish export refineries in Norway based on North Sea oil, which could refine the entire production from the Norwegian continental shelf. However, there is reason to believe that it would be more advantageous for Norway to directly export large amounts of crude oil. Thus the operation in Norway will mainly be concerned with reloading (transshipment) and will be on a more limited scale.

5. Today no market for natural gas exists in Norway. The landing of gas here would therefore raise a number of questions. The potential Norwegian gas market could

only receive a small part of the production from the North Sea. Large amounts of gas would therefore have to be exported, either via pipeline to southern Sweden and thence to the continent, or by cooling and transportation in special ships. Both these export possibilities would require large investments in construction.

4.4.2 Petrochemical Industry

1. The option agreement between the Phillips groups and the Norwegian government on the redelivery of wet gas (NGL) offers opportunities for expanding the petrochemical industry in Norway. The State has secured the right of return of wet gas, to a location in southern Norway, for the production of ca. 250,000 tons of ethylene over a fifteen year period at favourable price conditions. The agreement is assured by production from the Ekofisk field. Attention is also drawn to the Parliamentary Bill for the exploitation of wet gas and the establishment of the petrochemical industry in Norway.

2. The petrochemical industry is very capital intensive (investments per employee ca. 1.5 million kroner). The manufacturing is carried out in large production installation, which must have a high capacity for exploitation in order to be competitive. Because of high transportation costs there is an obvious tendency to locate the factories as near as possible to the largets markets.

3. Profits in the petrochemical industry were weak in the 1960's. The prices of plastic raw materials were under pressure because of overcapacity and rapid technological developments. This picture has changed in recent years, and the price of plastic raw materials has risen sharply. The prognoses indicate a continued annual increase in consumption of 8—12 per cent throughout the rest of the 1970's, at even higher prices. Nordic import requirements for ethylene products in 1980 are estimated at 1.1 million tons, if there is no new ethylene capacity.

On the other hand, there now seem to be difficulties in the supply of raw materials for the petrochemical industry.

4. The Government proposes that the State's wet gas contract be turned over to three companies, Norsk Hydro, Statoil and Saga Petroleum, who will cooperate in developing a wet gas molecular cracker and a disperal installation for ethylene and propylene in Bamble municipality in Telemark. Hydro will erect an installation for vinyl chloride (VCM), partly for the export of VCM and partly for the production of polyvinylchloride (PVC) at the company's factories at Herøya. In addition, Hydro/Borregaard will build a chlorine alkali factory which, as well as chlorine for the vinyl chloride factory, will manufacture soda lye, which has a long list of applications. It is also possible that an installation for the manufacturing of vinyl acetrate will be erected. The three companies will also build factories for the manufacture of two types of polyethylene and polypropylene.

Altogether the development in Bamble will create ca. 1,000 permanent employment positions. The combined investment at 1973 prices is estimated at a total of 1,600 million kroner. The environmental problems connected with an installation this large will be of a reasonable size.

5. In accordance with the agreement on wet gas, the installation must be capable of taking the first deliveries in the summer of 1977. The construction period will extend from mid-1974 to 1980, with the greatest activity in the period 1975—1977, when employment could reach 2,000 persons. It is realistic to expect that the Nordic countries will be the primary market for the proposed products, although there are broader market possibilities for VCM.

6. Development of the petrochemical industri beyond the plans outlined above will be tied to the extraction of oil or gas on the Norwegian continental shelf. There will hardly be an expansion of the petrochemical industry in Norway, if the raw materials must be imported. The development of such a large complex will demand such large scale building and installation projects that other industrial products will have to yeild. This must also be assessed within a local framework.

7. The division which are to be developed within the petrochemical industry, will depend on the composition of the raw materials in future strikes. For example, if large amounts of wet gas should be landed in northwest of North Norway, it could be feasible to build a new molecular cracker with additional dispersal units. Such an installation could hardly be put into operation before the mid-1980's at the earliest. It will probably prove most economical to merge the production of a limited number of products which could be shipped to the largest markets, either for sale or conversion, at moderate transportation costs.

Landing of natural gas could form the basis for the production of ammonia and methanol.

8. Today work is being carried out in

many quarters on processes and production means for manufacturing proteins from hydrocarbons, and Norwegian companies are assessing the possibility of such production in Norway. Industrial production of oil based proteins is now underway in Scotland and France, temporarily in small plants. In Italy and Japan considerably larger installations are under construction. Oil based proteins are used in fodder for hens and pigs. In Norway the feasibility of using oil proteins in animal feeds is being investigated.

4.4.3 Refining

1. Two refineries were built in Norway in the 1960's. They have a present capacity of ca. 8 million tons, divided between ca. 5.5 million tons at Norsk Esso's installation at Slagentangen and ca. 2.5 million tons at Norske Shell's refinery in Stavanger. This corresponds to Norway's consumption. In addition, Norsk Hydro A/S, in cooperation with Norsk Brændselolje A/S, is building a refinery at Mongstad outside Bergen with a first stage capacity of 4 million tons of crude oil per year. The installation will begin operations early in 1975. Hydro is basing the operations on handling 1.5—2 million tons of the crude oil output from the Ekofisk field. The installation at Mongstad will cost ca. 1 milliard kroner for the first building stage.

The total refining capacity in 1975 will be 12 million tons crude oil per year, which will exceed the country's consumption of refined products. The export of refined products, which is today ca. 2 million tons, will then increase, even if we must continue to import some types of refined products.

It is known that Norsk Hydro is working on plans for a further expansion of the Mongstad installation to 8 or 12 million tons crude oil per year, assuming increased access to oil from the North Sea. The company has sufficient space to expand to 20 million tons eventually.

2. If exploitable deposits of oil are found of North Norway, the landing must take place in Norway. There could then be extensive storage and transportation operations. It might be feasible in addition to build refineries for the export of finished products. Export refineries based on oil from the continental shelf could be established by the mid-1980's at the earliest. It is also possible that future discoveries are so small that ships would be the most suitable form of transportation.

4.5 RESEARCH AND DEVELOPMENT

1. So far our research connected with the continental shelf has mainly been concerned with seismic exploration to indicate possible petroleum deposits, studying the shelf itself and technology related to the operation on the shelf. Royal Norwegian Council for Scientific and Industrial Research (NTNF) coordinated the essential part of this research until 1973. Since then the responsibility for research directly connected with petroleum has been assumed by the Petroleum Directorate.

2. For a small country like Norway it is not possible to research all relevant areas, but the point of departure for Norwegian engagement must be recognized as favourable. The technology for the continental shelf is at an early stage of development. Other countries have experience in areas with shallower water and different climatic conditions than those in the North Sea. A great deal of technological pioneer work in research on the exploitation of petroleum deposits is going on today in the North Sea area. In addition, Norway has extensive experience in oceanic research.

3. Particular problems for the operation on the continental shelf are caused by the many deeper areas, where discoveries are possible, but which cannot be exploited by present technology, landing conditions on the Norwegian coast, as well as difficult weather and ice conditions.

4. The aim of exploration, research and extraction efforts is to discover what the continental shelf consists of, the dimensions and structure of the rock formations and sediments with a view to later search for petroleum deposits and minerals, as well as to make strikes which can be extracted, landed and exploited. A further goal is to stimulate the necessary Norwegian technological development with a view to Norwegian participation, extraction and delivery of production units, material and equipment to oil companies and other concerns engaged in the continental shelf operation at sea or on land. In addition come the safety tasks and a list of basic research tasks concerned with life in the ocean. It is important to attain the foundation necessary for appraising the size of petroleum discoveries, and to acquire management knowledge for negotiations on concession conditions.

5. The research projects can be roughly divided into the following main groups: geophysical, geological and oceanographical exploration and research, data banks

and position decisions, etc., marine technology, oil pollution and education. In addition, there are the industrial research projects which do not fall under one of these main groups. In some vital areas it is deemed natural that the problems be solved by Norwegian institutions.

6. The geophysical tasks are essentially seismic measurements and the measurement of magnetism and gravitation. There has been extensive cooperation between Norwegian scientific institutions in geophysical exploration. There is a need for continued research and development, including the improvement of exploratory and processing techniques.

8. Oceanographic and geological explorations are an important addition to the seismic and other geophysical explorations, and provide a basis for understanding the continental shelf's geology, seabed, ocean currents, ice conditions, etc. The results are also of great value in determining the dimensions and design of marine installations.

8. NTNF's Continental Shelf Office has produced an analysis of the need for an oil geology laboratory which, in addition to building up Norwegian technical knowledge in this field, would take assignments from Norwegian and foreign oil companies on a commercial basis. The establishment of such a laboratory would involve considerable investment. It is expected to employ ca. 30 persons.

9. Work has begun on data banking, mapping and position determination.

A very important task is the creation and development of an integrated system for determining positions north of Lat. 62° N with the precision necessary for drawing block boundaries and determining the position of drill holes and other underwater installations.

10. Marine technology covers a wide field with many problems. One area which is appropriate for Norwegian research and development, is marine instrumenting. Here Norwegian institutions have considerable experience from other areas.

11. A developed underwater technology is important for the work in the North Sea. A committee has examined the question of building a laboratory for simulating an ocean environment. A proposal from the committee is now under discussion recommending the establishment of a Norwegian Underwater Institute, which at its most extensive stage of development, would cost ca. 60 million kroner in total investments and accumulated operational deficits over a five year period. However, the institute is based on development in stages. The first phase could be started with support of 1.5 million kroner from industry or the State. A decision has not yet been made on its establishment.

12. In 1972 a committee was formed to examine the problem of laying pipelines in deep water. It expects to conclude its activities in the fall of 1974, when its work will be continued by Statoil/Norwegian Petroleum Directorate.

13. Reservoir techniques and evaluation is concerned primarily with methods and calculations. Such insight is of importance for consideration by the Norwegian oil companies and for the authorities' negotiations with the oil companies and their control of the companies' activities and exploitations of deposits.

Because of the large fishing interests on the continental shelf, it is especially important to prevent oil pollution, and to make provisions for reducing the consequences of possible oil leaks. Continued research is needed in this area, including observation methods and equipment.

14. Research, exploration and development related to the operation on the continental shelf, must be covered partly by the public budget and partly by industry. At present work is underway to solve practical problems connected with contract research within the institutions of higher learning. Until now most of the research at these institutions has been supported by the State budget or through the Research Councils.

15. The increased public incomes in the coming years will create a need for the importation of research results. Such importation constitutes use of oil income which does not debit Norwegian resources. However, it is necessary to have a research environment in these fields here in Norway, so as to be able to fully utilize foreign research results.

16. An increase of research personnel in this area is expected. Generally, apart from a certain need for education in special, individual professional fields, the research and development projects could largely be carried out by personnel educated within the existing professional fields. However, there will be a need for additional studies, travel scholarships and expanded courses.

Part 2

THE SIGNIFICANCE FOR NORWEGIAN SOCIETY

CHAPTER 5

Environmental Consequences and Life in the Ocean

Prepared in cooperation with the Ministry of Fisheries, the Ministry of Industry and the Ministry of Environment.

5.1 POLLUTION AND LIFE IN THE OCEAN

5.1.1 Oil as a Pollutant — General

1. Petroleum is a compound of the basic materials of hydrogen and carbon. These comprise up to 98 per cent of the composition of crude oil and 100 per cent of many oil products. The other components of crude oil are essentially hydrocarbon compounds, which also contain the basic elements of nitrogen, oxygen and sulphur, or a combination of these. Variations are also found with small amounts of different metals. The composition of crude oil varies according to its place of origin.

2. The composition of the crude oil determines its detrimental effects on the environment. The oil components and their decomposition products have different poisonous, destructive and solubility characteristics in water. They are absorbed by living organisms in varying degrees. Some components are completely unharmful in the marine environment, but others, especially the aromatic hydrocarbons, can be very dangerous. It is therefore necessary to have an exact knowledge of both the environment and the components in the oil, to find out what environmental consequences a certain crude oil will have.

3. When the oil gets into the ocean, it is affected by certain physical influences. There will always be an evaporation of simple components from oil in the oecan. Some oil will also be removed when blown into small droplets or spread by the wind, which then carries it away. A number of components dissolve in water, and the solubility increases as the movement of the waves causes a finer breakup and dispersal of the oil droplets in the water mass. After some time in the ocean the heaviest components sink to the bottom.

4. The spread of oil over the surface of the ocean will depend on wind and current condiditions. When the oil combines with the upper layer of the water, its spread depends primarily on the influence of the currents, but also on diffusion and the fact that oil droplets become attached to various organisms and free-floating particles.

5. In addition to the psysical influences which affect oil in the sea, the oil components are subject to bacterial breakdown. The

significance of this bacterial breakdown and the speed with which it occurs, are disputed. Among other things, it varies according to temperature, and is most marked between 15° C and 35° C, although breakdown can take place down to 0° C. Oil can also be broken down by chemical and photochemical processes.

6. With an oil spill the oil is highly concentrated in the upper layers of water. It is this part of the ocean which is of the greatest production importance. The plant plankton, which is a primary factor in the oceanic production cycle, is dependent on light for growth, and is therefore only found in the upper layers. The animal plankton, which feeds on the plant plankton, is also mainly found in these layers of water, as are the eggs and spawn of many types of fish and other organisms. It is therefore the smallest and most sensitive organisms which are most exposed to oil pollution.

7. Most of the oil components are more soluble in fat than in water, and organisms which come in contact with dissolved and finely dispersed oil components in water, can concentrate these components in their fat reservoirs. This accumulation takes place throughout the entire water mass, even with small concentrations of oil, and occurs in both animals and plants.

The absorption of low, non-lethal concentrations can influence the life process of an organism to a degree which can lead to unfavourable mutations in large segments of important populations.

An accumulation in several links of a food chain can thereby increase the effects of oil damage. Lethal concentrations which affect one or more links in a food chain, will result in a loss of food for dependents higher up in the chain.

5.1.2 The Effects of Oil Pollution on Fish

1. The continental shelf is one of the most fruitful ocean areas. The continuous shallow water area which stretches from the North Sea to the Barents Sea and includes the Norwegian continental shelf, is one of the world's richest fishing areas. In the North Sea alone the catch is in the area of 3—3.5 million tons per year.

The Norwegian coastal areas, with the banks off them, are the spawning grounds, and to a certain extent the maturation area, for the most important types of fish in the North Atlantic.

As an example, the Norwegian Arctic cod has its spawning ground off Lofoten—Vestfjorden and its maturation area in the Barents Sea. The young cod travel from the spawning grounds to the maturation area with the current and pass the coastal banks off Troms and Finnmark at their most sensitive stage. This important fish resource has yielded a catch of 450,000—1,300,000 tons round weight per year in this area. There are also several other types of fish, among them Artic haddock, which yield 100,000—200,000 ton round weight per year.

2. The effect of oil pollution on marine life depends on the opportunities for and capabilities of the organism to evade an oil polluted water mass.

The most important groups of marine organisms can be divided into planktons, nektons (mainly fish) and benthos (seabed organisms).

3. The plankton is tied to the upper layer of the water mass and consists of moving plants and animals with little or no swimming capacity. Planktons are more or less passive in the water mass. Oil pollution will therefore have a longterm effect on the plankton organisms because the oil will follow the same water mass.

Planktons consist of plant planktons, microscopic and for the most part uni-celled plants, and animal planktons which include permanent forms and the youngest stages of fish and seabed organisms, such as lobster and crab.

Planktons are therefore of basic importance to life in the ocean, both because they are part of the marine food chain, and because they include the youngest stages of our fish resources. The egg and larva stages are very sensitive to oil influence. As an example, experiments with cod roe, which were done with various types of crude oil in concentration of 0.5 g. oil blended with 1 liter of water, showed that Venezuelan and Iranian oil was 100 per cent lethal for the eggs after 3½ days. The eggs survived in Libyan crude oil for six days. The hydrocarbon composition of the crude oil accounted for the difference. The stage of development was decisive for the incubation results. Early influence gave low incubation percentages, i. e. was highly lethal. Fish larvae which were incubated in oil polluted sea water, showed a greater number of deformed individuals than the control larvae, and the injured larvae died quickly. Corresponding results were also found in experiments with other marine organisms.

4. Nektons are larger individuals which swim strongly enough to be more or less independent of the movements of the water mass. Fish make up the largest part of this group. Because fish can swim away, and thus escape an oil polluted water mass, the risk of damag-

ing influence on grown fish is less than on the younger stages of fish. If fish should come in contact with a water mass which contains oil, their gills can be damaged, with deadly results. Fish can easily acquire an oil taste, even if they come in contact with water which contains only a small amount of oil. Although the fish may not be directly damaged, the oil taste makes them unsuitable for human food.

5. The migrations of fish are determined by physical and chemical impulses in the environment. Oil in the water can mask the communications between fish. Individual components in the oil can presumably influence the sensory organs of fish, and thereby alter their migratory patterns. The spawning processes, and consequently the development, can be upset in this way, with unfavourable results for individual fish populations. For some important types of fish spawning is relatively concentrated, so that it is possible for oil pollution to reduce a generation considerably.

6. Benthos or seabed organisms are tied to the ocean floor for the greater part of their existence. This group consists of fast-growing algae (kelp and seaweed) and animals which are either fast-growing, like mussels and barnacles, or which have a certain ability to move, and thereby the possibility of escaping oil pollution. Benthos animal organisms are found from the uppermost level, the beach and littoral zone, to the greatest depths, but the plants, which depend on sufficient light, are seldom found deeper than 50 meter in our waters. The shallower parts of the continental shelf where the oil operation is taking place, also has the greatest concentration of benthos organisms.

7. The benthos organisms of special economic consequence and which are very exposed to oil pollution, are the shellfish like lobster, crab and some mussels.

Shellfish are sensitive to small concentrations of oil in water. Many of the chemical cleansing agents used against oil spills have proved very harmful to shellfish. Shellfish can also easily absorb the taste of very low concentrations of oil in water. There have been many instances in Norway where oil taste has damaged the market value of lobster.

A number of important fish types like capelin and herring are tied to the ocean floor in the earliest egg stage. Spawning takes place on a bed with a certain composition of stone and gravel. Therefore the spawning grounds are limited, and oil pollution in such areas, which could destroy the seabed as a spawning ground, necessitates a good understanding of the environment and the effects of various oil-combatting agents.

8. The beach zone is that part of the marine environment most exposed to oil pollution. The organisms in this zone are adaptable to great environmental variations, such as tide changes, which leave large areas dry, variations in salinity, and extreme changes in temperature. Therefore these organisms usually have a much greater survival ability against external influences.

Oil can coat plants and animals, and can cause some plants to become thinner, so that they are easily torn loose by the waves. Such mechanical effects can lead to greater damage to life connected with this part of the marine environment. The special composition of the oil and the use of various cleansing agents greatly determine the harmful effects on the organisms in the beach zone.

9. Seal and whale must break the surface of the water to breathe. Seals must also go on land. At present there is little known about the effects of oil pollution on these animals. The effect on their respiratory organs is not clear either. Grease on its fur presents problems for the polar bear. This should be especially taken into consideration when possible oil operations on and around Svalbard are assessed.

10. Oil pollution can also be very harmful to sea birds. These birds seek food and rest on the ocean surface, where they could easily come into contact with oil. A shiny, calm surface attracts many sea birds in stormy weather. Where there are large concentrations of birds many can be destroyed by a relatively small slip of oil.

11. The effects of oil pollution in the ocean must be examined in connection with the total pollution situation. Conditions which can be inconsequential, alone can cause considerable problems when acting together. The longterm effects and threshold value of oil pollutants on marine life are not adequately known. Basic knowledge of the marine environment, as well as of the composition of various pollution components and the effects of these on the different levels in the marine ecology system, is necessary before corrective remedies can be implemented.

5.2 POLLUTION PROBLEMS CONNECTED WITH THE PETROLEUM ACTIVITIES

5.2.1 Pollution from Operations on the Continental Shelf

1. The total amount of oil annually taken from the world's oceans, is between

5 and 8 millions tons. This estimate is very uncertain.

There are varying opinions as to how much of the oil pollution results directly from drilling and production on the continental shelf. Most calculations estimate it at 3—4 per cent, which amounts to ca. 150,000—300,000 tons per year. In comparison, the spills from vessels are estimated at approximately 20 per cent.

On the basis of the operation in the Gulf of Mexico from 1960 to 1970, an oil company has estimated that 0.27 thousandths of the total production was dispersed in the sea. This is equivalent to ca. 12,000 tons for an annual production of 50 million tons oil.

2. At present it is difficult to know whether these calculations will be valid for the operation on the Norwegian continental shelf. The proportion from drilling and production could be larger because of the extremely difficult climatic conditions in the area. On the other hand, extensive safety controls and more sophisticated equipment for drilling and production will reduce the risk of oil spills. One single serious accident, such as a blowout or the wreck of a tanker, could have very damaging effects. To some extent these will depend on where the accident takes place.

Normally the oil will lie on the surface and move to land along the North Sea coasts. All the North Sea countries would be exposed. As the oil moves, it will be subjected to physical influences and breakdowns, which will reduce its dimensions to some extent.

When an accident takes place near land, the oil reaches the shore quickly, where it can cause catastrophic damage. Regardless of where the oil mess occurs, it will cause both immediate and far-reaching damage to life in the sea.

3. During drilling the greatest danger is the risk of explosive blowouts. Normally these are caused by unexpected thrusts into an oil stratum with such great pressure that it cannot be controlled.

The number of blowouts in comparison to the total number of drill holes is small. A government sponsored commission of experts in the United States concluded in 1969 that, statistically, there will be one major blowout somewhere in the world every year. The risk of a blowout occurring will depend to some extent on how comprehensive the geological exploration has been. However, there will always be some uncertainty, as well as the danger of mechanical or human error. Therefore, it is not possible completely to eliminate every risk of a blowout on the Norwegian continental shelf.

4. With a completely uncontrolled blowout a large amount of oil will pour into the sea. In the first phase this could reach a level of 1,500—2,000 tons per day per hole. The development of the hole will determine its future. Normally the amount will decrease to ca. 200—400 tons per day. Contending with the source of the pollution will usually take a long time — up to several months — since a relief or drain hole must be drilled. In the North Sea and the North Atlantic this method can be time consuming because of the harsh weather conditions and the relatively great depths. The difficulties will increase the farther north the operation takes place.

The total spill from a blowout hole can be as much as 50,000—200,000 tons. (The total spill from the «Torey Canyon» was 100,000 tons.)

The Norwegian Petroleum Directorate is presently working on new, detailed regulations, which contain a proposal to the effect that in the event of an uncontrolled blowout the Directorate can, if necessary, requisition one or more of the drilling platforms operating on the continental shelf at the claim holder's expense.

5. Production is usually carried out from platforms which stand on the ocean floor. It is not unusual to have some twenty wells drilled in different directions around the same production platform.

Production wells have automatically locking safety valves mounted 100 meter down in the wells. Even if the entire platform should be damaged in a catastrophe, these safety valves would lock and prevent oil from streaming out.

Each well has a production outlet which empties on the production deck through its own valve, which then leads into the equipment which separates oil, water and gas. In principle it should be possible to close off and secure the oil wells, should an unforeseen situation occur.

6. There can be other operational accidents connected with production which could cause considerable pollution, aside from blowouts. A production installation for petroleum in the North Sea is comprised of a relatively complicated grouping of process apparatus for handling oil and gas. All the opparatus undergoes strict control before it goes into operation, and is inspected after a specified period of operation to assure that the process apparatus and pipeline fulfil requirements for strength and realibility of the individual components. This will still not eliminate the danger of technical or human error, with consequent pollution. However, in

such an event there would hardly be a spill of really large dimensions.

7. The production of oil in a field will have a regular amount of spill. An oil field usually contains considerable amounts of water which comes up with the oil and must be rinsed out. The amount of water varies greatly from field to field and over time.

The water is rinsed out with modern equipment, so that its oil content is reduced to a fixed level (25 p. p. m. or 25 millionths).

Today it is impossible to accurately calculate the total future oil pollution resulting from normal spills. The size of this will be very dependent on the amount of water produced in various fields. Again, this will vary greatly over time, (e. g. from 0.1 per cent at the beginning to 90 per cent at the end of a field's production). It is calculated as several thousand tons per year from an operation of considerable dimensions. Since spills continually will occur at the same place, it must be expected that the ecology of the ocean area closest to the operation will be upset.

8. The use of large storage tanks located on the ocean floor, such as the Ekofisk tank, could entail pollution. Such tanks can hold over 100,000 tons of oil. Considerable pollution could be the result, should a tank spring a leak from ramming, natural catastrophe or other causes. However, the present constructional demands are considered to be safe.

Nevertheless, there will be regular spills of oil-bearing water from such a storage tank when it is used. Some of the drainage water from the tank contains a certain amount of oil, which is rinsed by the same methods as the production water.

Phillips have estimated an annual spill from the Ekofisk tank of ca. 50 tons.

9. Loading oil in tankers by the buoy system (as is done on the Ekofisk field today) also entails pollution, even though all precautions are taken.

Wear, tear and cracks occur in the buoyed hoses which deliver the oil onboard the tankers, and the joining mechanisms give way. The result is sludge, as a rule less than a couple of cubic meters in size, and usually from accidents connected with buoy loading. An improvement in the construction of the loading hoses has reduced the number of these accidents in recent months.

10. Tanker transport entails the risk of accidents like collisions, shipwrecks, etc., with resulting oil sludge. This danger will increase as the operation is moved north. Operations on and off the coast of Svalbard will be especially risky because of the ice situation, which will make navigation with large tankers difficult and dangerous.

In addition to the risk of accidents, there will be a certain amount of pollution from the tanker's ballast water, even though the spilling of this is regulated by international rules. It is important that the ships which transport oil, belong to countries which have signed the international conventions in this respect, and that there is as much control possible that these rules are abided by.

11. The danger of a high degree of pollution from pipeline transport is connected with the danger of breaks in the pipeline, e. g. caused by ship's anchors or fishing trawls. Individual episodes have occurred in the British sector. However, pipelines have so far proved capable of tolerating very considerable stress.

As a rule all pipelines will be buried beneath the ocean floor, but this can be done only when the floor is soft. With shifting sand and the like the pipeline will never be completely covered, and it is then exposed to movement by the currents.

There is a danger of a high degree of pollution from pipeline breaks because the oil is under pressure. In addition to the pressure which drives it forward, oil which is piped to land through a pipeline, usually has a lot of steam pressure. When there is a break in a pipeline containing oil with high steam pressure, the oil and gas will continue to pour out of the pipe even though all the pumps are shut off. The amount will largely depend on the relation between the pressure within the pipe and the outside pressure of the water. The spill could therefore be very large if the pipeline is near the surface of the ocean — on the field or near land. The pipeline from Ekofisk to Teesside has two pumping stations. A total break could result in a spill of 30—40,000 tons (the amount which is in the pipe section).

There can also be smaller, more permanent leaks from pipelines. When a leak occurs, it will normally cause a drop in pressure which will automatically halt the supply. Therefore, there is little likelihood that a pipeline could leak considerable amounts over a long period.

However, the leakage can be so small that it is not registered by the pressure gauge, and therefore does not halt the supply. Such leaks can only be detected by oil sludge on the surface. Thus it is necessary to have regular air inspection of the course of the pipeline.

12. The pollution damage which results from an accident in the field, will depend on

how effective the preparedness is, and on what efforts are put into effect.

It must be stressed, however, that the weather conditions in these areas will make it very difficult to effectively contend with oil sludge. Therefore great emphasis must be placed on preventive efforts.

The introduction and organization of preparedness is under discussion by two public commissions at the moment. The commission which is preparing safety regulations for the production of oil in the North Sea (Ministry of Industry), must evaluate what preparedness demands to place on the oil companies with regard to equipment, etc. The commission assessing preparedness against all forms of acute pollution (Ministry of Environment), will evaluate preparedness on the continental shelf together with the organization of preparedness against acute pollution in general, with a view to building up the necessary public preparedness apparatus in addition to that of the companies. The proposal of the Phillips group for a preparedness plan for the Ekofisk field is being evaluated by The Council of Oil Pollution.

Today the oil companies handle any oil spills which occur by using chemicals which break up the oil and allow it to sink to the bottom. The continued use of this method will be evaluated in principle.

So far there is no collective plan for preparedness for all the areas in the North Sea. Certain cooperation exists between some operators, but this has not been developed into a permanent joint preparedness program for the entire area.

5.2.2 Pollution from Operations on Land

1. The possibility of pollution from petroleum based activities will to some extent depend on the composition of the raw materials and the types of products.

A closer assessment of the pollution can only be made when concrete plans for landing and development are at hand.

2. Both heat power plants and refineries will have to dispose of large amounts of heated cooling water, which could be used for local heating by the recipient. The exit temperature will usually be 20—30° C.

The dispersal of the released coolants, current and other local conditions will determine what rise in temperature occurs and what consequences such disposals will have for life in the sea and ecological conditions.

Considerable amounts of oil-bearing drainage water will be disposed by the refineries. The essential air pollutant from such installations will consist of sulphur dioxide waste.

3. The pollutants from the petrochemical industry are a very varied group, which will differ according to the composition of the production and the technical standards of the concerns. There is a steady development in production techniques and purifying techniques which reduce unwanted wastes. This development could be stimulated and accelerated by establishing regulations and concession terms in relation to different kinds of disposals, coordinated with technical developments, at the same time as both the industries and recipients are controlled. The most important pollutants are described in the following.

4. There will also be some oil and oil fractions from the petrochemical sector, mainly from direct leaks. Since some oil fractions are very harmful, even in small amounts, there must be very strict regulations as to what disposal is allowable. Such disposals often build up around purifying installations, embankments and basins which catch the disposal. Regular as well as inadvertent spills can be held at very low levels.

5. In many instances organic waste products from the petrochemical industry are a considerable problem. In Norwegian waters the disposal of waste products such as polyvinylchloride has been especially important.

6. Heavy metals like quicksilver and copper can be disposed as waste by chlorine factories involved in the production of PVC (polyvinylchloride). The disposal of quicksilver from the electrolysis of sodium in chlorine production should be especially watched for.

7. The chlorinated hydrocarbons which occur as waste products in the manufacture of vinylchloride and polyvinylchloride, include a long list of materials which are base products for further plastic production. The biological effects of these are far from clear, but they are somewhat related to DDT and PCB, and must be considered very dangerous. When chlorinated hydrocarbons accumulate in living organisms, especially in greasy water, they can move from stage to stage through the food chain.

8. Air pollutants from such installations can be considerable and of many types. The disposal of ethylene will often create problems. For example, if this is disposed together with nitrogen gases very serious air pollution problems can be the result.

5.3 SURVEY OF DISTURBANCE TO FISHERIES

5.3.1 Seismic Exploration

During the last ten years there has been a seismic exploration of the entire North Sea area. With present methods this exploration is not thought to have any effect on marine animals. The vessels which carry out the seismic exploration, are subject to control, and must comply with certain regulations so that they do not create difficulties for the practice of fishing.

5.3.2 Physical Installations and Obstacles at Places of Extraction

1. Every installation in the sea will in itself constitute an obstacle to the practice of fishing. The extent of this obstruction will be determined by the occurrences of fish in the area.

Conditions are such in the North Sea that there are few areas without fish. North of Stad the fish are more concentrated on certain fishing banks. Installations on such banks could create considerable difficulties, but installations in other areas will be less of a hinderance to fishing.

2. A drilling platform does not in itself take up a large area, but there is a safety zone of 500 meter around the platform where all fishing is forbidden. On fields where oil is being extracted, the various installations can take up larger areas. There are comparable safety zones around these as well.

3. It may be very difficult to calculate safety zones under some conditions. In practice the safety zones must be substantially larger than 500 meters, since anchor chains on the platforms can be as long as 1000 meters in the northern part of the North Sea because of the greater depths. In such instances safety zones considerably larger than 500 meters may apply during the actual drilling operation. With catches of fish in the vicinity of a platform, the fish can pull in the direction of the installation and its corresponding safety zone. A fishing vessel could be forced to break off its catching operation because the installation lies in the direction the shoal of fish is pulling. Fishing must also be stopped when the fish are to the windward or near currents which flow in the direction of the platform. Fishing boats must calculate a degree of deviation during the fishing operation, and under unfavourable conditions a platform can be a substantial obstacle.

4. Trawlers and Danish seine boats prefer to fish where there are good bottom conditions. In areas where there has been drilling for oil, or where other installations have been established, the seabed can be littered, destroying the area for these vessels.

5. The oil companies must ensure that no iron objects, empty barrels and the like which could tear the fishing equipment, are thrown overboard. When a platform is moved, the seabed must be cleaned of all objects and iron constructions. In the proposal on detailed regulations for exploratory drilling, which is being drawn up by the Norwegian Petroleum Directorate, the claim holders are enjoined to assure themselves, with the help of diving inspection, that no obstacles of any kind have been left which could damage or obstruct fishing, shipping or other activities either on the seabed or on the surface at and around the place of drilling. If conditions do not permit diving inspection, the inspection shall be carried out in another way which is deemed adequate.

There is usually some degree of activity around a drilling or construction platform, with supplies being sent back and forth. Under certain conditions supply boats can also be obstacles.

5.3.3 Pipelines from the Field to Land

1. A pipeline will always be an obstacle in areas where fishing is being carried out, as long as some of the pipeline lies above the seabed. In practice it will not be possible to satisfactorily bury the pipeline in certain ocean areas.

Collisions between oil or gas lines and fishing equipment could result in damage to both the equipment and the line.

2. When a trawl becomes fastened in some object on the bottom, the vessel normally stops as soon as the wires tighten. The vessel will then reverse and have in the wire until it is directly over the place where the trawl is fastened. Then with the help of a winch it lifts the wire vertically. If an oil line has caught the edges of the net, the nets will lie flat on the seabed as the boat goes astern, and there is the possibility that they will drift under the pipeline. A trawl winch, which lifts the edges of the trawling nets, can have a lifting power of ten tons or more, so there is the danger that it will lift the line as well, causing a break or damage, as well as destroying the trawling equipment. This has happened with telegraph cables, when the edges of the trawl became trangled with a telegraph cable, and the trawler brought the cable up to the surface in order to cut the equipment free.

3. A pipeline could also cause problems for ring seine vessels. Norway has

300—400 ring seine vessels. The purse nets used are 400—500 meters long and 160—200 meters deep. The steel wire which draws it together, could hook fast on an oil line on the bottom, so that the wire and net could be torn and destroyed, or the cement cover of the line damaged.

4. There is considerable fishing in the North Sea, along the coast of Norway and in the Barents Sea. A pipeline constitutes a real danger for collisions which could damage both fishing equipment and oil lines. Therefore, the pipelines must be buried to the extent technically possible. Further, in areas where it is not possible to bury the pipeline, its position must be accurately reported, so that collisions can be avoided. Finally, the pipelines must be removed from such areas when their use has ended.

5.3.4 Soiling of Fittings and Equipment

Oil in the sea and on the seabed will soil fishing equipment such as trawls, nets, traps, etc., and could thereby hamper fishing activity.

The danger of such soiling could easily result in reduced fishing in the area in question. The drop in the fish market just after the accident off Santa Barbara was caused by a decrease in fishing intensity because the fishermen feared their boats and equipment would be soiled, rather than by damage to the shoals of fish in the area.

5.4 POSSIBLE VENTURES

5.4.1 Research and Development

Today research is being undertaken on the effects of oil pollution on life in the ocean, and the pollution situation in the North Sea and the Norwegian Sea is being observed.

Since September, 1971, the Institute of Marine Research, Directorate of Fisheries, has made routine monthly investigations of a section between Fedje and Shetland. Water samples are collected at selected stations and depths to determine possible oil components in the water. The Institute of Marine Research cooperates directly with British research institutes in order to cover the largest possible area of the North Sea. The cooperation is directed towards both observation and method development, and testing for the effects on various marine organisms. Through the International Council for Ocean Research (ICES), the Institute of Marine Research is engaged in a total analysis of the pollutants influencing the North Sea area. There is an attempt to quantify the various inputs into the area, and to calculate the effects on the marine environment, and especially on the fishing yield.

Since the circulation pattern in the North Sea only is known in large patterns, the Institute of Marine Research is taking part in a study whereby they are attempting, with the help of the drift convolutions from the oil installations in the North Sea, to make a model of the surface circulation.

2. There is a great need for research, however, if there is to be a fully satisfactory basis for making far-reaching decisions on future petroleum activity, including the rate of further development and the areas where the activity will problably take place, with regard to the danger of pollution and which means should be implemented to prevent and combat pollution.

Research and technical development of increased safety during drilling, production, storage and transport, better methods for purifying drainage water, and more effective preparedness equipment are also necessary.

3. The companies operating on the continental shelf have individual responsibility for developing better and safer equipment and a better understanding of the effects of the operation, as well as the elements of risk attached to it. In applications for concessions, the authorities can demand the calculations and clarifications necessary for making a decision, including detailed information on the elements of risks, involved in the proposed operations, and the effects these could have on the surrounding environment and life in the ocean. It would also be of interest to secure the companies' cooperation in goal-oriented research, for which there is an evident need.

4. There are several established research environments with competence in those fields in which it is natural to expand, including the universities, the Institute of Marine Research, Directorate of Fisheries, and the institutes under the Royal Norwegian Council for Scientific and Industrial Research. Appropriate cooperation should be established between these and possibly other institutions to realize the most effective exploitation of means and personnel.

5.4.2 Control of Pollution

1. Pollution from petroleum based activities on land is covered by the ordinary pollution legislation. Permission from the authorities is needed for every polluted disposal into water and the air, from the Water Supply and Water Pollution Office an the Smoke Control Council respectively. In the near future these will merge to form an office

for pollution inspection. This will be a central licencing and export organ for pollution problems, with industrial pollution as its main concern. It will have extensive knowledge at its disposal on purifying techniques and which enterprise to call on in each particular pollution situation at any time.

2. The control and inspection of the operation on the continental shelf has been delegated to a number of institutions by the Ministry of Industry. With the establishment of the Norwegian Petroleum Directorate in 1973, it was assumed that this would take over the control operation. The Directorate is now expanding to accommodate these functions. Further discussion of this problem can be found in Parliamentary Report No. 30, 1973—74, on the operation on the Norwegian continental shelf, etc.

5.4.3 Preparedness Against Oil Damage

1. At present the operators on the continental shelf are obliged to maintain effective preparedness against oil sludge. In addition to this, effective public oil protection must be established, according to the Law on protection against oil damages of March 6, 1970.

The purpose of this law is to establish measures which will prevent, avert and restrict oil damage in the ocean, the watercourses and on land. Oil preparedness has so far been concentrated in the costal counties, which are especially exposed to damage from crude oil.

2. The Council on Oil Pollution was appointed under this law, and is composed of representatives from 16 different services and institutions. Among other things they will observe, plan and coordinate the national preparedness against damage from oil spills or blends containing oil, and will lead and coordinate the prevention and limitation of damages from oil spills in instances of catastrophe and at sea, which could have dangerous consequences.

3. The pollution from the operation on the shelf and on land should be reduced to a minimum. The most modern and effective methods for reducing pollution should be exploited. Those who carry out the operation, must submit the necessary information on the environmental consequences.

The activity on land is covered by the regular pollution legislation, and is subject to State pollution inspection. The control and supervision of spills from the operation on the continental shelf are now being taken over by the Norwegian Petroleum Directorate.

The regulation of spills from this operation must correspond to the general guidelines for preventing pollution. Spills from platforms and from installations on land should be subjected to the same rules as much as possible, and should be apparaised by the same body.

4. According to the Oil Prevention Law § 5, every municipality which is exposed to oil damage within its area, is obliged to hold in readiness personnel and material satisfying reasonable requirements to secure against such damage. The Petroleum Directorate, in consultation with a municipality, will decide the direction and area of activity of the municipal prepardness, and will also make decisions on inter-municipal cooperation. However, temporary regulations have been stipulated on municipal, inter-municipal, harbour commission and business protection against oil damage and about warnings of spills of oil and oil-bearing mixtures.

Guidelines for the development of municipal oil protection preparedness plans, approved by the Council on Oil Pollution on June 30, 1972, have been sent to all coastal towns in the country, with the request that they submit proposals for preparedness plans. In most of these the work of organizing municipal or inter-municipal oil protection preparedness has begun.

5. Emphasis must be placed on the increased risk of oil sludge from the petroleum operation. The requirements for preparedness by the oil companies in the field must be stipulated in regulations and with the allocation of concessions. It must be a basic rule that the companies themselves must be able to take care of every situation which might occur, and that the most advanced methods are used. All oil sludge must be reported to the authorities, with a statement of the efforts being undertaken, etc.

6. Public preparedness organization shall step in when the companies themselves cannot master the situation, and there is thereby a danger of considerable damage. This organisation must have extensive expertise in reducing oil sludge, as well as know where to obtain the necessary material and personnel. On the event of an accident the material available in the municipalities and from the companies themselves must be used. The preparedness must be built up in accordance with the general guidelines for the reduction of acute pollutions, both as regards equipment and organization.

7. The organization of future preparedness against acute pollution, including oil sludge in the open sea, is now being handled by a fast working commission («The Mellbye Commission»). This is also evaluating a further expansion of the Petroleum Directorate.

The organization which has the collective responsibility for oil protection, must also be the responsible authority for stipulating regulations for the equipping, manning, training, organization, etc. of the companies' oil protection.

5.4.4 The Question of Compensation and Compensation Measures

1. According to § 51.2 of the Royal Resolution of December 8, 1972, Norwegian compensation regulations are to be applied in the event of damage or inconvenience. The person causing the damage, his employer and claim holder are jointly legally liable for compensation demands.

§ 51.2, Section A stipulates that responsibility is not waived by the Ministry's having approved or permitted the activities or installations causing the damage. The main rule under Norwegian law is that compensation can be claimed only if carelessness can be shown. However, in certain instances responsability can be established without carelessness having occurred. Of particular importance in this connection is the objective, non-legal responsibility for damages caused by «hazardous activity».

2. Under the most recent extraction permissions the companies have assumed — until new compensation regulations come into effect — objective compensation responsibility for damages resulting from the operation, including pollution damages, with the exceptions and limitations existing under Norwegian law.

A commission was appointed under the Crown Prince Regent's Resolution of May 22, 1970, to draft regulations on compensation responsibility for damages occurring in connection with the exploration for and extraction of underwater natural deposits (Fleischer Commission).

The commission made its recommendations on December 15, 1972, (NOU 1973: 8) with proposals for a bill, «*Law on liability, etc. for pollution damages in connection with exploration for and production of submarine natural resources.*»

According to the draft law, the claim holder is liable on an objective basis for all pollution damage which occurs in connection with the petroleum operation, even if the damage results from a fault by an independent subcontractor, e. g. the owners of a drilling rig. In instances involving compensation on an objective basis, only the claim holder is liable to the injured party. The law is geographically limited to damages which occur on the Norwegian continental shelf, or which affect Norwegian interests on the open sea. Pollution resulting from transport by ship is not including under the law. When there are several claim holders under the same concession, it is proposed that they would be responsible on a pro rata basis in the event of damages. In accordance with the existing law, a majority of the Fleischer Commission are in favour of unlimited liability.

Comments of the recommendations of the Fleischer Commission were obtained from the departments and institutions concerned. The draft law raises a variety of questions on which there are many diverging opinions. From the conservation quarter there is strong pressure for statutes on the obligation of the damager to restore the environment as much as possible to its original state, so that the compensation sum is not bound to purely economic criteria. There is also the opinion that there should be joint liability for the claim holder. From other quarters there have been proposals to establish a fund which would cover the losses of certain injured parties.

The material received is under consideration, and the Ministry of Industry intends to present a proposed law in the course of 1974.

3. In September, 1973, an explantion of the liability for compensation for damages incurred from oil sludge from ships was presented. (Sjølovkomitéens innstilling XI (NOU 1973: 8).) According to the draft law, new regulations on this will be included in a new Chapter 12 of the Sea Law. The proposed regulations will, under Norwegian jurisprudence, conform to the Brussels Convention of 1969 on compensation liability for oil sludge damage and of 1971 on the establishment of an international fund to compensate for oil sludge damage. The committee on the Sea Law recommends that Norway now concur with both these Conventions.

The proposal implies that the owners of the ship will assume extensive objective liability for oil sludge damage. Distinct (higher) limits for the owners' liability for damages resulting from oil sludge from ships which transport oil as cargo in bulk, will also be introduced. Compulsory liability insurance

will be imposed on the owners of ships which transport more than 2,000 tons of oil as cargo in bulk.

Norwegian accession to the Fund Convention (1971) will permit a Norwegian injured party to demand compensation from the International Compensation Fund for the extent of the loss not covered within the liability limits which apply to ship owners. The Fund will be financed by levies on oil transported by sea.

The report has been sent to the interested authorities and institutions for comments. The Ministry of Justice intends to forward a proposition in the course of February/March, 1974, so that Parliament can deal with the matter in the Spring, 1974 session.

5.4.5 International Cooperation on Pollution from Operations on the Continental Shelf.

1. In order to effectively contend with pollution in the North Sea, and thereby protect the marine environment, fish resources, etc., it is not adequate to institute strict regulations and initiate effective preparedness on the Norwegian section of the continental shelf. Pollution of the North Sea can only be reduced to a minimum, if correspondingly strict measures are instituted in other parts of the North Sea.

The effective combatting of sea pollution generally demands comprehensive global cooperation on research and measures, and on the development of international regulations.

The problems in the North Sea, however, are so great and in many respects so specialized, that regional cooperation in solving them is justifiable and appropriate.

2. Cooperation is necessary among both the operators and the authorities in the countries concerned. This cooperation must have the dual goal of contending with pollution and of preventing to much competitive bias arising between operators in the different sectors.

The injured party must have the same protection regardless of which country's shelf the pollution comes from.

The problems have been taken up at various international conferences, but at present none of them has come as far as might be desired.

3. The situation can be summarized as follows:

The convention on ocean pollution from ships, which was prepared in London in the autumn of 1973 under the direction of the International Maritime Consulting Organization (IMCO), is the only global agreement which directly applies to pollution from the continental shelf operations. This convention, however, does not concern spills which result directly from exploration for or extraction of petroleum deposits on the shelf, and therefore its influence is greatly limited.

An agreement between the North Sea countries has been prepared on cooperation in preparedness in the event of large oil slicks in the area (Hamburg Convention, 1969). The convention has so far been without practical significance.

Further North Sea cooperation was begun at a conference in London in March, 1973, where regulations for construction, security undertakings and control of pollution were among the subjects discussed. After the conference a number of working groups were created. The Ministry of Industry has appointed the Petroleum Directorate to direct one of these groups, which has the task of harmonizing the security regulations of individual countries.

Another group under Dutch leadership was formed at the conference. It is to harmonize the compensation regulations concerning pollution damage resulting from the operations in the North Sea.

As a continuation of the convention on the ban on dumping in the Northeast Atlantic (Oslo Convention), a convention has now been prepared on the control of spills into the ocean from land-based sources (Paris Convention), to which all the Western European countries belong.

The convention also covers spills of oil from platforms connected with the operation on the continental shelf.

It is a framework convention. A commission will be established to prepare common programs for the reduction of spills, the observation of the pollution situation, etc. Oceanic research in the area will be coordinated by the commission, and the results will be used as a basis for future measures.

4. It is very desirable that international cooperation in this area be expanded. It is natural that Norway should advocate that pollution problems connected with the petroleum operation should be made a priority task within the framework of the Paris Convention.

Parallel with this it is desirable to further, as quickly as possible, the special cooperation established between the North Sea countries at the London conference in March, 1973. Norway must take the necessary intiative

to get underway the program which was drawn up there.

The goals of these cooperative efforts must be:

— a strengthening of joint preparedness in the North Sea area
— joint regulations on the maximum spill of oil in drainage water (follow-up of the London meeting or Paris Convention)
— joint regulations on objective liability for pollution damage
— joint observation and inspection system in the North Sea, including observation of the pollution situation in general, watching the sea for evidence of oil sludge, etc.

CHAPTER 6

Energy Policy Perspectives For Norway

Prepared in cooperation with the Ministry of Industry.

6.1 ENERGY RESOURCES

1. The known oil and gas deposits in the North Sea represent an enormous amount of energy, compared to the present Norwegian energy consumption. A continued steady production of oil on the level of 50 million tons annually, for example, would have the same heating capacity as 580 TWh (milliard kWh). If converted to electricity at a thermal power plant, using modern techniques, this amount of oil would produce ca. 200 TWh. Correspondingly, an annual production of 40 milliard m^3 of gas could produce 145—160 TWh of electricity per year. Norway's total consumption of electricity in 1972 was 63.2 TWh.

2. In addition to oil and gas, Norway has water power, coal, wood and peat as well as other sources of energy. These are of varying importance. About 50 per cent of the combined domestic energy supply comes from hydroelectric power. Water power is a comparatively small source of energy globally. The total developable water power sources in the world are estimated capable of producing ca. 5,000 TWh per year. Only ca. 1,000 TWh of these are developed, of which Norway has 6.5 per cent and Sweden 5.5 per cent. Developed hydroelectric power provides ca. 6 per cent of the world's total energy supply. This percentage has remained constant for a long time.

3. The total hydroelectric potential in Norway is estimated at 500 TWh, of which 135 TWh is considered economically developable at present. 63 TWh is completely developed, while hydroelectric resources with a production potential of 15 TWh are excepted from development for protective reasons, some for a period of ten years and others permanently. Aside from power resources which have been partially or entirely withheld from development for concession treatment at a later date, the remaining hydroelectric resources are estimated to represent about 50 TWh per year. If oil were used to produce this amount of electricity, approximately 12.5 million tons per year would be required with present technology.

4. The Great Norwegian Spitsbergen Coal Company A/S has estimated known and possible coal reserves of ca. 9 million tons gross as of March 31, 1973, divided between Mines 3, 4, 6 and 7. There are also possible reserves of some 5.5 million tons in the same mines. With allowances for cleaning and separation, 14.5 tons gros of coal corresponds to ca. 7 million tons of oil. The coal reserves in the Svea East field have not been calculated, but they are expected to be of considerable extent.

So far Svalbard coal has mainly been used for industrial purposes (as a reduction agent in the metallurgical industry). During the working year 1972—73 only 35,000 tons of Svalbard coal was used for heating purposes of a total sale of ca. 430,000 tons.

The extraction of coal on Svalbard is described in more detail in Parliamentary Report No. 79, 1972—73. After 1975 a net production of 450—500,000 tons of Svalbard coal is expected. This corresponds to 250,000 tons of oil, or ca. 1 TWh if theoretical thermal amounts are compared.

For the time being there is production in the Longyear area only. The Government will return to the question of extraction in the Svea field. Even a doubling of production, however, would have little impact on the total Norwegian energy supply.

5. There are considerable potential energy resources at our disposal in the forests and peat bogs. Their contribution to the energy supply has decreased rather rapidly, however, and now comprises less than 5 per cent of our combined consumption of primary energy.

Norway has no known profitable deposits of uranium. Exploration for uranium could be feasible, however.

6.2 ENERGY CONSUMPTION

6.2.1 Energy Consumption in Norway up to the Present

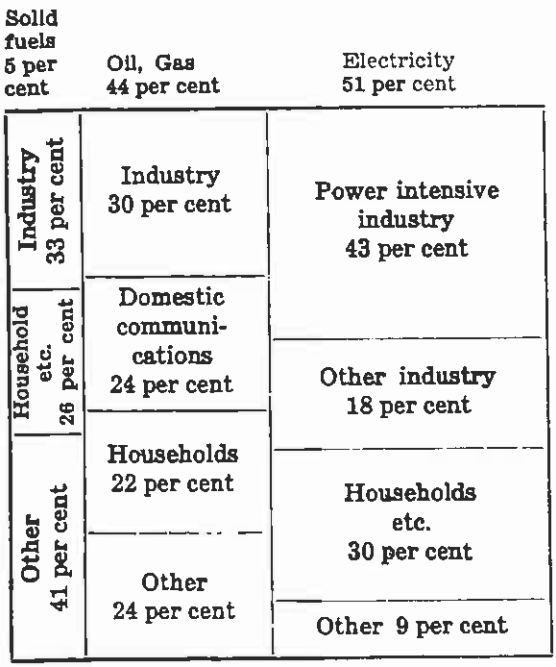
1. Norway's consumption of energy raw materials (oil, coal, hydroelectric power), the primary energy consumption, has increased almost tenfold since the turn of the century, from a scant 2 million tons of oil in 1900 to approximately 17.2 million tons of oil equivalents in 1972. This corresponds to an average annual increase of ca. 3 per cent. These figures do not include the

consumption by ships involved in foreign trade. The consumption of the Norwegian foreign fleet is almost equal to the entire domestic energy consumption.

2. Norwegian energy consumption per capita in 1972, excluding the shipping trade, was ca. 4 tons of oil equivalents. The corresponding figures for consumption in other countries were: Sweden 5.4 tons oil equivalents, Japan 3.0 tons, Great Britain 3.8 tons and the United States 8.2 tons. The average for all of Western Europe was 3.1 tons and for the entire world 1.5 tons.

3. The increase in domestic consumption was especially strong in the years after 1950, with 5 per cent per year in the period 1950—1960, and 7.6 per cent per year for the period 1960—1972. The energy picture has also changed. From the turn of the century to the years following World War II solid fuels (coal, coke and wood) were the dominant sources of energy in Norway's energy picture. Today the importance of solid fuels has been considerably reduced, and they comprise only 7 per cent of the country's primary consumption. The use of liquid fuels has been steadily increasing since the 1920's, with the exception of the last three years. Hydroelectric power has expanded extensively since the turn of the century, so that today hydroelectric power and oil are the dominant sources of energy.

Figure 6.2.1a . Percentage of total end consumption divided by use and energy source, 1970.

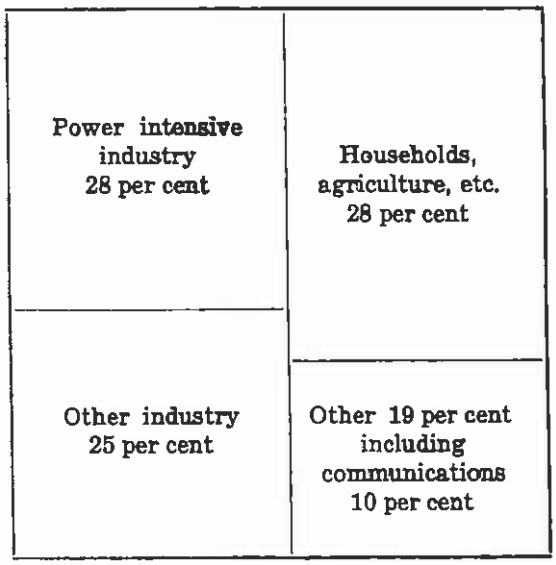


4. The primary energy is converted and distributed, often with considerable loss, into usable energy such as heat, light, mechanical labour, etc. (end consumption).

In 1970 the end consumption was nearly 15 million tons of oil equivalents or 85—90 per cent of the primary consumption. In other words, there was a loss of at least 10 per cent. Of the end consumption, solid fuels accounted for 5 per cent, oil 44 per cent and electricity 51 per cent.

The distribution between means of energy and objects of consumption are indicated in Figures 6.2.1a and 6.2.1b.

Figure 6.2.1b. Percentage of total and consymption according to use in million tons oil equivalents, 1970.



5. In 1970 industry consumed 53 per cent of the total. Consumption by power intensive industries was greater than consumption by other industries. End consumption in households and agriculture constituted 28 per cent of the total end consumption, while the remaining 19 per cent was used in communications and other sectors.

6.2.2 Prognoses for Future Consumption

1. In the report on Norway's energy by the Energy Council in 1969 (supplement to Parliamentary Report No. 97, 1969—70) prognoses were made for the total energy consumption in Norway up to 1990. These were prepared as sector prognoses. They are based on observed relationships between the growth in energy consumption and the total growth within the various sectors, such as industry, households, etc. The sector prognoses together form the total prog-

noses. The report assumes an annual GNP growth rate of 4 per cent up to 1990, and a growth in industrial production of 5 per cent per year.

On the basis of an estimated end consumption of energy, two alternatives were presented for the primary consumption of energy in Norway (see Table 6.2.2). The alternative with the lowest consumption of energy is based on a somewhat stronger growth in the consumption of hydroelectric power and a somewhat smaller growth in the consumption of oil and gas, and also nuclear power. This consumption composition involves the least energy loss during conversion to utilized energy when using modern techniques.

Table 6.2.2. Figures from the Energy Report on estimated primary consumption of energy in Norway, 1966—1990. Million tons oil equivalents.

	1966	1970	1980	1990
Water power alternative ..	12.9	15.8	24.3	37.9
Oil alternative .	12.9	16.5	26.2	43.2

2. In relation to the known energy resources, a consumption development such as described in the Energy Report, is not considered alarming. Nevertheless, several circumstances signal that Norway, like other industrialized countries, should try to slow down the increase in energy consumption.

There are obvious advantages in such a reduced growth. Every one of the known types of energy has some negative environmental effects, such as pollution, storage of radioactive materials, encroachment on the landscape, etc.

It is also expected that the cost of providing different kinds of energy will climb faster than the general price level. For example, the cost of developing hydroelectric power has risen by 15—20 per cent in recent years, and it must be expected that this will continue. Attention is also drawn to the predictions in other sections of this report on price developments for petroleum products.

3. An examination of the international energy situation also indicates that Norway, along with other industrialized countries, should aim at the least possible growth in consumption. Should energy consumption continue to increase at the same rate as in recent years, the consumption in Europe and the United States will triple between 1970 and 1985. It must also be expected that the energy needs of the developing countries will climb rapidly in the years ahead. An essential part of the energy demand will be for gas and oil.

Until now estimates of the growth in global oil supply have largely been based on the assumption that oil production in the Middle East would increase rapidly. It now appears that these oil producing countries are interested in stretching production over a longer period of time. Even if other oil producing countries increase production, less growth in the total production must be expected than in recent years.

Changes to new forms of energy in compensation for those now utilized will take time. Therefore the industrialized countries must economize their energy resources in the years ahead.

4. Norway now has rich supplies of oil and gas. However, in the main Norway should base herself on the same considerations as the other industrial countries in regard to negative environmental effects, expected relative price increases and the global situation.

Economic considerations also indicate a reduced growth in consumption, for if Norway were to utilize superfluous amounts of energy domestically, she would forfeit incemes from the sale of oil and gas abroad.

5. It should be possible to maintain a satisfactory growth in production without as great an increase in energy consumption as we have had in recent years. The Swedish Energy Prognosis Report, presented in July, 1973, asserts that it is possible to reduce the growth in energy consumption without especially reducing the growth in GNP or industrial production. It states inter alia: «Through the possibilities of employing less energy intensive production processes by a changed industrial structure and by a number of other adjustments, it is possible to reduce elasticity (the relationship between the percentage growth in energy consumption and the percentage growth in the GNP), and thereby to reduce the dependence of growth in the GNP on growth in energy consumption.»

Such an adjustment would, of course, take some years.

6. A price fixing in accordance with the actual costs of energy production would be an important measure in an attempt to economize resources.

Increased energy prices will mean:

— less utilization of energy for heating, by e. g. stimulating lower room temperatures

and better insulation of new and older buildings,
— substitution consequences in industri, inter alia a partial replacement of the energy production factor by other production factors,
— the development of new production methods which better exploit the energy contents of primary resources,
— a change to goods and forms of transport which require less energy.

7. The authorities also have other means at their disposal for influencing energy consumption. These include:

— the energy price to consumers be fixed so as to actively encourage lower consumption,
— the encouragement or imposition of centralized heating (remote thermal power stations) in instances where this will save energy,
— a ban or tax on energy intensive articles, forms of transport, production methods, etc.,
— regulations for better insulation and ventilation.

8. The Government is now working on a report to the Parliament on future energy coverage, in which this question will be examined in more detail. Alternative prognoses for energy consumption in Norway will be presented therein, based on the assumption that the public authorities can take a more active role than outlined in the Energy Report.

6.3 OIL/GAS IN THE FUTURE NORWEGIAN ENERGY PICTURE

6.3.1 Production and Consumption

1. The total Norwegian production of oil and gas in 1980 is estimated at ca. 90 million tons of oil equivalents. The domestic market can only absorb less than half of this though, and regardless of the consumption development proposed for the domestic market, Norway will export considerable amounts of oil and gas.

2. The era of continuous hydroelectric development will soon be over. Further increases in electricity consumption must be covered by power stations based on oil, gas or uranium. When electricity is produced in oil and gas based thermal power plants, 25—45 per cent of the energy potential of the input factors is utilized.

3. If oil and gas were utilized directly, a considerably larger part of the energy potential could be exploited. Although Norway has rich supplies of oil, as well as gas, the international energy situation may indicate that direct fuel consumption should be stimulated, rather than the use of electricity. Low prices for electricity would result in high demands for it. It might then be necessary to use oil and gas for the production of electricity, rather than for direct fuel purposes, where there is a considerably higher exploitation of the energy potential. Even if such development in the price pattern can be influenced by price policy, a continued increase in electricity production will be necessary.

4. The composition of the future supply of electricity will be influenced by the cost structure of various ways of procuring electricity.

Generally, power plants with high construction costs and low operating costs are run continuously (base load plants), while plants with low construction costs and high operating costs are coupled in at peak load periods (top load plants).

5. Nuclear power plants have a cost structure which indicates that they will eventually come into the system as base load plants. As of January, 1973, capital investments were estimated at 2,500 kroner pr. kW for a 1,000 MW plant, excluding nuclear material. The variable costs constitute 5—10 per cent of the capital costs.

6. Thermal power plants based on oil or gas are suitable for peak load plants from the point of view of cost. However, it is possible to design such plants with a higher degree of effectiveness. The operating costs per kWh then go down and the construction cost up.

As of January, 1973, construction costs were estimated at between 1,500 and 1,700 kroner pr. kWh for an installation of 500—600 MW size.

Fuel costs comprise 30—40 per cent of the total cost pr. kWh, depending on the degree of effectiveness. Consequently the price level of oil and gas will influence the establishment of such a plant. As an example, if the price should triple, the kWh price from an efficient plant would increase by 70 per cent.

7. If future electricity production is based on gas landed by pipeline, the plants must come into the system as base load plants in order to best exploit the transport capacity. Conditions could be somwhat different, if the gas for electricity production comprised only a small part of the total gas landet. This

will be closely examined in the report on the Frigg gas.

8. The construction costs for a gas turbine plant are ca. 50 per cent less than for a steam operated plant. The degree of effectiveness, however, is considerably lower, so that such a plant is suitable for top load.

The construction costs of a combined power plant (with both gas and steam turbines) is ca. 40 per cent lower per installed kWh than for a conventional plant. In addition the degree of effectiveness is higher. Questions concerning operating safety and costs are now being examined by the Ministry of Industry.

9. If gas is used for base load production, other sources of energy must cover the top load. Thermal power based on oil is one possibility, while water power is another. If water power is used, large regulating dams will be needed to assure against drought years. There can also be considerable differences in water level from year to year.

10. The cost per kWh of the various types of power plants is determined by the operating time and the size and degree of effectiveness of each plant. Another factor which must be taken into account, is the price which could be obtained for the input factors, if they were utilized in another way (opportunity costs). For example, when considering production based on gas, the price which could be realized by the direct sale of the gas must be taken into consideration.

The opportunity cost for gas from discoveries north of Lat. 62° N, for example, will be appreciably lower than that for gas from fields further south. This is because the transportation cost factor in the sale price will be greater.

The environmental, health and safety consequences must also be integrated into the cost concept on which decisions are based.

11. If gas is discovered north of Lat. 62° N, it will probably be landed in Norway. This will make possible the production of electricity based on gas, among other things.

6.3.2 Direct Use of Oil and Gas as Fuels

1. Natural gas has a high degree of effectiveness when used directly. Burning poisonous, and usually completely dust free. injurious pollutant materials. The gas is not posionous, and is usually completely dust free.

In addition, natural gas is easily burnt, and can be delivered via pipe networks without pumping or labour intensive transport.

2. These characteristics make natural gas a highly demanded source of energy for industry. In other countries gas is used in industrial ovens which have a large energy consumption, for heating steam and hot water boilers, as tools, for burners, etc.

The purely environmental advantages in using gas rather than coal or oil are large. The use of gas can also involve economic advantages for some enterprises.

3. In many countries natural gas is distributed through extensive pipeline networks to households, businesses and small industries. It is then utilized to heat rooms, either directly by gas heaters or through central heating, to heat water and to some degree for lighting. Because of the pattern of settlement in Norway, probably only the Østland region would be a current market.

4. Gas in large quantities can be transported through pipelines over great distances. For example, there are gas lines from Omsk in Siberia to the central parts of Europe, a distance of 4,500 km. There are many pipelines in the United States, including links between New York's energy grid and the gas deposits in Texas. In Canada a gas line is projected from the MacKenzie Delta to the central parts of Canada, a distance of 5,600 km. Such pipelines require large investments in installation, and therefore it is necessary to have a considerable market for gas, if it is to be profitable.

5. Several variations of a pipeline system to transport Norwegian gas can be envisaged. Possible discoveries of gas off the coast of Møre could be carried across the country to the Oslo area, and thence to Sweden, Denmark and the northern parts of the continent.

Offshoots can be connected to such a pipeline, so that it could be tapped along the route.

The realization of such projects depends on the size and location of future discoveries, and whether the project routes could be laid out in proximity to existing or potential markets. If suitable discoveries are made, such solutions must be evaluated.

If the Norwegian market could be supplied with considerable quantities of gas at reasonable prices, it might be feasible to stimulate consumption by establishing a distribution system. The practicality of a distribution system for industry only will also be assessed. The Norwegian consumption of gas could also be influenced by future environmental restrictions on other types of energy.

6. At present Norway has an inconsiderable consumption of gas, whereas oil consumption rose 7.6 million tons in 1972. Of this amount 22 per cent was used for heating, 24 per cent for domestic communications, 9.6 per cent by coastal trade and fishing and 30 per cent by industry. The remainder went to agriculture, stockpiles and other uses.

7. The discoveries on the Norwegian continental shelf do not in themselves justify lower sale prices in Norway than those which could be realized by export. Nor will proximity to the source essentially affect transportation costs, even if the oil is landed by pipeline. This is related to the fact that the oil would probably have to be transported from the place of landing to the refinery. Nevertheless, the certainty of deliveries could mean that increased direct utilization of oil would seem more advantageous, or that an equalization of energy and raw material prices may be used for the purpose of influencing localization policy or energy policy.

CHAPTER 7

Public Incomes from the Petroleum Activities

The rights to the submarine natural deposits on the Norwegian continental shelf belong to the State. The State can give permission to persons or companies to investigate or exploit these resources. The most recent regulations for the exploration for and exploitation of submarine petroleum deposits were presented in the Royal Resolution of December 8, 1972. The compensation demanded by the State as recompense for the permission to investigate and exploit the petroleum resources, is governed in part by this law and in part by the ordinary code of law.

In this chapter the established provisions regarding public income from the operation on the continental shelf are clarified. The problems of control connected with the collection of taxes and duties are also discussed. Changes in the provisions governing public incomes are discussed in Section 2.2 of this report.

The question of taxation of operation directly connected with the exploration for or extraction of petroleum, drilling platforms, means of supply, etc. are not discussed.

7.1 CURRENT REGULATIONS CONCERNING PUBLIC INCOME FROM THE PETROLEUM ACTIVITIES

1. The combined public income (Total Government Take) from the activities on the continental shelf will come, according to present regulations, from a number of different levies and fees, income from State participation, and direct taxes on income and capital. From the first allocation of production licences in 1965, through the next allocation in 1969, and up to the allocation of concessions for the Norwegian Brent blocks in August, 1973, the State's share of future income from the operation on the continental shelf has increased. The fixed levies imposed in 1965 were raised in 1972. In addition, there was the first agreement on direct State participation in 1969. The State's participant interests in commercially exploitable discoveries have risen, as it has entered into new agreements. The share in the Norwegian Brent blocks is 50 per cent.

2. Firms taking part in the activities on the continental shelf come under their own tax law. (Law Number 3 of June 11, 1965, on taxation of submarine petroleum deposits.) It was taken as a point of departure that a separate tax system should not be adopted for the oil industry. Nevertheless, certain concessions were introduced, as compared to the regulations and tax rates which then applied to other industries. The object of this arrangement, which was adopted in 1965, was to interest a sufficient number of international oil companies in the Norwegian continental shelf. At that time it was not known which areas of the Norwegian seas contained deposits which would be profitable to extract.

As a first step in expanding the legal regulations of 1965, an amendment of June 9, 1972, decreed that the same rates of income tax would apply to the oil industry as to other industries. This was connected with the alteration of the regular tax system which took place January 1, 1970.

3. There are several taxes and fees which have relatively little influence on the public income. Exploration fee is tied to the permission to undertake geophysical explorations for a period of three calendar years, and is fixed at 20,000 kroner per year. Upon application for production licence the applicant must pay a 15,000 kroner handling fee. Claim holders of such production licences must also pay a one-time tax of 750 kroner per km^2.

The area tax is somewhat more substantial. The rates for this tax are fixed at 1,800 kroner per km^2 for the first year after the end of a six year period. Thereafter the tax per km^2 climbs annually to 15,000 kroner per km^2 ten years after the end of the six year period. For the remainder of the concession period the tax is 30,000 kroner per km^2 per year. The tax can be adjusted every five years to bring it into accordance with changes in the value of the kroner. Adjustments can also be made for changes in the value of the kroner in relation to other currencies.

It is estimated that altogether these taxes could bring in ca. 50 million kroner annually for the next few years.

4. According to the Royal Resolution of April 9, 1965, there was a royalty on extracted gas and oil of 10 per cent of the value at the place of production. Under new regulations for production licences, according to the Royal Resolution of December 8, 1972, the royalty is to vary according to the size of oil production from the various fields. (See table 7.1.)

Table 7.1. Rates for the royalty.

Average daily production over a 30 day period.	Royalty in per cent
1— 40,000 barrels[1])	8
40,000—100,000 »	10
100,000—225,000 »	12
225,000—350,000 »	14
350,000— »	16

[1]) 1,000 barrels corresponds to ca. 130 tons.

There is a tax on the production of petroleum products other than oil, especially gas, of 12½ per cent.

In calculating the royalty, the field is understood to include the zones, structures, traps, etc. which produce through the same production installation. For the exploitation of fields where joint installations can be partially or totally used, the royalty is calculated according to a rate which corresponds to the combined production.

The Ministry of Industry can order the royalty paid in petroleum rather than money with six months' notice. It has been decided that the royalty for the Ekofisk field will be paid in extracted petroleum from March 19, 1974, at the latest, and throughout the rest of the year.

5. It can be stipulated that a production bonus be paid in addition to the other taxes.

In the production licences for the Brent blocks it is stated that the claim holder must pay a bonus of 25 million kroner when production first reaches 250,000 barrels per day. When the production first reaches 400,000 barrels per day, the bonus will be 50 million kroner.

6. State participation in commercial discoveries provides the State with an income in addition to the taxes and various levies described above. It also allows a greater degree of administration and control of the operation.

State participation so far has been in the form of agreements on shares of net profits and agreements on carried interest.

7. The agreement on the share of net profits is an arrangement whereby the State receives a certain percentage of the claim holder's net profits, in addition to the fixed statutory duties and taxes. This form of agreement does not give the State any influence over the operation beyond its power as an administering authority. The State has entered into three such agreements, and has thereby secured access to information in line with the other claim holders, as well as permission to be present as an observer at the claim holders' operators meetings.

8. The agreement on carried interest can be generally described as an arrangement where the State has the option of becoming a participant, in line with the other participants, for a fixed percentage share of the production licence, should there be a commersial discovery of petroleum within the concession area. Until the allocation of production licences for the Brent blocks, the agreement has been that the State must pay its share of previously accrued expenses aquired through the exploration leading to the discovery of the deposit. The reimbursement by the State could mean that the other partners take over some of the State's share of the profits. Expenses which accrue after the option is taken, must be paid by the State, usually in line with the other partners. The method of payment varies, however, from agreement to agreement. In the Petronord agreement, which applies to the Frigg field among others, and in which the State has a participation of 5 per cent, the State's share of expenses accrued after the option is taken are to be paid from its share of the production.

Under the most recent production licences allocated, i. e. for the Norwegian Brent blocks, the State will not refund any part of the expenses from the exploration phase. However, the State will pay its share of the expenses of extracting a commercial discovery.

So far State participation shares have been secured in agreements with seven groups of claim holders.

9. According to tax regulations in force the oil companies, like other companies, are liable for 50.8 per cent tax on their taxable income, of which 24.3 per cent is municipal assessments (municipal tax, collective tax and a special tax for developmental assistance) and 26.5 per cent is state assessment. The computing of taxable income for these companies involves a number of problems. These are more closely examined later in this chapter and in Section 2.2 of the report.

7.2 CONTROL POSSIBILITIES AND CONTROL PROBLEMS

1. It is essentially the international oil companies which are engaged on the Norwegian continental shelf. Most of these are very large companies — both by international standards and in relation to the total Norwegian economy.

The organizational, technical and economic administration of these companies, together with their geological expertise, are important

for mastering the demanding operations in the North Sea. This has been the basic justification in selecting claim holders. It is characteristic that the development of international concerns began in the oil sector. It is estimated that between 80 and 90 per cent of all the oil sold today, goes through integrated, multinational companies which have a hand in the oil from the sources of raw materials, through production, transport, refining, distribution and up to marketing. Therefore, to a large extent crude oil from the Norwegian continental shelf will be sold to buyers who belong to the same concern as the seller. The concentration of economic power in these companies raises special control problems. The companies' plans will be made according to their own economic interests, which could differ greatly from national interests.

2. There are no control problems connected with levies, aside from the royalty. The size of this fee is depent on the quantity produced and the value used as a base. According to current legislation, agreement will be sought on the value used as a basis for determining the fee. If agreement is not reached within a reasonable period of time, the Ministry of Industries will stipulate the fee. The justification for this method of procedure lies in the strong degree of integration in the oil industry, which means that ordinary market prices are not available. As the companies' settlement prices are unacceptable, the Ministry of Industry has decided to stipulate the value after negotiations with the claim holders.

Technically advanced measuring instruments are used in the field to control the quantity produced. The quantity is also controlled during loading on board ship and again at the receiving depot. This control function comes under the Norwegian Petroleum Directorate. The Directorate has appointed a separate commission to assess the analysis and measuring problems. The Directorate is also considering whether the State should have a representative on the field to control both the measurement and the installed measuring equipment.

3. The greatest control problems are connected with the taxation of income. The prices of extracted oil and gas are very important. According to the regulations in the tax laws, the companies ordinarily would have the right to have the assessment made on their accounts. On the other hand, with buying and selling between integrated companies the assessment authorities have certain rights to disregard the accounts, and make an estimate of the income.

The assessment authorities are faced with a very demanding and difficult task when they decide to disregard accounts. Among other things, this involves controlling the depreciations entered, the entries which refer to intermediate accounts with other companies within the same concern, the compensation for purchase of technical expertise, etc. In other sections of the report possible means of easing the control problems of income taxation are discussed.

7.3 POSSIBLE INCOME ACCORDING TO PRESENT REGULATIONS

1. The costs of petroleum extraction, depreciations, interest, and operating and maintenance expences, as a share of the market value of petroleum will vary greatly according to the size of the discovery. These costs will comprise a large part of the market value of the petroleum from smaller commercial discoveries, but it is estimated that they will only comprise a small part of the market value for larger discoveries, when calculated over the area's production period.

2. To illustrate, if it is presupposed that construction and operating costs comprise 30 per cent of the gross market value of petroleum from the Ekofisk area, the public tax and duty income under present regulations can be calculated as an average 40 per cent of the market value. This corresponds to 55—60 per cent of the net market value. The net market value, then, is calculated as gross market value minus depreciations, interest, and operational and maintenance expenses. These costs will mainly correspond to the deductions approved during tax assessments, in addition to the royalty. Direct income tax comprises ca. 70 per cent of the public income, while levies provide ca. 25 per cent.

For the time being only the companies with shares in the Ekofisk area have had this income tax imposed. There is no direct State participation in Ekofisk.

The Ekofisk area and later the Frigg area, on the basis of present assumptions in regard to production and prices, will contribute to a rapid increase in public income by the end of the 1970's. By 1980 this income is estimated to reach between 10 and 15 milliards kroner, according to the present tax and levy regulations and with the assumptions illustrated above. In other words, this will be ca. 40 per cent of an estimated gross market value of some 30 milliards kroner. These figures do not take general price developments up to 1980 into account.

3. It should be emphasized that there is a considerable uncertainty as to just how

large the public income, and especially the tax income according to present tax regulations, will amount to. Income of the dimensions outlined, obviously requires an expansion of tax expertise and effective assessment control. The developments in petroleum prices will greatly influence the profitability of extraction in the various areas.

4. As mentioned above, under the rules for the royalty fixed in 1972, the rate varies with the volume of production. The public income will also increase with State participation in extraction. With such participation part of the income would certainly be regarded as yield on invested capital and compensation for business participation risks.

With a discovery of the same size as Ekofisk the rate for the royalty fixed in 1972, and State participation of 50 per cent, for example, the total income could comprise more than half of the gross sale value.

5. The Norwegian State Oil Company A/S (Statoil) will take care of State interests in agreements on State participation shares. With the above assumptions as a base, the total public income, after taxes, will be divided between some 20 per cent to Statoil and almost 80 per cent to the public administration.

During the spring a proposal on the guidelines for Statoil's enterprise will be presented. These guidelines will largely determine the disposal of that part of the income which goes to Statoil.

6. Figure 7.3 illustrates an average distribution of the income from petroleum extraction over the production period. First a distribution is presented for an area of the size of Ekofisk according to the regulations in the Royal Resolution of April, 9, 1965. (Figure 7.3a.) Then a corresponding area is depicted with 50 per cent State participation shares and royalty rates based on the regulations in the Royal Resolution of December 8, 1972. (Figure 7.3 b.)

The costs are assumed to include all deductions recognized at the tax assessment with the exception of dividends. Depreciations, interest and operational and maintenance expenses are assumed to comprise an average 30 per cent of the production value. For the sake of simplicity, the effects of reduced national tax resulting from dividends paid, have been ignored in the illustration.

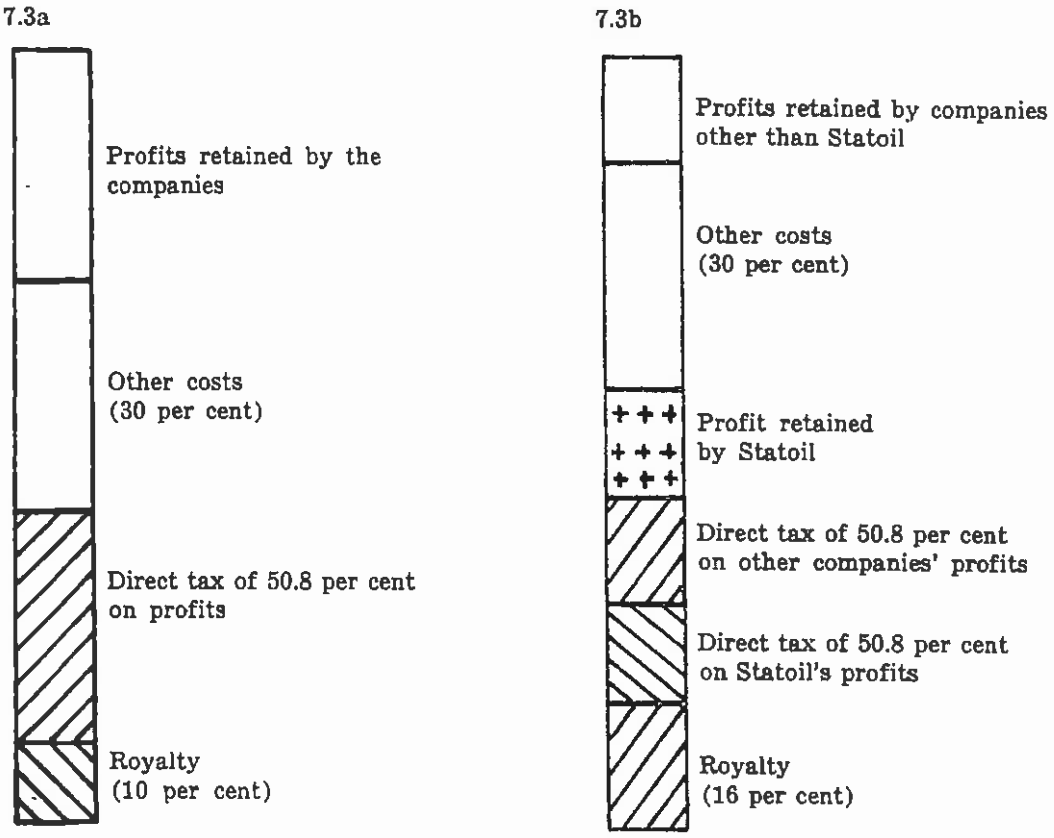


Figure 7.3. Examples of distribution of the production value of petroleum extraction.

CHAPTER 8

Integration of the Petroleum Incomes and the Petroleum Activities in Norwegian Society

8.1 INTRODUCTION

1. The oil discoveries in the North Sea provide the basis for a stronger economic growth in Norwegian society. This will benefit individuals through increased personal consumption and improved public services.

The oil operation and the application of the increased income will, however, intensify readjustments in Norwegian society. If such changes come too quickly, they could lead to considerable problems. This must be taken into consideration when the extent of the operation is decided. It will also be necessary to attempt to reduce the undesirable readjustment trends.

2. The oil and gas discoveries will mainly affect the Norwegian economy in two ways:

— direct effects for Norwegian workers and Norwegian industry through participation in exploration, extraction and base activities, the delivery of platforms, equipment, etc., and through further improvements in refining, petrochemistry, etc.
— the use of the increased income for higher consumption and larger domestic investments.

3. In the first round the direct effects will be the most noticeable. The most important single factor today is the construction of mobile drilling platforms. In 1974 Norwegian shipyards are expected to deliver platforms for a value of 1,300—1,400 million kroner to Norwegian owners. Deliveries of this size are not anticipated in the next few years, but the yards can expect an increasing amount of repairs and maintenance. In 1980 it is estimated that Norwegian shipyards will deliver mobile drilling platforms to Norwegian owners and undertake repairs for a round figure of 1 milliard kroner at 1974 prices.

It is expected that in 1974 Norwegian industries will deliver other goods and services to the operation on the Norwegian continental shelf for a value of ca. 450 million kroner. These will include drilling services from Norwegian owned drilling platforms, services by Norwegian supply vessels and base operations, and other goods and services necessary for conducting the operation on the shelf. Towards the end of the 1970's such services could be for a value of 1—1½ milliard kroner per year (at 1974 prices). The delivery of stationary drilling platforms is included in this calculation.

In addition to this, ca. 60—70 million kroner will be earned in wages from extraction companies in 1974. By 1980 this figure could reach 150—200 million kroner (at 1974 prices).

As well as deliveries to the Norwegian continental shelf, there is already a considerable export of goods and services for petroleum exploration and extraction in other countries. It is expected the export for 1974 will be on the level of 850 million kroner. This figure includes the export of a drilling rig to a foreign owner. Otherwise the export mainly consists of drilling services from Norwegian owned platforms on the shelf areas of other countries. All in all, direct production activities connected with petroleum extraction are expected to amount to 2½—3 milliard kroner in 1974, climbing to ca. 5 milliard kroner in 1980 (at 1974 prices).

In comparison, the total export of goods in 1973 (including new ships) amounted to at least 23 million kroner.

The operation on the Norwegian continental shelf and the direct and indirect deliveries to this operation should employ ca. 15,000 workers in 1974. This employment will probably climb to 20,000—25,000 in 1980. Included in this calculation is the labour force involved in building platforms with equipment. Although this will not constitute more than one per cent of the total employment, the geographical concentration could lead to considerable local adjustment problems.

4. Before the end of the decade the utilization of the increased income for consumption and domestic investments could demand more of an increase in employment than direct petroleum activities. Even if part of the increased demand for goods and services can be directly satisfied by imports, it will also require a considerable increase in deliveries from several sectors within the country. Some of this increase will be at the expense of growth possibilities

in other sectors. After 1980 the public income from taxes and duties could amount to 10—15 milliard kroner (1974 prices), and the net income of the extraction companies will also be considerable. For every milliard kroner (1974 prices) of income used domestically in 1980, at least 7,000—8,000 workers will be required to produce the goods and services demanded by industries which are protected from foreign competition. It will also lead to a certain amount of growth in production and employment in those industries which compete with imports.

5. There are three main ways the income can be utilized:

- income is used abroad
  - for real and financial investments (including the purchase of foreign ownership interests in Norway)
  - for transfers abroad (including development assistance)
- income is used for investment on the continental shelf
- income is used domestically for increased investments and increased private or public consumption.

6. The income used abroad will not affect domestic demand. Investments abroad can take the form of increased currency holdings (bank deposits, short term securities, and credit in international organizations) or comparable financial investments by banks, private industries and individuals. Norwegian concerns might also acquire ownership interests in foreign companies or establish subsidiaries abroad. Another result could be the purchase of foreign ownership rights in Norwegian industry.

When the income is disposed in investments abroad, it will in turn provide income which can be used at a later point in time to increase domestic demand. In this way the utilization of the income will be spread out over a period of time.

Parliament has complied with the United Nations' request to turn over 1 per cent of the gross national product to developing countries Accordingly Norwegian development assistance could amount to 1,550 million kroner (1974 prices) in 1978, when the petroleum industry is included in the GNP. This means that in 1978 development assistance will be ca. 300 million kroner more than if oil and gas had not been discovered in the North Sea. In comparison, development assistance in 1974 will be ca. 700 million kroner.

7. Considerable investment in the continental shelf must be expected. From 1974 to 1980 the extraction of oil and gas and pipelines on the shelf could require expenditures in the area of 20 milliard kroner (1974 prices). The most extensive of these investments will be financed abroad. With continued discoveries the need for investment will increase accordingly. As Norwegian engagement in oil exploration and extraction increases, it might be appropriate to use some of the public income for investment on the shelf.

If some of the income is invested on the shelf, Norwegian financing could replace foreign to a considerable extent. The form of financing will not have influence in determining the extent and rate of extraction at any point in time. It has also been a fundamental assumption that Norwegian financing will not necessarily lead to an increased share of Norwegian deliveries. If income is invested in the shelf at the same time as substantial investments are imported, the effects on domestic demands will be approximately the same as those from investments abroad. The stream of income will stretch over a period of time.

8. If the income is utilized domestically, it will result in a corresponding increase in domestic demand. This is treated in more detail in Section 8.2 below.

If common consumption or public investments should increase, it will be on the financial basis of the public oil income. An increase in private consumption and private investments will result from an increase in private disposable income and through an increased credit supply.

The increased income utilized domestically will be directed to the various sectors of production according to how it affects private consumption by individuals, common consumption, or public and private investing.

Some of the goods and services demanded by consumption or investment can be imported. However, much of the demand will be directed towards Norwegian produced goods and services. This will result in a rapid growth in employment for those industries towards which the demand is directed. This means that the labour market will set the limits of how quickly these industries can expand.

9. In 1972 the total employment measured in work years was about 2,560 thousand. During the 1960's there was an approximate increase of 0.7 per cent per year. With unlimited occupational participation the growth in the number of persons occupationally active from now until 1980 will be 0.5 to 0.6 per cent per year. Thus a growth in employment of 0.7 per cent per year, as out-

lined in the Long Term Programme 1974—1977, assumes a strong increase in occupational participation by women, young people, the elderly and persons with limited occupational choice. Such a growth can hardly occur, unless conditions are especially prepared with this in mind.

In some districts there is a degree of unemployment and very low occupational participation because of the limited variety of jobs available. If the labour market and regional policies were strengthened, the employment opportunities in such regions could increase considerably. Under favourable conditions it is though possible to increase the growth in employment to an average 0.8 per cent per year. This would correspond to about 75 thousand man years in the period 1974—1980. However, it should be stressed that such a strong increase would require very great efforts in the labour market and regional policies.

A policy to stimulate immigration will not be adopted.

When the level of prosperity rises, many people will be more interested in shorter working hours and more leisure time than in higher wages. The 40 hour working week will be introduced during this Parliamentary session. When considered in isolation, this would appear to consume some of the growth in employment. However, experience has shown that there will not be a decline in production of a corresponding size to the decrease in working hours. In addition, this could be followed by an increase in overtime. Therefore, a stronger growth in productivity is possible when the working week is reduced. There is reason to believe that such a growth will be evident in those industries exposed to foreign competition.

As the demand increases, both from the domestic utilization of public oil income and directly because of the oil operation, the industries which will satisfy this demand, must increase their employment when the working week is shortened. In Chapter 10.3 it is estimated that the protected industries will require 10,000—15,000 employees, it they are to compensate for the shorter working week.

10. The increased employment resulting from the oil operation and in the industries producing the goods and services to satisfy the demand created by domestic utilization of increased income, will be considerably larger than the growth in total employment.

Growth in these industries is only possible if employment in other industries declines, i. e. with a readjustment of employment and production. The industries which will have to decrease employment, could be divided, in the first instance, between the traditional export industries and those which face strong competition on the domestic market from foreign concerns.

Readjustments in production, employment and residence take place in every developing society. They can be extremely inconvenient or costly, but they are difficult to avoid if the advantages of economic growth are to be attained.

These readjustments could be greatly amplified by a rapid expansion of the petroleum operation or by an extensive utilization of the increased income domestically. Therefore, the direct welfare advantages, such as better job opportunities, eased taxation, improved public contributions, etc. must be weighed against undesirable readjustments in employment and changes of residence. This is the most important question to be considered in relation with petroleum industry.

11. A transfer of production and employment can result from increased domestic pressure on costs. Price developments will change in favour of those industries towards which the increased demand is directed, and which do not face competition from foreign firms. Firms in trades which face competition on the export market or from imports, could be forced to curtail or reorganize production because of poorer profits. This means that the labour force will move to the better paying operations. These could either be firms which produce for the oil operation or firms in protected industries which, faced with a strong increase in demand, will be able to raise the prices of their products and thus have good earning power.

The readjustment process will mean that income which is disposed domestically, will largely correspond to an increased import excess, if the export of oil and gas is disregarded. The export industries and those competing on the domestic market must both relinquish some employment and some share of the market.

12. A readjustment could easily mean that the prices on goods and services from the expanding industries will climb in comparison with other goods and services. The degree of price pressure will be very dependent on the extent to which Norwegian industry becomes involved in the oil operation, and on how much income is utilized domestically. Changes in international rates of exchange strengthening the value of the Norwegian kroner in comparison to currencies of other coutries, could also contribute to slowing down the ordinary price increase.

13. Pressure on the labour market will offer wage earners greater opportunities for choosing their place of employment and changing to better paid jobs. If the pressure is too strong, however, it could affect efficient production if concerns lack of sufficient employment, employees change their jobs frequently, etc. If the pressure led to poor working conditions, readjustments and work stoppages, it would be clearly disadvantageous to large groups of wage earners. For some persons readjustments in industry and employment could outweigh the welfare gains resulting from the increased income. These problems are examined more closely in the chapter on social perspectives.

14. If no effort is made to counteract it, the increased demand will be largely directed towards operations in areas where the level of activity and consequently pressure are already high. This could increase the tendency towards centralization.

The goal is to maintain the main features of existing settlement and to avoid onerous commuting. This means that great emphasis must be placed on obtaining a geographical distribution of places of employment. Older people, married women and persons with limited occupational choice have few possibilities for moving. Unless the regional and localization polices are implemented, it will be difficult to increase employment growth in the areas where it is both particularly desirable and possible.

15. Most people are tied to society as both workers and consumers. From the consumer viewpoint certain domestic applications of the increased income will appear most desirable. However, such applications could result in production conditions and an industrial structure which are less advantageous from the workers' point of view.

Emphasis can be placed on finding applications of the income which will reduce the readjustment pressures on the economy. One means could be increased imports for direct consumption and investment, but this would hardly apply to the total increases in income. Considerable demands on domestic production will be difficult to avoid.

An attempt could be made to direct this demand towards production possibilities in outlying districts and to groups which particularly desire increased possibilities for paid employment. However, this will not always provide the products most in demand. The advantages of a pressured labour market must therefore be weighed against the disadvantages involved. Thus we are confronted with a basic problem of balance.

16. A more detailed examination of these problems are presented in other sections of this chapter. A number of model calculations are discussed. These calculations illustrate the main developmental traits which can be the basis for appraising the opportunities and problems which will result from the petroleum operation and the increased income from it.

8.2 UTILIZATION OF PUBLIC INCOME IN NORWAY AND READJUSTMENTS BETWEEN INDUSTRIES

8.2.1 Ways of Using the Income

1. Aside from investing in the continental shelf, the anticipated increased income can be utilized domestically in the following ways:

— private consumption
— public purchase of goods and services
— investments in dwellings
— investments in enterprises.

Other possibilities for real economic use of the oil income in the country are not available.

2. An increased use of goods and services must correspond to a similar increase in the supply of goods and services. This is equal to what is produced domestically, i. e. the gross national product plus the net brought in from abroad. The later is the import excess, i. e. import minus export.

3. The increased use of goods and services resulting from the oil income must therefore correspond to a comparable increase in import excess of goods and services other than oil products. Fewer traditional exports should be anticipated, as well. Thus the oil incomes will pay for imports which would otherwise have been paid for by traditional exports.

4. An increased domestic use of goods and services can occur in several ways. Private consumption can increase through an easing of taxes and duties or through increased transfers to the private sector, for example by increasing social security contributions without a corresponding increase in duties. This means that the income each individual has left after all taxes and duties are paid, the private disposable income, is greater.

5. The increased private consumption resulting from such an increase in private income, will be directed towards different groups of goods and services

with varying emphasis. Some items in the household budget will naturally count more than others. For example, foodstuffs comprise a quarter of the household budget on the average, while expenses for shoes and clothing account for about one eighth. However, when the household income increases, demands will be directed to a greater degree towards some goods and especially services and to a lesser degree towards others. As an example, the demand for milk and flour products will rise only slightly, while the demand for travel and transport will increase strongly.

Although a substantial part of the expenses are paid from the public budget, all the expenses of the public health servises are calculated under private consumption. A strong increase in such expenditures has been predicted for the long term budget period up to 1978. This will also contribute to increased private consumption.

6. An increased public purchase of goods and services will result in greater public contributions in important sectors, such as environmental protection, health, education and communications. Common consumption can increase, and the expansion of public consumption capital can occur without corresponding increases in taxes and levies. The largest items under the public purchase of goods and services at present are school expenses, the public health service, defence and the extension and maintenance of roads. The development of water and sewage systems, together with purification installation, is also very costly. These items will be considerable in the years ahead, but as with private consumption, some will weigh more than others.

Investments in public ventures such as railways, telephone and telegraph, etc, are calculated under enterprise investments and not as public purchases of goods and services.

7. Increased investments in dwellings could be accomplished by expanding the National Housing Bank of Norway's framework of appropriations more than otherwise, without drawing on corresponding credits from the private sector. There would be more room within this expanded framevork for a stronger use of resources to improve older dwellings and the residential environment.

8. Some of the enterprise investments, like telecommunications and power development, directly consist of public appropriations or loan assurances. They are thereby subject to government priorities. Investments in other enterprises in industry, trade in goods, etc., are not subject to the same degree of public control. However, the total private investments are governed by the total credit supply and the taxation policy. The new temporary law in establishment control is also an important instrument.

9. Some of the main trends in an increased domestic demand for goods and services have been outlined above. The ways in which the public oil income can stimulate this demand, have also been discussed. So far, however, only the purely financial means have been considered. Another question is the organization of the production sector to make this possible, and thus what demands will be made on the distribution of the production factors of labour and capital between the various industries. As mentioned in the introduction, an increased domestic utilization of goods and services cannot be achieved without readjustments in labour and industry. There will especially be a shift of labour from those industries exposed to foreign competition to the protected industries.

8.2.2 Readjustments Between Industries

1. The increased utilization of public income from oil and gas extraction could mean that we are faced with an almost permanent pressure situation in the Norwegian economy in the years ahead. When analysing industrial development in such a situation, it is appropriate to differentiate between those industries which can largely meet increased costs by raising the prices of their products, and those where cost increases must essentially be covered by reduced profits.

2. The industries which can raise the prices of their products without losing out in competition, are those which produce products protected from foreign competition.

These protected industries are first and foremost those which produce goods and services which are impossible, or only slightly possible, to produce outside the country. These include building and construction activities, power and water supplies, trade in goods, hotel and restaurant activities, domestic transport, postal and telecommunications, bank and insurance activities, education and research, health and veterinary services, social care, reparation activity of various types, cultural services of a business or personal nature.

Other industries which in principle could face competition from abroad, but which in reality do not, are also regarded as protected, such as agriculture and some industry and mining. These include stone quarrying, some of the foodstuffs industry, the beverage industry, the woodwork industry (excluding furni-

ture production), packaging production, graphic production and publishing and various industrial repair activities.

3. In other industries firms will be exposed to competition from foreign producers. If firms in such industries should raise their prices, they would quickly be displaced by foreign firms.

The industries exposed to foreign competition, are the traditional export ones. However, certain industries which produce goods and services for the Norwegian market, also come under this classification because they are displaced by competition from imported goods.

The traditional export industries include the international shipping trade, mining, the chemical industry, including oil refining and the petrochemical industry, the wood products industry, primary iron and metal industries, and air transport. The extraction of oil and gas and oil drilling activities also come under industries exposed to foreign competition.

The industries which can be called domestically competitive, include fishing, sealing and whaling, lumbering, some of the foodstuffs industry, textile, clothing and shoe industries, the furniture industry, the production of technical products like paints and varnishes, washing products, rubber and plastic production, production of glass and glassware, the foundry industry, production of metalware, machines, electric appliances and material, the shipbuilding industry and other means of transport, as well as the production of gold and silverware, instruments and sports articles.

4. There is no sharp division between the two types of industries. For example, some industries will mainly produce goods and services which are protected from foreign competition, as well as others which are not. In addition there will naturally be competition between the individual concerns within the protected industries.

Nevertheless, this division has been found useful in the past, among other things in discussions of prices and incomes in connection with wage negotiations. It must be expected that even if the division is not sharp, there will be systematic differences in the opportunities which the various concerns have for retaining their profitability in a pressure situation such at they must expect. A closer examination is given of the division between the protected industries and industries exposed to competition in the adjustments by the investigation committee for the settlements for 1966, of January 22 and October 20, 1966. Subsequent recommendations by the committee on technical estimates for the settlement of wages also clarified the division between these industries.

5. Increased domestic demand will be largely directed towards goods and services produced in Norway. To obtain this increased production, the employment in the industries which produce for the Norwegian market, must increase. These will especially be the protected industries. Those goods and services which are produced for the Norwegian market in competition with foreign ones, will be replaced by imports to an increasing degree. Nevertheless, it must be expected that when the domestic demand increases, the individual firms and industries, even if they fall in the category of those exposed to competition, will increase employment. Overall, however, it will be the protected industries which will gradually grow as the oil incomes are utilized to increase domestic demand.

Table 8.2.2a. Estimated increase in the number of wage earners (man years) in protected industries with increased deliveries to various objevtives. For 1 milliard kroner at 1974 prises.

1 milliard kroner increased deliveries to:	Required increase in number of wage earners in protected industries: in 1974	In 1980
Private consumption .	5,000	4,400
Public consumption .	18,000	16,000
Gross investments:		
Building and construction	8,500	7,600
Machinery and equipment	4,300	3,800

6. Table 8.2.2a presents a calculation of what increases in the number of wage-earners in the protected industries will be required, if private consumption, public consumption, etc., increases by 1 milliard kroner estimated at today's price level. Such a calculation is naturally uncertain. The figures must therefore be taken as an illustration of the greatest effects different utilizations of goods and services will have on the labour market.

Because the production per employee is expectet to be greater in 1980 than in 1974, not as many work hours will be needed to increase the deliveries by 1 milliard kroner in 1980 as are needed in 1974. Therefore the figures for 1980 are lower than the figures for 1974.

7. Should one of the items, e. g. private consumption increase, ebployment in those industries which directly deliver goods and services for private consumtion, must increase. However, the various industries are interdependent. If deliveries to private consumption increase by 1 milliard kroner, the industries responsible for the increased deliveries will need larger amounts of input goods from other industries. This means that these industries in turn must increase their production and employment. Increased employment which results indirectly, is examined in Table 8.2.2a.

8. As shown in Table 8.2.2a, the composition of the use of goods and services for the four objectives imply a great need for increased employment in the protected industries. It is indicated that the need for employment is estimated to increase especially strongly when the income is used for public consumption. In 1974 it is estimated that a total of 18,000 extra work years by wage-earners would be needed if public consumption should increase by 1 milliard kroner, compared to ca. 5,000 if private consumption should increase correspondingly. One explanation for this is that public consumption corresponds almost entirely to an increased domestic production, while private consumption can be satisfied to a greater degree by increased imports. When private consumption increases by 1 milliard kroner, approximately 250 million kroner will be covered directly by increased imports. Another condition is also that private consumption is burdened by considerable duties. In addition, production catering to private consumption is less labour intensive than production catering to public consumption, such as education and other public services.

9. As an example, if the combined use of goods and services in 1974 should increase by 1 milliard kroner, while the distribution follows the same pattern as in previous years, approximately 8,000 extra wage-earners will be needed in the protected industries. I 1980 approximately 7,000 extra wage-earners per milliard kroner spent (1974 prices) will be needed. The difference in the figures results from the assumed productivity growth up to 1980. It is presumed that one half of this milliard kroner will go to private consumption, ¼ to public consumption and investments in public consumption capital, and ¼ to enterprise investments, including dwellings.

It is further assumed that public consumption comprises ¾ and public investments ¼ of the public expenditures, and that the combined investments are divided along the lines of 60 per cent for building and construction and 40 per cent for machinery and equipment.

Alternatively, if a division of ⅓ for each of the main components of private consumption, public consumption and investments, and enterprise investments (including dwellings) is considered, employment would have to increase to about 9,000 wage earners in these industries per milliard kroner disposed in 1974, and about 8,000 wage earners in 1980.

10. The figures in Table 8.2.2a are based on certain assumpions in regard to the composition of the individual items. A composition has been assumed which is in accordance with the results of consumption surveys.

For public consumption and investments a

Table 8.8.8b. Illustrative estimate of decline in employment in industries exposed to competition from 1974 to 1980 under various alternatives for domestic use of oil income. 1974 prices. Work years.

	Income application of 1 milliard kroner in 1980 1974 prices[1])			
	None	3 milliard	6 milliard	10 milliard
Total increase of employed persons	75,000	75,000	75,000	75,000
— Increased employment in petroleum operation	10,000	10,000	10,000	10,000
— Increased number of persons employed in protected industries[2])	95,000	115,000	135,000	165,000
— Necessary decline in employed persons in other industries exposed to competition ..	30,000	50,000	70,000	100,000

[1]) The alternative with no use of the oil incomes was used as a starting point in the Long Term Programme up to 1977 of the Korvald Government and subsequently extended. The increase in the use of goods and services in the other three alternatives is divided between private consumption, public consumption, etc., as described in the text in referense to Table 8.2.2a. The alternative of 6 milliard kroner is in agreement with the use of oil income outlined in Section 8.4.

[2]) The included effects of the shortened working hours corresponds to 10,000—15,000 employees.

«normal composition» is presupposed. That is, that the increase in the individual sub-items of investments and public consumption are divided proportionately according to the size of the sub-items. If emphasis is placed on increasing investments which are especially import intensive, the figure for increased employment can be somewhat reduced. We will come back to this in more detail later in the chapter.

11. As mentioned in the introduction to Chapter 8, reduced working time will result in the need for increased employment in the protected industries, if the increased production is to be maintained. It is estimated that this will comprise an additional 10—15,000 workers on a yearly basis.

12. So far in this chapter it has been described how increased application of income will result in increased employment in the protected sectors. It can be assumed that such increased employment will come in addition to the increase which otherwise can be expectet in these sectors. In this case it must be at the expense of employment which would otherwise have been employed in industries exposed to foreign competition. This can be eased somewhat, but not significantly, if occupational participation were to be increased by measures in the labour market and strong pressures on the labour market.

13. Table 8.2.2b gives some results of calculations of the development of employment up to 1980, with different alternatives for the use of the oil incomes. The calculations are encumbered by several weaknesses, but the estimations show the dimension of the readjustments which must be expected.

It should be possible to increase the total employment by 0.8 per cent per year. Calculating up to 1980, this means an increase in employment of about 75,000 work years from 1974 to 1980. In the Long Term Programme of the Korvald Government, the growth in employment from 1973 to 1977 was estimated at 0.7 per cent on a yearly average. Such a development up to 1980 would involve an employment increase of about 65,000 work years from 1974 io 1980.

The petroleum industry, i. e. petroleum extraction itself and the activity directly and indirectly connected with it, is expected to account for about 10,000 more employed in 1980 than in 1974.

On these assumptions, in Table 8.2.2b the effects on employment of the use of, respectively, 3 milliard, 6 milliard and 10 milliard kroner of oil incomes in 1980 have been estimated. All figures are in 1974 prices. In the figures for the increase in the number employed, the increase estimated as a result of a shortened working week are taken into account.

Different regional trends in employment changes are discussed in detail in Chapter 10.

14. The alternative constructed on no domestic utilization of oil incomes, gives a growth in employment of 95,000 man years in the protected industries up to 1980, taking into consideration the estimated effect of the shortened working week. This involves a decline of 30,000 man years in round figures in the industries exposed to competition, other than the petroleum operation. Some of the basis for this decline is that unchanged employment in the industrial total from 1974 to 1977 is presumed in the Long Term Programme, compared to ca. 1 per cent annual growth in the 1960's. This implies some decline in the competitively exposed group of industries.

15. In Section 8.4 a possible domestic expenditure of 6 milliard kroner of oil incomes (in 1974 prices) is suggested. In an increase in employment in the protected industries in the area of 95,000 man work up to 1980 is assumed, as above, plus ca. 40,000 (6×7,000) man years resulting from the increased domestic use of goods and services, the result is an increased need for about 135,000 man years in the protected industries. If the fact that the petroleum activity demands about 10,000 more man years is taken into account, this means that the other industries exposed to competition must have their employment reduced by about 70,000 man years up to 1980.

In 1974 the employment in these industries was about 330,000 man years. A development such as that outlined, though the figures are uncertain, implies a reduction in employment of at least 20 per cent for the industries exposed to competition other than the petroleum operation.

The utilization of 6 milliard kroner of oil incomes (1974 prices) is used as a basis in this report. This must be regarded as an upper limit of a reasonable domestic utilization apart from investments on the continental shelf.

16. The alternative with the use of 3 milliard kroner (1974 prices) in 1980 suggests a decline in employment in the industries exposed to competition other than the petroleum operation of some 50,000 man years.

Should it be decided to use the entire 10 milliard kroner (1974 prices) in 1980 for increased domestic use of goods and

services, the table indicates that the industries exposed to competition other than the petroleum operation must reduce their employment by about 100,000 man years up to 1980, or a total decline of about 30 per cent over the six year period 1974—1980.

17. The figure 70,000 man years does not express the total readjustments which will occur, if it is decided to increase the use of oil incomes domestically by up to 6 milliard kroner in 1980 (1974 prices). An increase in domestic use of goods and services will also lead to the need for increased employment in certain activities exposed to competition.

When the need for labour inputs in certain parts of the industries exposed to competition increase, it means that another exposed activity must yield considerable employment in addition to that taken up by the protected activity. This, for example, could manifest itself in increased pressure on the fishing industry or shipping, where workers can transfer to the oil industry.

18. Some of the protected industries must also be expected to yield workers to the expansion of other industries. Verdal is an example of a prace where many persons have changed over from agricultural to industrial and construction activities. The desired establishment of base activities and the building of concrete platforms will have a corresponding effect, but of course this will depend on the localization chosen. A sector such as building and construction will be confronted with a strong expansion. This industry traditionally recruits a good part of its labour force from the primary industries of agriculture and lumbering.

19. In the alternative using 6 milliard kroner, a combined growth in the protected industries of about 135,000 man years from 1974 to 1980 is estimated. In the Long Term Programme of the Korvald Government, however, a decline in employment in agriculture (which is a protected industry) of about 5,000 per year up to 1980 is estimated, i. e. a decline of about 30,000 employed from 1974 til 1980. When the protected industries, under the state application of income, increase the total numbers by about 135,000, this means that the protected industries aside from agriculture will increase their employment by 165,000 man years (135,000+30,000) in round figures.

8.3 POSSIBILITIES FOR LIMITING READJUSTMENT PROBLEMS

1. The utilization of increased incomes domestically and the increased production connected with the operation in the North Sea create readjustment problems. The main problem is to balance the undesirable effects of the readjustment process against the direct welfare gains the use of increased incomes will provide, so that the collective welfare gains will be the largest possible. Both the problems of pressure and the direct advantages resulting from the oil production will depend on how the increased public incomes are disposed, and to what degree Norwegian producers become engaged in the petroleum operation.

2. The extent of the readjustments will depend on how large a part of the oil incomes are used domestically. Apart from this, the three main ways of limiting the readjustment problems are:

— direct domestic demand towards imported goods and services
— direct the demand towards less labour intensive production
— attempt to exploit domestic production resources better than previously.

3. It is not certain that those goods and services most desired will be obtained through imports or less labour intensive production. But different domestic uses of the increased incomes will significantly alter the portions of the demand directed towards imports or less labour intensive production. Therefore, the distribution of the income between private consumption, public consumption and investments will be a very important means of administration.

4. There can also be an attempt to directly administer the consumption demand, so as to limit the readjustment problems. But it must be recognized that part of the private consumption which many will especially desire, such as health services, are both labour intensive and satified by imports only to a small degree. The possibilities for localization are also limited.

Nevertheless there are certain possibilities for using the increased incomes disposed for private consumption, so that special goods and services are demanded. This can be done by tying increased income transfers to particular public contributions.

Through subsidies and levies it is possible to stimulate the demand for goods and services produced outside the pressure areas. Today this is done to a large degree through agricultural and consumer subsidies. Subsidies and levies can also be used to alter the price ratio between domestically produced and imported consumer goods and services.

5. With the public purchase of goods and services a direct attempt can be made to import a proportionately high share. But this means that the oil income can be used to a lesser degree for the objective preferred at present. Increased investments in roads, hospitals, building of schools, etc., require construction workers who are also sought in connection with the petroleum operation. The public contribution of service requires more health personnel, many teachers, etc., who must come from other places. The oil incomes disposed for public purchase will therefore press the labour market to a special degree.

It is possible to curb the pressure problems by letting public activity increase outside the pressure areas. It is important to channel new public undertaking to the outlying regions and also to decentralize existing public activity. There must be great emphasis placed on the task of decentralizing and moving public activity out of the Oslo area.

6. There are also problems connected with increased public enterprise in building dwellings, the improvement of older dwellings and of residential environments. Dwelling construction requires large domestic deliveries and is consequently very labour intensive. At the same time, a large part of the new dwelling construction will take place in the pressure areas. A strong increase in the building of dwellings will place great demands on the building and construction sector, where the pressure is already great from the petroleum operation, public construction work, and the expansion of refining and the petrochemical industry, etc. It is estimated that in 1978 almost 150,000 man years will be required in this industry, compared to ca. 130,000 in 1973. It is therefore important to continue the task of finding labour saving building methods.

7. Various investment projects have different import shares. There is therefore the possibility of directing the demand towards imports through the selection of the projects, but high import share does not necessarily go together with high priority investment. Nevertheless, considered in isolation, it will be part of a development plan which will place relatively few requirements on Norwegian production resources.

8. The readjustment problems can be limited by localizing firms outside the pressure areas. This involves both activity directly connected with the petroleum operation, and with increased production resulting from income disposed domestically. But it must be considered that the localizing of large concerns in areas which are not highly developed industrially, can lead to large local readjustment problems. Such localizations can result in an undesirably large influx of workers from trades such as agriculture and fishing.

One means of administering the localization of new activity is, among others, the temporary law on establishment control. A permanent law is being prepared. Another means is a geographical differentiation of employer levies for social security. In this way the wage cost can be reduced by production outside the pressure areas. The use of support and subsidy arrangements and other stimulation measures in the outlying areas can be continued.

9. The demand for increased employment in the protected industries can be limited by transfers to less labour intensive production. This can be accomplished through investments in new industrial equipment. It can thus be possible to satisfy the increased demand without increasing employment to the same degree. A great part of the production in the protected sectors is very labour intensive. This is especially true in the service sector. With the development of new work processes for need for labour inputs can be reduced without affecting the standard of service. Public activity often requires large personnel resources. It is therefore especially important to arrive at personnel saving ways of solving the problems within the state and country.

10. In existing industries exposed to foreign competition the change over to less labour intensive operations by moving out old production equipment can make it possible to maintain production to a certain extent, even if employment declines. But with the assessment of investments in industry exposed to competition, it must always be understood that the readjustment problems are caused by employment in those industries yielding in order to contribute to increased employment in the protected industries and in connection with the petroleum operation.

11. It is important that the necessary curtailments and discontinuations of activities are planned. The curtailments must occur in places where they will cause the least possible social disadvantage or after alternative places of work for the employees are prepared. In order to attain this, it is necessary to have an active and goal orientated industrial policy.

8.4 AN OUTLINE OF THE NORWEGIAN ECONOMY UP TO 1980

1. In the following, the economic presentation of the Korvald Government's Long Term Programme will be used as a basis for comparison when the effects of the petroleum operation and the use of petroleum incomes are illustrated. On the basis of assumption in regard to the increased petroleum activity, the Long Term Programme anticipated a somewhat larger domestic use of goods and services than would otherwise be available. The effects of the petroleum operation and an assessment of the possibilities for increased use of goods and services based on the petroleum incomes was not discussed at any length in the programme, however.

2. The calculations presented are obviously uncertain. The uncertainty with regard to prices and production of oil and gas were mentioned earlier. The calculations represent, however, a possible course of development for the Norwegian economy up to 1980. It provides a framework which is essentially in agreement with the Government's priorities. However, they do not represent a revised long term programme.

The calculations are presented to give the first comprehensive outline of economic development which takes into account the petroleum operation and the utilization of the increased incomes from this operation. The Government will present a more detailed outline of its economic policy and of the economic development for the four year period in the revised national budget for 1974, and in the proposals for the state and national budgets for 1975 and the long term state budget 1975—78. More detailed guidelines for the disposal public incomes and solutions for the various problems will be proposed. In addition, a report of long term character will be presented to the Parliament which meets in the autumn of 1974.

3. The perspective for the projections in this section is 1980. There are two special reasons for choosing 1980 as the perspective. First, we must look that far ahead to feel the effects of the increased domestic disposal of goods and services resulting from the petroleum incomes. Secondly, the assumptions for the extraction and production possibilities on the continental shelf are relatively certain up to 1980, while production and incomes after that will depend on the results of future exploration.

4. All extraction of oil and gas from the Norwegian continental shelf is calculated as Norwegion production, regardless of who is in charge of the production. Pipe transport of oil and gas is counted as Norwegian production when the pipeline is owned and operated by companies registered in Norway. This applies even if the oil and gas are delivered to other countries.

5. The petroleum sector will be of considerable dimensions. This implies that there will be an appreciable addition to the Norwegian national product. To illustrate the influence of this operation in the following analysis, it is desirable to «isolate» the activity on the continental shelf from the activity on land to the greatest degree possible.

6. In 1972 employment in the Norwegian economy was estimated at about 1560 thousand man yeras. With unchanged occupational participation the growth in the number employed up to 1980 will be about 0.5 to 0.6 per cent per year. In the Long Term Programme the average growth in employment was estimated at 0.7 per cent per year up to 1977. On the basis of the regionally favourable localization of much of the petroleum operation and because the Government will prepare for a stronger commitment to regional policy and labour market policy measures, it is possible to assume a somewhat stronger rise in employment. The growth in employment measured in the number of work years is therefore set at an average of 0.8 per cent per year for the period up to 1980.

7. Against this background and the productivity growth expected in the coming years, it has been found reasonable to base the examples in the following on an assumption of a total annual growth in gross national product, calculated in volume, of almost 5½ per cent in the period 1972 to 1980. Without the petroleum the corresponding rate of growth for Norway is about 4½ per cent. Because oil production does not grow steadily from one year to the next, the growth in the GNP will be stronger some years and weaker other years than this average figure suggests. For the period 1974—78 the growth will be especially strong. The growth in the GNP in this period could be as high as 6.3 per cent on a yearly average. The strong increase in oil production expected in 1976 will cause the GNP for that year to increase by an estimated 7½ per cent calculated in volume. Calculating in current prices, and thus taking into consideration the strong price rise for oil and gas, it can be estimated that the oil and gas production for 1980 will constitute almost 12—14 per cent of the GNP.

8. The time profile for the extraction of oil and gas is estimated to be such that the public incomes will increase strongly at the end of the 1970's. These are estimated at 8—12 milliard kroner per year in 1978 and 10—15 milliard kroner per year in 1971—82, all in 1974 prices.

The assumption of prices, production development and the public share of the incomes are reviewed in Chapter 1, 3 and 7. It goes without saying that there are great uncertainties connected with the price estimates, as well as the production estimates.

Table 8.4.1. *Possible distribution of increased demand resulting from the oil income.*[1]) *By million kroner in 1974 prices.*

	1977	1980[2])
Private consumption	1,120	2,500
+ Public consumption and gross investment in public consumer capital	570	1,250
+ Investment in dwellings	570	1,250
+ Enterprise investment excluding dwellings	360	950
= Total additional demand	2,250	5,000
+ Use of oil income incorporated in the Long Term Programme	1,000	1,000
= Use of income to increase domestic demand	3,250	6,000

[1]) Increased demand in proportion with the Long Term Programme 1974—1977 of the Korvald Government.

[2]) The additional demand for 1978—1980 is calculated as an extension of the development presented in the Long Term Programme of the Korvald Government. It is assumed that the extended trend of the Long Term Programme will involve the same use of income in 1980 as proposed in the Programme for up to 1977.

9. With regard to the readjustment problems in the rest of the Norwegian economy, it is assumed that the domestic disposition of the public incomes will be stretched over a period of time. An increase in the domestic disposition ought to occur during the present programme period. On the other hand, the domestic disposition should not increase at the same rate as the public incomes. In the calculations presented here, in comparison with the Long Term Programme 1974—77, a steady increase in additional domestic demand up to 1980 is assumed. In 1975 it is assumed that an additional ca. 750 million kroner will be disposed for domestic purposes. In the years 1977 and 1980 it will increase by 2¼ and 5 milliard kroner respectively, in addition to the increased disposal planned in the Long Term Programme 1974—77 on the basis of the petroleum incomes. When this is included, the increased disposal in 1977 and 1980 will consist of 3¼ and 6 milliard kroner respectively.

Table 8.4.1 shows the distribution of the additional demand which has been chosen as a basis for the calculation example. The same price base was used here as we used in the state budget for 1974 and the long term budget 1975—78.

In the subsequent calculations it was necessary to go over to 1972 prices in order to use the last accessible national accounts.

10. Table 8.4.2 gives a survey of the estimated total supply and use of goods and services for Norway, with a specification for petroleum extraction and the other Norwegian sectors (including shipping). Table 8.4.3 gives the corresponding rates of growth for the period 1972 til 1980.

Even though the domestic disposal of goods and services has increased considerably, a large export surplus is expected as early as 1977. This export surplus is created by the petroleum extraction. Norway without petroleum extraction would have, as indicated, an estimated import surplus of a total of 2.2 milliard kroner in 1977, calculated in 1972 prices. While the GNP in the period 1972—1980 could grow by a minimum average of 5½ per cent per year, the growth in the domestic use of goods and services is estimated at an average 5.1 per cent up to 1980.

11. In the calculation example reconstructed in Table 8.4.2, the growth in gross investment in volume is estimated at an average of almost 6.4 per cent per year in the period 1973 to 1977.

12. As explained above, it was decided to allow about half of the additional demand to be used for increasing private consumption in the calculation example. For the long term budget period up to 1978 an increase in the disposable real income (i. e price rise) of about 2.5 per cent per year is inserted for a person who is occupationally active, has an average income and does dot change jobs. Approximately the same income development is aimed at for persons on social security with the lowest pension. It was estimated that the disponable real income for an occupationally active person, such as described above, declined by 1.8 per cent in 1972. In 1973 it went up by 0.5 per cent.

A great part of the expenses of the health service are calculated as private consumption, even though individuals do not pay directly for most of the services received. A growth in the private consumption

Table 8.4.2. *Illustration of supply and use of goods and services. Million kroner in 1972 prices.*[1])

	1972			1977			1980		
	Total	Norway without Petroleum	Petroleum sector	Total	Norway without Petroleum	Petroleum sector	Total	Norway without Petroleum	Petroleum sector
Gross national product	96,666	96,552	114	128,800	121,500	7,300	147,800	138,300	9,500
÷Export excess	275	889	÷614	3,600	÷2,200	5,800	4,300	÷3,800	8,100
Export	39,609	39,401	208	63,200	56,000	7,200	77,600	68,500	9,100
÷Import	39,334	38,512	822	59,600	58,200	1,400	73,300	72,300	1,000
÷Net delivery to petroleum sector	—	200	÷200	—	400	÷400	—	100	÷ 100
Delivery to petroleum sector	—	230	÷230	—	900	÷900	—	1,000	÷1,000
Delivery from petroleum sector	—	÷30	30	—	÷500	500	—	÷900	900
=Supply of goods and services	96,391	95,463	928	125,200	123,300	1,900	143,500	142,000	1,500
Gross investment	27,533	26,605	928	40,100	38,200	1,900	45,400	43,900	1,500
Petroleum sector	928	—	928	1,900	—	1,900	1,500	—	1,500
Other	26,605	26,605	—	38,200	38,200	—	43,900	43,900	—
+Private consumtion	52,955	52,955	—	65,400	65,400	—	75,800	75,800	—
+Public consumption	15,903	15,903	—	19,700	19,700	—	22,300	22,300	—
=Use of goods and services	96,391	95,463	928	125,200	123,300	1,900	143,500	142,000	1,500

1) The petroleum sector includes the production sectors of extraction of crude oil and gas and transport of oil and gas via pipelines.

Table 8.4.3. *Illustration of supply and use of goods and services. Per cent of annual growth, 1972—1980.*[1])

	Total	Norway without petroleum	Petr. sect.
Gross national product	5.4	4.6	73.6
÷ Export surplus			
Export	8.8	7.2	60.4
÷ Import	8.1	8.2	2.5
÷ Net delivery to the petroleum sector	—		
Delivery to the petroleum sector	—		20.2
Delivery from the petroleum sector	—		53.0
= Supply of goods and services	5.1	5.1	6.2
Gross investment	6.4	6.5	6.2
Petroleum sector[2])	6.2	—	6.2
Dwellings	4.5	4.5	—
Other enterprise investments and storage	7.7	7.1	—
Public consumer capital	6.2	6.2	—
+ Private consumption	4.6	4.6	—
+ Public consumption	4.4	4.4	—
= Use of goods and services	5.1	5.1	6.2

[1]) See footnote 1, table 8.4.2.
[2]) The investments in the petroleum sector will vary strongly from year to year up to 1980. The level of investments for 1980 is estimated at 1,500 million kroner, which is lower than the levels for previous years. The growth rate in investment in the petroleum sector is therefore relatively low when the levels for 1980 and 1972 are compared.

of health services of about 8.5 per cent per year in the long term budget period up to 1978 is provisionally assumed. The rate of growth in the consumption of health services, however, must undergo constant appraisal. All in all, the figures mentioned imply that the combined private consumption will increase by an average of about 5 per cent per year in this period. The consumption due to the income earned by the increased number of occupationally active, is also included. In the years 1972 and 1973 the growth in private consumption was low. When the period 1972 to 1980 is considered as a whole, the increase in private consumption will be about 4.6 per cent per year.

In comparison, private consumption must increase by an average of 4.4 per cent per year from 1973 to 1977 to come up to the level for 1977, which was used as a base in the long term programme.

13. The growth in public consumption and public consumer capital is estimated at 4.9 per cent on a yearly average from 1973 to 1977, in comparison with 4.5 per cent in the long term programme. For the period 1972—1980 the growth outlined in the calculation example corresponds to an average of about 4.3 per cent per year for public consumption and 6.2 per cent per year for gross investments in public consumer capital.

14. As stated, the total investment growth in the calculation example is estimated at 6.4 per cent per year in the period 1972 to 1980.

The growth in dwelling investments in the period 1972 to 1980 will be about 4.5 per cent per year. This is somewhat stronger than in the long term programme, where dwelling investments for the period 1973—1977 were assumed to increase by about 4.0 per cent per year in the period. Within this expanded framework there will be a place for a stronger commitment for the improvement of older dwellings and an improvement of the residential environment.

For the investments in enterprises other than dwellings an annual volume growth of 7.1 per cent in the period 1972—1980 is assumed. Of the investments in enterprises, the development of new petrochemical industry is estimated to comprise 320 million kroner in 1975 and 530 million kroner in 1976. This corresponds to about 2.5 per cent of the total investments in enterprises.

15. The building up of the petrochemical industry implies that the other enterprise investments will go down in relation to the assumptions in the long term programme. This development shows that even if the total investment framework is increased by the oil incomes, the expansion of the petrochemical industry will take up so many resources that other investments must yield.

The investments in oil and gas extraction and pipeline transport are estimated at ca. 3.6 milliard kroner in 1974 and ca. 1.5 milliard kroner in 1980 respectively, calculated in 1972 prices. Even if the investments provide the basis for extensive Norwegian deliveries, the major part of the investments will be imported. Current production will also require imports. However

this import will consist of a much smaller amount of money than the combined export, at least after 1976—77. For 1980 the import is estimated to at least 900 million kroner, so that the export surplus of the petroleum sector is estimated at about 8 milliard kroner, when calculated in 1972 fixed prices. Calculated in current prices, the export surplus could amont to between 27 and 28 milliard kroner in 1980, when the price assumptions in the foregoing are used as a base.

CHAPTER 9

Social Perspectives and Measures

Prepared in cooperation with the Ministry of Social Affairs.

9.1 INTRODUCTION

1. The petroleum discoveries in the North Sea and Norwegian petroleum extraction offer new opportunities to Norwegian society. The increased incomes the operation creates, will provide the basis for a more rapid improvement in material living conditions. Engagement in the petroleum operation and the utilization of public incomes domestically could also lead, however, to considerable readjustments in industry, employment and settlement. To a great degree this will come in addition to the changes which we would be confronted with in any case. The changes can be desirable, and can contribute to solving social tasks, but if they take place to rapidly, considerable social problems could evolve.

2. The purpose of this chapter is, first and foremost, to discuss the social and health consequences which could result from such a readjustment process. This discussion must be based on general considerations of the form of the expansion. Finally industrial guidelines for the expansion of the operation and measures aimed at preventing or reducing the disadvantages and problems, are outlined.

3. How deep the changes in local society and in the living conditions of various groups of the population will be, will depend on which types of activity it is decided to develop on Norwegian soil, the choice of localization, the extent and tempo of the expansion, the domestic utilization of public incomes and the policy which is followed in other areas of society.

4. It is difficult to forecast theoretically or empirically all the manifold, widespread social effects of engagement in the petroleum operation. Nor do experiences and research material from other related fields of economic life offer a secure basis for predicting the consequences of this new and, to some extent, special operation. However, quite a bit of information on the general relationship between changes in industry, working conditions, settlement, and the tempo of reform in one hand, and the social and health effects of such changes on local societies and groups of population on the other, has been compiled.

On the basis of these and other factors an attempt has been made in the following to assess the direct and indirect effects of petroleum extraction which can especially influence social and health conditions.

9.2 A MORE EXPLICIT EXAMINATION OF THE SOCIAL EFFECTS

9.2.1 General Effects

1. The main trends in the time profile of the actual petroleum operation will be a relatively short construction period with high employment, followed by a production phase with essentially lower employment, succeeded by a liquidation of the operation when the oil sources are empty. With the building of various parts of the petrochemical industry, however, even the construction period could be of considerable duration. Mongstad is an example of this, where the latest expansion plans indicate a construction phase of twelve years.

2. The expansion of the petroleum operation and the domestic utilization of incomes will generally create a tight labour market. If conditions are right, this could increase the possibilities for groups of young people, elderly, married women and occupationally limited persons to obtain paying work if they so wish. The higher wage levels in the petroleum sector, building and construction activity and other expanding industries could create problems, however, for other existing industrial activities if workers move into the expanding activity. The expansion of the petroleum operation could also help to limit or halt migration to the existing pressure areas from districts with certain unemployment or underemployment. Such changes in the labour market can both solve and create social problems.

3. Reduced migration to existing congested areas will increase the possibilities of solving some of the problems in those areas. In developing areas the oil operation can provide a more varied base for industry where today there is unemployment and underemployment. This will generally improve the opportunities for work in such districts.

The new jobs created by the oil operation and building and construction activity, however, are often very demanding both physically and mentally. It is therefore uncertain

to what extent these will provide opportunities for workers who already find it difficult to find employment, like those in groups with weak resources such as young people, the elderly, and persons with limited occupational choice. Experience in the Stavanger area has shown that workers from these groups who took jobs in the oil operation, often had to quit after a while.

If conditions are right, however, a tight labour market will increase the possibilities for groups of young people, elderly, married women and persons with limited occupational choice to get payed work. However these groups usually have very little mobility. Labour market and regional policy must take this into consideration.

4. If a number of workers attempt to change over to well paid jobs in the oil operation, it could contribute to an increased rate of decline in jobs with lower earning power. A number of workers who lose their jobs because of this, could find it difficult to get other work in another activity. To the extent this applies to the elderly and persons with limited occupational choice, it will be a serious problem. These persons are especially susceptible to reductions and layoffs, and will often find it difficult to move to another place.

5. Many of the jobs in the petroleum sector must be expected to involve the risk of a number of social and occupational hazards. Work on drilling platforms is especially of this nature, as is activity in parts of the building and construction sector. This sector, for example, has a considerably higher frequency of accidents on the job than the industrial average, and there is therefore the danger that work on the drilling platforms can also involve a high risk of injuries. Moreover, both forms of work assume frequent moving or commuting, and create difficulties for normal family life and participation in social activities.

6. Wages in parts of the petroleum operation will generally be higher than in most of the existing operations in those localities the development takes place. This could lead to an uneven distribution of income in the places of development. Social inbalance can increase through such things as price pressures on residences and vacation homes and through reduced access to various goods and services for different groups in the population.

7. The operation on the continental shelf has little or no connection with any particular county. The oil activity could provide individual municipalities with increased income through taxes from businesses and individuals, however. It will thereby give these the opportunity of undertaking social and health measures, which it would otherwise have been impossible to develop. However, there is the danger here of getting into a circle, where the social problems are solved with the help of an excess of economic growth, buth where individual aspects of the growth create new problems. The social and health sector is very labour intensive, and in developing areas, there will already be strong pressure on the labour market. Since the incomes will mainly come after the development period has finished, it is very doubtful whether it will be possible to improve social and health conditions in the short run to any special degree, unnless special efforts are made.

8. In a local pressure situation there could be the danger that county authorities will feel obliged to give priority to the special expansion needs of the oil industry. The rehabilitation of older residential areas, the development of daycare institutions, the institution of cultural and recreational projects for young and old could all be in danger of getting lower priorities. Such projects are of great importance for health and social development.

9. The creation of jobs through oil extraction will presumably accelerate equally strong participation by men and women in economic life, as has been noted in regard to pressure on the labour market. In order to keep the necessity of moving at the lowest possible level, it will be desirable to stimulate this development — through investments in service benefits and projects for supervision of children.

9.2.2 Developing Areas

1. A shortage of housing is normally an important social consequence of a rapid and relatively extensive growth process. When there is immigration to an area, already existing social problems increase. Experiences in larger cities in general, and in Stavanger in particular, offer examples of this. Housing expenses are pressed up to a level which often forces people with ordinary incomes to apply for social assistance in order to cope with fixed expenses. New clients are created under such conditions. The problems will especially hit socially and economically weak groups, including young families, persons receiving social assistance and welfare, and the elderly, since their possibilities of improving poor living conditions are reduced.

2. The growth in population in those areas where the oil operation is localized, will lead to changes in composition mainly

according to sex and age, especially during the construction stage. An important social result of such a change is the temporary migrotion of young single workers. To a large degree they will be faced with unstable and temporary housing conditions. This special way of life under these working and living conditions, together with hard work, could lead to social and mental stresses which could have undesirable effects on already susceptible persons. A varied offer of recreational activities could help to reduce the effects of some of these problems.

3. Because of both the increased activity in the building and construction sector generally and the concentration of jobs in areas with a shortage of housing, many persons will have to commute between their place of residence and their place of work. Some workers will attach greater importance to the opportunities offered by the petroleum operation and the building and construction activities, and will prefer certain forms of commuting to the work available near where they live or the housing available in the development area.

Daily commuting will mean first of all increased travelling time, and consequently less time with family and friends at home, and less chance to exploit leisure time. Weekly commuters experience additional mental stress, which could create problems with wives and children, among other things. At the same time it reduces the opportunities for commuters to participate in social and political life at their places of residence.

4. Work in the petroleum operation is also based on commuting, with a division of working and leisure time of 7 or 14 days on the platforms and a corresponding period of free time on land. The rhythm produced by this pattern is found in the community. The problems will be different for those who have families to go home to, than for those who are single. The basic family must alternate between periods without the husband and father, and periods when his need for leisure and company conflicts with the rhythm of family and friends. With good communication the distance between home and the base area will play a smaller role for this type of commuter. This could make it possible to maintain an extended area of residence for these workers.

5. Generally social research indicates that a local community undergoing rapid development and change, experiences increased social detachment and a breakup of social ties. In such places increases can be noted in criminality, misuse of alcohol and narcotic drugs, divorce and other indications of social problems connected with this type of change process.

9.2.3 «New» Places

1. The processing of petroleum is expected to be localized in places which do not have any appreciable population at present. The formation of these new concentrations of population must be built up on the basis of a new exploitation of the oil resources, and will provide an extremely one-sided economic base. In this respect, if the choice of localization is not adapted to the surrounding economic and population structure, the needs of the concentrated center can comê into conflict with the existing interests in the region, such as the primary industries.

2. Here also rapid immigration could easily result in a lack of housing, because the construction of industrial installations could receive priority. This problem will be especially acute during the construction period, because it will be difficult to build housing in accordance with the needs of this stage. Many workers will therefore be faced with the choice between barracks accommodation and daily commuting where possible.

3. It is also reasonable to anticipate problems, when the development of such a community takes place quickly. The development of a stable social bond is a time demanding process, and among other things requires that the inhabitants have a long term perspective of their connection with the local community.

A rapid expansion of industrial activity will make it difficult to develop organizations and an institutional apparatus to take care of the interests of the workers and their families at the same rate. These things include professional associations, other social and political organizations, supervision of work, etc.

The development of health projects and especially of social services could slow down, if such plans have to be included in municipal or county priorities.

4. Concentrated areas with a one-side economic base could be vulnerable to a change in demand or the initiation of new labour saving technology, unless alternative employment opportunities are developed. Such vulnerability and dependence create uncertain expectations for the future, and could easily influence the attitude of the inhabitants towards a place. Single individuals and families will normally attempt to reduce the element of uncertainty, and when the labour market is otherwise tight, this could result in

further migration. The impression of a community's temporary character can thereby be strengthened by a steady in and out migration.

5. The number of jobs in the community will vary, depending on which phase of the operation is taking place. This will be highest in the construction phase and will go markedly down in the operational phase. As with other new industrial areas, a large part of the working force from the first stage could be without work in the area when the construction phase is finished. Such industrial areas will be prone to special problems when the operation must be wound up, because the basis for the area's existance is removed.

9.2.4 Emigration and Recruiting Areas

1. The petroleum operation will also have an effect on conditions in the areas which the workers come from. Recruiting from outlying districts will mostly concern young workers, often unskilled. Many of them will abandon work in their home towns in favour of work in the oil operation or building and construction activity. The wage levels will be higher than for work in the primary industries. The problems of maintaining the economic and social life and the population in the outlying districts will especially increase if young people move out.

2. Many concerns are dependent upon a core of professionally well qualified workers, in order to maintain their operations. These concerns could be hard hit, if workers choose better paying jobs in the oil activities. Moving of industries, reductions or decreases in operations could result, thereby hitting all the employees of a concern. In the outlying districts especially many smaller concerns have an important regional and social function, including the employment opportunities they provide for groups who have a weak position in the labour market, and they are usually not very mobile. If an increased activity in the petroleum sector means that such concerns are in a poorer position to compete, the consequences of the social effects will be very great.

3. When a decrease in jobs and a more one-sided economy result in the communities concerned, there can be a corresponding need and demand for social benefits and assistance. The statistics show, for example, that the consumption of disability benefits is highest in those areas of the country where there is a scarcity and low variety of jobs.

4. The basis for the maintenance of public services will presumably be weakened in pace with the decline in tax income, in a situation where the need for such provisions is especially strong. Readjustment, reduction and decline in economic life could increase the need for public work arrangements, advice, etc. If the younger people move away, the average age in the places they leave, rises. At the same time, the breaking or weakening of contacts with relatives and neighbours could increase the need for projects to care for the elderly. In the wake of development there can be an increased need for public services wich are costly, personnel intensive and more satisfactory. A rapid and extensive development within the petroleum operation and increaseed pressure on the labour market generally can thus contribute to intensifying the type of health and social problems which have been noted throughout the 1960's and up to the present.

9.3 SOCIAL AND HEALTH MEASURES

The readjustment problems Norwegian society faces because of the petroleum operation and the utilization of petroleum incomes, will mainly be determined by which types of activity it is decided to develop on Norwegian soil, the choice of localization, the extent and tempo of development and, not least, the utilization of public income. Social and health problems cannot be prevented by social projects alone. The guidelines for social and health policies, which are outlined in the following, can therefore not be examined in isolation, but must be considered in conjunction with the measures discussed in the other chapters in the report.

9.3.1 Preventive Measures

1. In the foregoing a number of social problems have been outlined which can result from the development of the oil operation and the readjustments in connection with the domestic utilization of petroleum incomes. Generally it can be said that the greater the the speed of the development are, the greater the readjustment problems will be. The petroleum policy and the domestic disposal of the increased income will be determined with a view to avoiding undesirable social effects.

2. A condition for securing a satisfactory social development, is the regulation of the speed of development in the oil operation, so that the operation can be worked into the local communities, and can be followed up with the necessary service benefits on a broad basis. At the same time there must be

room for further development of that part of the economic life which is not based on the petroleum activities.

3. The temporary nature of the operation, seen in a long term perspective, requires that local development must be planned from the very beginning with emphasis on the social consequences of a later liquidation or considerable reduction in production circumstances. To avoid damaging effects, which could be too great, the economy in the development areas should be hindered from becoming based one-sidely on the petroleum activities. Therefore the activities should ideally be located in areas with a relatively extensive and differentiated economic life. Larger local communities will be able to absorb such development more easily, and will be better equipped to handle the problems caused by an eventual liquidation. New industrial areas built solely around the petroleum operation, should not be established.

4. It is necessary to have a policy which aims at limiting the social and health problems connected with jobs in the oil industry. It must be assessed to what degree an expansion of communications can reduce the problems connected with commuting, and it will be important to investigate which forms of commuting are least harmful.

5. It must be accepted that barrack towns will be built only to solve the housing problems for short construction periods. At the same time it must be emphasized that the offer of important services like schools, health care, social services and projects for children and young people must be developed in a satisfactory manner.

In order to accomplish this, there must be an attempt to coordinate labour market policy and housing policy with the development of public services. It will still be a requirement that concrete development projects contain plans for a satisfactory development of housing and public services.

6. In some places the oil operation will create a new situation for physical planning. The law on establishment control, the building law and the health law could be important means of directing the development. However, it could be necessary to reassess the legislation and its control apparatus in the light of the new situation. To assure that the political authorities get the necesssary information before plans for future oil policy on central, regional and local levels is adopted, the social and health consequences must be made plain. Representatives from the social and health sectors must take part in this activity.

7. Research, investigations and a continual registration of the effects are a necessary and important means in this process. An important purpose of continually registering the national, regional and local effects on different groups in the population will be to secure a feedback of information to the authorities concerned. In this way there will be a possibility of correcting the development, if the effects come into conflict with larger community and social goals.

8. A new and extensive type of activity, which has considerable foreign interest, must not be undertaken without assuring a prevention of social problems. The financing must be organized, so that the political authorities have control over the disposal of the means.

In the development areas care must be taken that there are the necessary locations for different types of cultural activities, such as films, theatre, meeting and study activities, sport, and youth activities. It will often be expedient to arrive at a combined solution, where the school facilities have a central role.

9. School facilities throughout the country have been undergoing renewal and expansion. Today school facilities are not only used for the instruction of children and young people in the daytime. In many places the school represents a gathering place for cultural and recreational activities. In each municipality the school authorities must consider it an important task to inform newcomers to the community of what is available at each school for adults, and ecourage them to take advantage of this. A special aim of such activity for newcomers will be to help them settle into and take part in the new environment.

10. The engagement of the central authorities in cultural work must first be examined in the light of the problems outlined in Parliamentary Report No. 8, 1973—74, on the organization and financing of cultural activity, and in the Government's corresponding report. It is important to hold to the principle that the population in such new localities should have the same opportunity to participate in cultural activities and have equal access to cultural life as the other inhabitants of the country.

In a recommendation of the committee report of the Norwegian Cultural Council which assessed the cultural facilities in Førde (Førde Committee) there was a general proposal for advisory groups for cultural locations. For places which will undergo large

changes, such as with the establishment of the petrochemical industry, such an advisory service would extent to other parts of cultural life as well, like assuring that conservation interests are carefully looked after. The responsibility for the practical solutions to these problems lies with the new cultural committees, which it is proposed to establish in the counties and municipalities. These cultural committees can appoint separate sub-committees, if it is considered appropriate.

9.3.2 Closer Examination of Health and Social Services

1. The increased petroleum operation will require a number of health and social measures. There are a number of medical and practical problems connected with the health and ambulance services for the drilling platforms. All platforms which drill on the Norwegian part of the continental shelf, come under the sanction of the Directorate of Health. Guidelines have been developed for sick rooms, first aid equipment and medicine, as well as for sanitary conditions on board. The Directorate of Healh has issued a list of medicines which must be available on every platform, rescue ship and lifeboat. At the beginning of drilling and at specific later dates inspection will be carried out on all platforms by representatives of the Directorate of Health.

2. The Ministry of Social Affairs will work further to improve the organized health services for the platforms on the basis of the experience gained. Stress must be placed on the provision of up-to-date sick rooms, equipment and qualified personnel and on maintaining good cooperation with the health services on land. The problem of rendering quick and effective help in the event of larger accidents, must be given special attention.

3. There must be attempts to further clarify the effects of the special conditions connected with work on drilling platforms on the mental health of the empoyees and their social function. Other questions of professional hygiene must also be examined more closely. Increased knowledge in these areas can influence the routines followed in the future.

4. There will be an assessment of more explicit regulations under the social care law, which will apply to workers employed in the oil operation on the Norwegian part of the continental shelf and on Norwegian drilling platforms outside this. The regulations will be decided by the Government.

5. It must also be expected that new problems of professional hygiene of a somewhat different character than those we have been accustomed to, can occur. Previous developments of new industrial communities have shown that this can happen. The development on land could increase environmental hygiene problems, such as the supply of drinking water, collection and disposal of refuse and sewage disposal.

The local, regional and central health and social authorities are all confronted with extensive and, to some extent, new problems. Under the Health Law, the Health Councils have considerable responsibility in this field, while the law on social care regulates the activity in the social sector. In preventive work there will be a need for cooperation between the public health system (public doctors, public health nurses and other health personnel) and the bodies in the social sector.

6. The health and social services in the areas involved in the petroleum operation must find a natural place within the total planning of these services. Development according to these principles assumes thorough knowledge of local conditions and of the development anticipated in the years immediately ahead. The main principle of Parliamentary Report No. 85, 1970—71, is that the responsibility for developing the total health and social services is accorded to the county municipalities. The principle guidelines will be drawn up by the central authorities, which will continue to render extensive advisory services. The Ministry of Social Affairs is presently working on the draft of a new law on health services outside hospitals on the basis of Parliamentary Report No. 85 and on practical solutions to the communication and transportation problems facing the health services on the basis of Parliamentary Report No. 41, 1971—72.

7. Long term planning of health and social services will face a long list of problems, even in relatively stable types of communities. An important principle is that plans are formulated so that they can be revised easily and without great expense, when development indicates this is necessary.

CHAPTER 10

Labour Market and Regional Policy

Developed in cooperation with the Ministry of Education and Ecclesiastical Affairs and the Ministry of Labour and Municipal Affairs.

One of the most basic political goals is to establish and maintain full employment. In recent years there has been little registered unemployment in Norway. Nevertheless, it is a fact that within certain professional groups there is a considerable degree of unemployment. Furthermore, some groups, especially women, young people without training, the elderly and the disabled, have difficulties in obtaining work. The petroleum activity will give the Norwegian economy growth impulses which will facilitate groups which traditionally have problems to find work in the labour market. If a deliberate policy is prepared aimed at directing the activity and the utilization of the increased income, the petroleum operation could contribute greatly to realizing the goal of work for everyone.

10.1 DIRECT EFFECTS OF THE PETROLEUM ACTIVIES

10.1.1 Aspects of Localization

1. Employment in the petroleum operation and in activities which deliver to the petroleum operation, can be divided into the following categories with regard to the effects of localization:

— the operation on the shelf
— supply bases and connected services
— shipyards
— other industries
— building and construction activities.

It is only the first three of these which are dependent on where the exploration for and extraction of petroleum is carried out. The production in shipyards, the platform construction, which comes under building and construction activities, and the production in industry can be spread out more, without the distances from the exploration and production areas having much effect. Those employed on the shelf and on supply vessels which provide services on the Norwegian shelf, must presumably come on land in the base area in their leisure time. This will provide an economic impulse for these areas, even if many of these people do not live there. Recruiting for such an operation can take place in nearby areas, as well as other places in the country.

2. Even if the localization of different petroleum activities is flexible to a certain degree, in most cases the activity on land will be located in relation to possible oil and/or gas discoveries. To avoid an undesirably strong buildup of the operation in the southwestern parts of the country, it is presumed that the exploration activity will be moved northward as soon as the necessary charting north of Lat. 62° N is clear.

3. As explained earlier in the report, the Government places great importance on maintaining a moderate speed in the exploitation of the petroleum resources. This is important both for assuring a long term exploitation of the resources and with regard to the readjustment problems in the total economy. Therefore, for the time being it will only be possible to have a limited opening of new areas of the Norwegian continental shelf for the petroleum activities.

According to a total consideration of regional policy, taking in the economic, population and employment factors, the Government has decided that areas north of Lat. 62° N should be opened for exploration, and that test drilling should be started off North Norway. In the same respect it is desirable to open the areas off the Møre—Trøndelag coast soon. Proposals for more detailed guidelines for the opening of new areas for exploration and test drilling will be outlined in Parliamentary Report No. 30, 1973—74.

4. It will be necessary to follow up the plans which have been presented for a base operation near Harstad in the near future. The area of Møre—Trøndelag will provide the basis for establishing a base in Kristiansund. The question of establishing several bases must be assessed more closely later when the exploration activity increases in dimension.

5. It should be emphasized in connection with the opening of new areas north of Lat. 62° N that the established activities should be capable of competing with the activity already established in South Norway. This will apply to branches of the workshop industry among others. As soon as possible the economy in these parts of the country must avail itself of the existing

possibilities for preparing for the new tasks which will result from the petroleum operation.

6. The operation on the Norwegian continental shelf will determine the extent of the base activity in Norway. It will also strongly affect the opportunities for Norwegian deliveries to the petroleum operation. However, Norwegian industry generally regards the whole North Sea, as well as other areas in the world, as markets for its products. The export of platforms and other equipment to the petroleum operation is already larger than the deliveries to the Norwegian continental shelf. In this report there is no exploration of the opportunities on the world market.

10.1.2 Influence on Employment

1. The petroleum operation will influence employment in five ways:

— direct influences, i. e. employment in the operation in connection with exploration for or extraction of petroleum and direct deliveries to this operation
— indirect influences, i. e. sub-deliveries from Norwegian industry directly to the operation described in point one
— secondary effects, i. e. increased activity in the districts concerned on the basis of the increased economic activity and higher incomes in the area
— effects on incomes, i. e. activity created by the disposal of public incomes from petroleum extraction in Norway
— depression effects, i. e. employment which must yield from industries and areas because it is absorbed in increased employment under the four points above.

2. In Table 10.1.2 a rough estimate of employment in activity connected with petroleum is given. The estimates are very uncertain, and are meant as an illustration of the dimensions the operation can have.

Table 10.1.2. *Employment Connected with the Petroleum Operation.*

	1973	1974	1975	1980
Drilling rigs under Norwegian flag	300	1,500	3,000	4,000
Supply ships under Norwegian flag	150	400	600	1,000
Extraction on the Norwegian continental shelf[1])	400	600	600	1,200
Base activity and various services[2])	700	1,000	1,400	1,800
Shipyards[3])	3,200	5,000	5,500	5,500
Building and construction activity[4])	1,500	3,000	3,000	3,500
New petrochemical industry[5])	0	0	200	1,500
Other deliveries[6])	600	800	1,200	1,500
Total	6,850	12,300	15,500	20,000
Indirect deliveries (sub-contractors)	2,000	3,000	3,500	4,500
Total	8,850	15,300	19,000	24,500
Drilling rigs on the Norwegian continental shelf[7])	600	800	800	800
Supply ships on the Norwegian continental shelf[7])	200	300	300	400

[1]) Employed in extraction companies, oil and gas transport to land.
[2]) Includes building of concrete (with the exception of the deck sections, with are made in shipyards).
[3]) Includes building of mobile drilling rigs, supply ships and «jackets», as well as the delivery of constructions for drilling platforms.
[4]) Includes building of concrete (with the exception of the deck sections, which are made in shipyards).
[5]) Includes those employed in the operation of such installations.
[6]) Includes equipment for drilling and extraction and pipe transport.
[7]) Some of the drilling rigs and supply ships on the Norwegian shelf will be foreign.

3. The development of employment in sea-based activity is closely connected with the production development. Exploration activity, however, will precede production and research activity on established discoveries. It is estimated that the exploration activity up to 1980 will be of about the same extent as in 1974, i. e. that 20—25 holes per year will be drilled. Now mostly foreign drilling rigs operate on the Norwegian continental shelf. Both Norwegian and foreign drilling rigs will operate in the years ahead. On the other hand, Norwegian drilling rigs and supply ships must be engaged outside the Norwegian continental shelf, if all of them are to operate.

Landing operations involve little employment in this connection. However, there will be some construction activity during the building stage.

4. The operation on the Norwegian continental shelf will largely determine the employment in the base activity in Norway and in services connected with the base activity.

5. Production in shipyards in connection with the petroleum operation shows a sharp rise up to 1974—75. It is estimated that there will then be an employment of about 5,000—6,000 persons. There are great uncertainties connected with further expansion. The operation on the Norwegian continental shelf does not provide any basis for anticipating any large increase after 1975, but the expansion in the whole North Sea area could be considerable.

In 1974 the shipyards will deliver 9 drilling rigs and 13 supply ships, which will be used on different places in the world. On the Norwegian continental shelf there are now sufficient rigs for the continuing exploration. Repairs and maintenance could be relatively extensive in this activity.

The production of framework constructions for stationary installations is expected to rise in the years immediately ahead, and there can be some increase in the production of constructions for concrete platforms, etc. The market in the British continental shelf and other areas in the world can offer great opportunities. New technology could also entail the need for new constructions in the future. Great importance is attached to the development of Norwegian competence in underwater constructions.

6. In 1973 there was a production in the building and construction sector corresponding to about two completed concrete platforms on annual basis. This required about 800 work years. The need for concrete platforms on the British continental shelf has so far been covered by orders from Norway. The demand for such constructions is very difficult to estimate. For example, it can be expected that 2—5 concrete platforms will be required annually by the British side for the next few years, but British industrial policy will be an important factor here, at least in the selection of constructions, which might be Norwegian delivery possibilities. Towards the end of the 1970's there could also be a couple of platforms per year for wegian drilling rigs and supply ships must the Norwegian continental shelf. If several discoveries are made in the future, the delivery of concrete constructions could continue. Such constructions will be larger with increased sea depths, but on the other hand a strong increase in productivity is anticipated in the production of platforms, so that the amount of work per item will not rise accordingly.

The technological development in this area, however, could result in alternative solution. With especially great depths special constructions on the seabed might replace platforms. In that case there would be new challenges for the Norwegian economy.

Construction activity in building petrochemical installations could employ 2,000—3,000 workers in the late 1970's. Other construction activity, which is a more indirect result of the petroleum operation, is not included in the estimates of employment directly connected with the petroleum operation.

7. The activity in the new petrochemical industry based on the exploitation of oil and gas from the Norwegian continental shelf, is estimated to employ 1,500 persons in 1980.

8. The employment in indirect activity, i. e. sub-contractors directly to the oil extraction and closely affiliated activities, is very difficult to estimate. Its extent, however, will be in direct relation to the activity in the different petroleum operations. An estimate of the employment in indirect activities has been arrived at by cross reasoning. It is given in Table 10.1.2.

9. The estimates given for employment in the direct and indirect operations concerned with petroleum activities, which are presented in Table 10.1.2, involve the total employment in such operations. Concerns which have been established because of the petroleum operation, such as exploration, drilling and extraction, base activity and a number of other services, represent new activity and increased employment.

For the other sectors, such as shipyards, other industrial activity, building and construction activity, and the indirect activity (subcontractors) the production concerned with petroleum will either come in addition to other production, or completely or partially instead of other production.

10. The increased economic activity in connection with the oil extraction and the resulting direct and indirect activities could lead to still more activity in the form of secondary economic effects of a more general nature. The petroleum operation will provide increased working and capital incomes in the local communities concerned, and these income increases will bring about

increased demand for consumer goods and services, and for investment goods respectively.

A part of the increased demand will be directed towards goods and services which are offered in the local community, but another part will be for goods which must be brought in from outside.

The original income increases will thus spread through the economy, and will eventually also lead to an employment increase in branches which are not connected directly or through sub-contracts with the petroleum extraction.

11. The effect of the income increase in the separate regions, i. e. the employment from the secondary effects measured in relation to the employment in the direct operation (the effects of the multiplication factor), will depend on such things as the location of the local communities, the exploitation capacity in the industries concerned, the mobility of the workers, and whether or not there is full employment to start with.

12. For the country as a whole the influence will even itself out, in that this will only depend on how large the total income increase has been in relation to what it was formerly for those persons who are directly or indirectly engaged in the petroleum operation. For most of these it will be a question of changing over from one trade or job to another, usually with better wages.

13. The estimates above are, as mentioned, based on a continued exploration activity of about the same extent as in 1974, with 20—25 drill holes per year. When exploration of new areas off North Norway is begun, it is not unreasonable to expect that there will be little detected in the first years. It was several years before the first profitable discoveries were made in the North Sea.

If it should be decided to increase exploration activity to 40—50 holes per year, an additional employment of a couple of thousand men in activity to 40—50 holes per year, an additional would be involved. In addition there would be the indirect deliveries and the possible secondary effects.

With more exploration activity there could also be larger discoveries than calculated in the middle production alternative. There could thereby be greater employment in building and construction and in extraction.

Should a continuation of the present exploration activity not lead to any considerable discoveries in the immediate future, employment could be somewhat lower than estimated for 1980 in sectors like building and construction.

10.2 INFLUENCE ON PETROLEUM INCOMES

1. In Chapter 8 the adjustments in the economy expected to follow the domestic utilization of the State's petroleum incomes are presented. The main effect of such a utilization will be a need for greater employment in the protected industries than would otherwise be expected.

2. The employment in the industries exposed to competition has declined in recent years, and will continue to do so, even without the domestic utilization of the petroleum incomes. However, there can be an additional reduction of ca. 7,000 jobs per year up to 1980 in these industries as a result of the petroleum incomes.

In addition there will be the effects of the shortening of the working week and of employment connected directly and indirectly with the actual petroleum incomes. Therefore, a

Table 10.2.1 *Percentage Share of Employment in Each County (work years).*

	Total[1])	Expanding protected industries[2])
Østfold	5.6	4.5
Akershus	5.5	6.1
Oslo	20.7	26.2
Hedmark	4.2	4.2
Oppland	3.9	3.3
Buskerud	5.0	4.5
Vestfold	4.4	3.8
Telemark	3.8	3.4
East Agder	1.8	1.6
West Agder	3.1	3.0
Rogaland	6.4	5.8
Hordaland	5.0	3.9
Bergen	4.3	5.3
Sogn and Fjordane	2.4	1.7
Møre and Romsdal	5.4	4.5
South Trøndelag	5.9	6.4
North Trøndelag	2.5	2.2
Nordland	5.2	4.9
Troms	3.1	3.1
Finnmark	1.8	1.6
	100.0	100.0

[1]) Source: Directorate of Labour (figures for October, 1970).

[2]) The industries which are included here are: woodwork industry, graphics industry, publishing, earthen and stonewares industry, building activity, construction activity, retail stores, domestic sea transport, public administration, education, health and veterinary services, hotel and restaurant activities, laundries, cleaners and other personal services. The figures are calculated on the basis of the labour market statistics for 1970.

total decline in employment in the industries exposed to competition, without the petroleum operation, could be on the level of 11,000—12,000 employed per year from 1974 to 1980.

3. In an attempt to clarify some possible regional fluctuations, Table 10.2.1 gives a distribution of employed wage earners and self-employed according to county. Further, a corresponding division by county is made of the protected industries, where especially strong growth is anticipated as a result of the domestic utilization of petroleum incomes.

4. As shown in the table, some counties have a large share of employment in expanding protected industries, in comparison with their share of the total employment. It is thus expected that when the domestic use of the petroleum incomes is increased, the demand for work will be especially directed towards those counties which have a high share of employment in the protected sectors, if nothing is done to counteract it. Oslo, Bergen and Sør-Trøndelag (with Trondheim) have high shares of employment in the growing protected sectors.

It is stressed, however, that within the separate industries there are different production limits with various expansion possibilities, and the demand increase will also show geographical variations. Part of the activity is public, and localized with regard to the general development. Finally, the goal is a strong administration of the localization of services generally.

10.3 THE LABOUR MARKET

10.3.1 Employment Resulting from the Petroleum Activities

1. Table 10.3.1 gives a rough estimate of the growth in employment. Without any utilization of the petroleum incomes the employment in industries which are protected from outside competition, can increase by 95,000 work years by 1980, when the effects of the shortened working week are taken into account. With an increase of almost 10,000 employees in the petroleum operation, the assumption of a total growth in employment of ca. 75,000 will require a changeover from other industries exposed to competition of about 30,000 work years. If, in addition, 6 milliard kroner of public oil incomes is used for domestic objectives, there will be a necessary decline in employment in these other industries of an additional ca. 40,000 work years from 1974 to 1980. Altogether these industries must yield 70,000 work years in round figures by 1980. This means that these industries will lose about on fifth of their labour force.

Table 10.3.1 *Illustration of changes in employment in the main groups of industries.*[1]) *1974—1980. Work years.*

Total increase in employment	75,000
Increased employment in the petroleum operation	10,000
Increased employment in protected industries	135,000[2])
= Necessary decline in employment in industries exposed to competition	70,000

[1]) In Chapter 8 there is an explanation of which industries are included in the various main groups.

[2]) The 10,000—15,000 workers which will be necessary to maintain production when the working week is reduced, are included in the calculations.

It should be strongly stressed that these figures are very uncertain and are only meant as an illustration of the dimensions.

2. Until now it has been mainly men who have had increased employment opportunities, with the main emphasis on the western counties of Rogaland and Hordaland. This will continue to be the main pattern in 1974. In North Norway the direct influences of some importance will come somewhat later. From 1975 there will be increasing opportunities for female workers as well, especially as a result of the income effects. From then on, for the same reason, the demand for both male and female workers will increase throughout the country.

10.3.2 Opportunities for Increased Occupational Participation

1. In assessing the possibilities of satisfying the petroleum operation's need for workers in the years ahead, it must be considered that Norway has had a rather tight labour market in the years since the war, but with considerable geographical variations. North Norway, large parts of West Norway, and the counties in the center of the country have traditionally had a more open labour market with a certain idleness and underemployment, and correspondingly low occupational percentage and net emigration. Thus in 1970 the total occupational participation in the various parts of the country varied from 53 per cent to 62 per cent of the population of working age. See Table 10.3.2. For the individual counties the occupational participation varied between 51 per cent and 69 per cent.

The variations were especially large for employed women, with a very high occupational percentage in the Oslo area.

Because of the discontinuation of regional employment statistics after 1971, it is difficult to state anything definite about the development of employment in the individual counties and districts in the years 1971 to 1973. But the annual statistics for migration and population show that in these years there has been a clearly more favourable development than formerly in the traditionally weak counties. This is partly a result of the increased influence of the regional policy.

2. The last international recession in business conditions in 1971—72 created only a very small fluctation on the Norwegian labour market. From the fall of 1973 there has been an obvious tightening of the labour market as a whole. This is a result of both the international acceleration in business conditions and the increasing dimension of the oil activity. In January, 1974, Norway had the tightest labour market ever registered for that time of the year. Under the assumption that the oil shortage will not have negative effects on our labour market, a continued very tight labour market is anticipated throughout 1974.

Table 10.3.2 *Percentage of persons of occupationally active age (16—69 years) employed as wage earners and selfemployed in 1970.*

	Men	Women	Men and women
Østfold	81	33	57
Oslo/Akershus	93	48	69
Hedmark	79	30	55
Oppland	76	33	54
Buskerud	81	34	58
Vestfold	84	30	57
Telemark	79	30	55
East Agder	77	29	54
West Agder	84	32	58
Rogaland	80	33	57
Bergen/Hordaland	79	37	58
Sogn and Fjordane	85	37	62
Møre and Romsdal	82	33	58
South Trøndelag	82	36	59
North Trøndelag	76	30	54
Nordland	73	28	51
Troms	75	31	54
Finnmark	76	32	55
East Norway	85	39	62
South Norway	81	31	56
West Norway	81	35	58
Trøndelag	80	34	57
North Norway	74	30	53
National total	82	36	59

[1]) Included in the calculation are family workers in agriculture (by estimated work years). The figures for parts of the country (and counties) are made on the basis of the agricultural census of 1970.

3. On the whole the following groups provide the basis for increasing employment in Norway:

— natural population growth to occupational population
— women who want to work
— underemployed in the primary industries and other industries
— unemployed
— persons with limited occupational choice and the elderly.

4. Immigration of foreign workers is another possible source of workers. Most of the question connected with immigration from abroad will be discussed in a parliamentary report which will be presented in the near future. No immigration of any considerable extent is planned.

Workers from Denmark, Sweden, Finland and Iceland do not need working permits in Norway. The development in each of the Nordic countries will likely be decisive for how large an effect these workers may have here.

5. The registered growth in the total employment was an average 12,500 for the years 1965—70. This corresponds to an annual growth of ca. 0.8 per cent. The increase came from most of the groups mentioned above, but especially from natural population growth and increased occupational participation by women. Among the rationalization components must be mentioned the reduced crews needed in the merchant fleet. There are not corresponding reliable statistics for recent years. It can be estimated, however, that the growth was somewhat weaker in the beginning of the 1970's, and in the long term programme an average annual growth in employment of 0.7 per cent from 1973 to 1977 is calculated.

With the measures outlined here, it should be possible to realize an annual growth in employment for the whole country of 0.8 per cent or about 13,000 work years per year from 1974 to 1977, and somewhat more in the following years.

On the basis of the foregoing prognoses for population expansion and occupational participation it can be estimated that the annual growth in employment in the years ahead will be somewhat as follows:

1977—1985	14,000—16,000
1985—1990	12,000—14,000

Proportionately higher estimates of occupational participation have thus been used as a base. A large expansion of daycare institutions and a stronger rate of training and education are assumed in connection with the assessment of increased occupational participation by married women.

6. The Government has announced that there will be a shortening of the working week from 42.5 to 40 hours before 1977. Such a shortening of working hours will mean ca. 6 per cent reduction in the weekly working time for ca. 600,000 workers. Calculated purely in terms of figures, this corresponds to 36,000 work years. The experience from previous shortenings of working time have shown that it is very difficult to estimate a numerical effect on production and employment. In connection with earlier reductions an extraordinary increase in productivity (production per hour of work) directly after this was carried out, was noted.

This means that the percentage of decline in production will not be as large as the percentage in the reduction of the working time. However, there is reason to estimate that the effect on production can be on the same level as if the total employment remained unchanged for a whole year. It has been estimated that the implementation of shortening the working week will require an addition of 10,000—15,000 workers in the protected industries, in order to maintain the production assumed there.

7. With an increased demand for workers it has been shown that there will be a stimulation for increased occupational participation, by women as well as by men. With the tight labour market expected in the future — not least as a result of the petroleum activities — a correspondingly strong increase of women in working life must be generally expected.

8. The best possible localization of new jobs in relation to existing population could increase the occupation participation. The proximity between residence and place of work is naturally a condition for married women taking work outside the home. If such offers of employment are lacking, many will have to remain occupationally passive. There must be an attempt to take this into consideration, when jobs are localized. This is discussed further in Chapter 11.

An active labour market policy which includes concrete analyses of the demand for and offer of work, information measures, occupational instruction, an effective distribution of job seekers and available jobs, occupational training for adults, and an increased degree of rehabilitation work for persons with limited occupational choice, could contribute considerably to increasing the offer to employees. There will be a continued strengthening of the apparatus which works with these questions.

9. The increase in employment in the petroleum activities, at least in the years immediately ahead, will largely occur in West Norway, where it must be expected that occupational participation will continue to be somewhat lower than for the country as a whole. Here there will continue to be a proportionately high share of workers in the primary industries, where a decline in employment would most probably take place regardless, even if efforts are undertaken to stabilize the employment in these industries. The increase in occupational percentage must necessarily take time, and it is very difficult to estimate a figure for the annual growth in employment resulting from a rise in occupational percentage.

10. The workers in those activities resulting from the petroleum operation, will largely come from occupations with lower wages than those offered by the news jobs. The difference in wages will thus be a great incentive in recruiting.

So far there has been no indication that the industries mentioned have been considerably harmed as a result of the petroleum operation. But with the continued increased need which is anticipated in the coming years, care must be taken to avoid this development reaching undesirably large dimensions.

11. There is thus a clear risk that the needs for employment can lead to undersirably rapid changes in structure and population, unfortunate effects for other industries, larger wage and price rises, etc. The risk of such a development is one of the most important reasons for slowing and directing the expansion resulting from the petroleum operation.

Experience has shown that it is possible to influence the recruitment of workers to a sufficient degree by entering into mediation agreements between the employers and the labour market authorities. Such agreement contribute to the employers obtaining suitable access to labour, while at the same time assuring that the other activity in the district or in other counties does not drain off the necessary workers. Mediation agreements are also aimed at establishing calm and security at the place of employment, as well assuring that Norwegian workers are employed to the necessary extent.

12. The general pressure of competition which the primary industries must expect in districts with a relatively strong expansion of the petroleum sector, will pressumable be greatest in the initial phase. The agricultur has few workers to spare aside from the farm operators themselves. Building and construction activity of a certain permanence can have a long lasting negative effect on regional agriculture. Interest in participating actively in agriculture and lumbering can be considerably weakened. This situation will be characteristic in rural areas and districts with an especially weak farm and income structure in agriculture, and with a correspondingly weak trade environment, e. g. as in large parts of North Norway. For that matter, this state off affairs will be general with any expansion activity of large dimensions.

13. The positive aspect for agriculture is that an increase in alternative offers of employment could indirectly lead to a more rapid improvement in farm structure, which is the greatest hinderance to rational and economical farming in many places. For those who would otherwise participate in agriculture, however, such a readjustment might seem so capital intensive that it could result in unreasonable demands on their own input, own capital and decreased disposal income over a large part of the operation time which cannot be coped with. There will be a recuiting problem in both the long and short run.

14. In North Norway especially, and in other parts of the country as well, the pressure of expansion in certain areas which results from the petroleum activity, could lead to a considerably greater decline in agricultural production, with corresponding unfortunate consequences for national self supply, and for regional supplies of the most important foodstuffs.

15. In the fisheries there will be especially negative effects on the labour situation and recruting, in addition to the general pressure of competition to which the primary industries will be exposed. This is because drilling and extraction activity will offer jobs which are very similar to the work on larger fishing vessels. Absence from home will be of about the same duration, but there will probably be greater regularity in the petroleum activities. Income conditions could be of great importance in the choice of job. The same applies to tax rules and pension arrangements, which are more favourable in drilling, extraction and supply activities than in fishing. The work can also be less physically demanding than that in certain types of fishing today.

In the first phase of petroleum extraction, which requires large investments in exploration and production equipment and in supply ships, fishing could be harmed by the heavy demand pressure on the workshop and service industries. It might be difficult for the owners of fishing boats to get the necessary workshop space for new construction, repairs and maintenance of the fleet, while at the same time the cost level in this sector could be driven up to an especially high level.

It will be of decisive importance for the fishing industry's possibilities of withstanding this pressure of competition, that there exists the economic capability of offering good wages and working conditions which are fully on a level with the other sectors.

16. The activity which is established on land in connection with the petroleum extraction, will also create a competition situation for fish processing on land.

There is now strong emphasis on improving working conditions for those employed in fish processing on land. Improvements in this field are a condition for the industry's getting and keeping workers.

17. Under certain conditions the fishing industry can also be stimulated by the petroleum operation. A widening of the economy base will provide greater opportunities in many coastal districts, and will give young people a greater incentive for remaining there. This will be affected by how much the disposal of the public incomes from the petroleum operation stimulates activity in the districts.

18. A varied economy can also encourage young women to reside in smaller areas, rather than considering large city areas. This will result in social improvements by reducing the considerable inbalance in the division of the adult population according to sex. There is now a larger female population in the Oslo area, compared to a large male population in other parts of the country, especially the three northernmost counties.

10.4 REGIONAL POLICY MEASURES

1. A primary task of regional policy will be the direction of the development resulting from the petroleum operation. On the basis of the expected development in employment, with the strongest pressure on the service

industries, there will be special emphasis on regional policy measures which can:
— direct the offer of services in the districts
— decentralize service activity from the largest city areas and the larger cities.

2. The offer of services in the districts can be directed in several ways. In weakly developed areas with widespread population it will be necessary to encourage concentrated development which can satisfy the localization need of the service industries. Here it is not only a question of municipal and regional centers of different sizes, but also of smaller centers which take care of the ordinary daily needs of the inhabitants.

In the Appendix to Parliamentary Report No. 108, 1972—73, on a development program for North Norway there is a proposal for establishing six environmental communities in North Norway and Namdalen as a trial project, where support will also be given to establish retail trade concerns within these environmental communities. The idea is to locate the environmental communities in small population centers. If the environmental communities come up to expectations, the establishment of these will be accelerated.

3. According to the Royal Resolution of December, 14, 1973, the regulations for the settlement of subsidies and of loans and guarantees by the Regional Development Fund were changed, so that certain service industries could also be supported. This applies to such things as wholesale trademen, laundries and cleaners, office space for the business side of services, transportation activities, etc.

4. Work on the decentralization of state institutions from the Oslo area is given high priority by the Ministry of Labour and Municipal Affairs. It intends to make a concrete presentation in the course of 1975. This could be an important step in the task of slowing the growth in the number of jobs in the Oslo area, and at the same time could provide the basis for strengthening the offer of services in other centers of population.

5. The questions concerning the future development of county and municipal administration and tasks is being taken up for wider consideration in the central committee for reforms in local administration. One of the main goals of the committee's work is the delegation of authority and tasks from the central state administration to the counties.

6. The Ministry of Labour and Municipal Affairs is working on a proposal for a permanent law on establishment control, which will also include service industries of various types. See Chapter 11, Section 11.1.3.

7. In order to reduce the need for commuting and moving, and at the same time improve social conditions, it is reasonable to improve the opportunities for moving and establishing households where both marriage partners wish to be occupationally active. This requires investments in services such as daycare institutions for children and a development of the central structure which creates a minimum travelling time between residence, work and service functions.

8. An important condition is that the mobile workers are also to a large degree the youngest ones. With the considerable equalization in the level of education for men and women which has taken place in recent years, opportunities have opened up for planning on the assumption of a much higher share of married women in working life.

9. In order to have adequate background material for directing the petroleum operation, it will be necessary to establish employment statistics to replace the statistics which were discontinued in 1971. In the fall of 1972 the Government presented a proposal for obtaining future employment statistics. It is assumed that the proposal will be carried out before the end of 1974.

10. In addition there is a need for charting the underemployment which exists within each region, and for surveying the employment in the petroleum activities at all times. The Directorate of Labour and the county labour offices will:
— undertake the registration of employment in the petroleum operation every half year
— develop current surveys of larger changes in the actual employment in existing jobs (petroleum activity and other industries) and of plans for larger new projects or reductions in existing installations
— develop employment prognoses by counties for 1—2 years in the future.

In principle this must include all industries and show changes in employment as much as possible specifically for places of employment, where changes are estimated to involve more than 100 persons in increase or decline in the period.

10.5 NORWEGIAN TECHNICAL KNOWLEDGE

10.5.1 Norwegian Employment and Norwegian Technical Knowledge

1. The manning of drilling ships or platforms normally requires ca. ⅓ of the crew to have special training and fairly long experience in oil drilling activity. Ca. ⅔ of the crew will carry out work which does not especially require technical qualifications. It might be necessary to have some special instruction for the workers.

2. The production of steel platforms requires some untrained workers, but most of them must be specialized, with some assistants. These workers are recruited from the ordinary trade schools and apprentice departments and from courses of shorter duration under trade instruction for adults, sheet metal and welding courses of 5 months duration, and welding courses usually of 2 months duration.

3. Concrete platforms of the Condeep type are now under construction in Norway. This is a purely Norwegian construction, behind which lies considerable technical knowledge.

The contract sum per platform is 3,000—4,000 million kroner, of which about half is for the hull and the remainder for the deck and outfitting.

The construction of the hull requires a considerable number of workers from the building and construction sector. These include casters, iron workers, and formwork carpenters, with the main emphasis on untrained workers.

For the deck and outfitting a relatively larger share of trained workers are required, with welders and others with backgrounds in technical trades espacially necessary.

Teaching the trained part of the labour force continues within the existing educational system. It is also desirable that the untrained part of the labour force has basic training. Courses in such things as reinforcement, formwork and concrete work are possible here.

4. There is a need for deep sea divers. Every platform or drilling rig now uses teams of 5—6 divers. The extent of the jobs divers can perform at great depths, is limited and time consuming. It might therefore be more economical to go over to remote control.

5. The operation on the continental shelf will have an important influence on the demand for workers in other parts of the economy. There will be a need, for example, for a considerable number of civil engineers, engineers and technicians.

6. A number of Norwegians are today employed in Norwegian and foreign companies, where further training is provided within the companies. Through cooperative agreements both the authorities and private Norwegian companies have created opportunities for training personnel outside the Norwegian educational system. This situation will continue for several years to come, and will limit to a considerable degree the demand pressure for the special training of technical personnel in Norway.

7. As a rule, however, the primary aim should be to educate our own technical experts on all levels to the greatest degree possible.

The education should be built on the existing school system to assure that:

— trained personnel on a higher level can be obtained relatively quickly
— the time for selecting a trade is put forward, and the shift back and forth between trades becomes flexible
— expenses are saved by making the costly special training as short as possible, a total solution which is relatively reasonable economically.

10.5.2 Educational Measures

1. It is estimated that the demand will mainly be met by the existing facilities, with probably an expanded capacity and the additional offer of the necessary special training.

2. For more untrained workers, courses in reinforcement, formwork and concrete work are already available to a considerable extent across the country, and no problems are anticipated in expanding this activity.

The presentation of these course is developed in cooperation with industry, and it is felt that the workers get a good basic training. Each year 150—175 courses are held with place for 1,800—2,000 participants.

3. Norway has a qualitatively well developed trade school system. With the development of training for off-shore personnel and oil technical personnel in general, it will be both rationally and economically favourable to develop the training in workshop schools, technical training schools, maritime schools, engineering schools, regional colleges and other colleges. In this respect can be mentioned:

— Stavanger Machinist School, Oil Techology Department, has started a course in drilling technology of 7 weeks' duration. Three courses were held in the spring, 1973 semester, with 32 students per

course, and four courses are planned for the fall semester.

— Bergen Technical College will offer further instruction in oil and processing techniques for engineers from the autumn of 1973, through a one year addition, with the main emphasis on chemistry and automation.

— Tinius Olsens Technical School (in cooperation with the Kongsberg Weapons Factory) is assessing possible instruction facilities for machine engineers in turbo machinery and off-shore engineering.

4. Diving instruction for civilian objectives is presently carried out by the Navy, which gives training in diving down to 60 meters depth (helmet divers). The question of establishing a Norwegian diving school is being considered. With such diving instruction, training in underwater work must be included.

It should also be mentioned in this connection that a steering group, composed of representatives from industry, education, research and the public authorities, are working on the question of a Norwegian laboratory for ocean simulation.

5. There is a need for practical training for apprentices for drilling platforms. To comply with this, the Norwegian Association of Drilling Contractors has acquired a land rig, which is situated in the Stavanger area and is used for training purposes.

It will be examined whether the need for practical training for apprentices could be satisfied if, with the future allocation of blocks, the authorities include a clause to the effect that the companies create training places at the disposition of Norwegian training centers.

6. At the moment our engineering schools have a certain overcapasity for training shipbuilding engineers, and it is being considered whether to shift some of the capacity over to specialization in the new marine technology areas. Another possibility is to introduce this profession into the already existing educational offers (machine, building/construction and shipbuilding).

7. In the spring of 1974 the first clutch of petroleum engineers will graduate from Rogaland district college after a three year course. During that time the students can specialize in drilling technique, production technique or reservoir technique.

8. The universities in Oslo, Bergen and Trondheim today offer instruction which covers the essential aspects of the petroleum operation. This includes the professional areas of geology, geophysics, petroleum technology, process technology and marine technology.

As a result of the petroleum operation these subjects are now given special priority. There has been a further division of tasks between the universities in Bergen, Oslo and Trondheim, so that the coverage will be the best possible.

The petroleum activity can also create an increased requirement for the other universtity professions such as economics, law, natural sciences including mathematics, and engineering in general. In order to accommodate this demand in the near future, there will be an analysis of the needs and probable adaptation of existing education to the new situation.

The goal is that professional people in the petroleum operation shall, to the highest degree possible, be educated in Norway. In the years immediately ahead, however, a scarcity of teaching personnel for university education must be anticipated.

9. A contact body will be established where representatives of the educational institutions, school authorities, research, public bodies, and workers' and employers' organizations will draw up more detailed guidelines for education.

CHAPTER 11

Localization and Planning

Prepared in coopcration with the Ministry of Labour and Municipal Affairs and the Ministry of Environment.

11.1 LOCALIZATION AND ADMINISTRATION

11.1.1 Development of the Pattern of Settlement — Goals

1. There are two characteristic trends in the development of the pattern of settlement:

— All parts of the country, counties and regions are undergoing a considerable growth in the centers of population and cities, with a corresponding decline in the more thinly populated areas.

— Furthermore, there appear to be regional growth differences in the development of population within some parts of the country and the other areas in between. In the period 1961—1971 North Norway and West Norway had net emigrations of 36,700 and 14,200 persons respectively, but the Oslofjord area (Østfold, Akershus, Oslo and Vestfold) had a net immigration of 60,000 persons in the same period.

2. This development is due to several circumstances. Technological, economic and social development entails considerable structural changes in the economy. Characteristic of this development is the sharp decline in employment which has taken place in agriculture, lumbering and fishing.

In recent years employment in the service trades has increased especially strongly, but employment in other industries has shown little increase. The development of industry and the service trades requires considerable basic investment and an expansion of the public service apparatus. A development of these trades can easily lead to a concentration of population. Such tendencies are greatly accentuated by the rationalization and increased efficiency taking place within the primary industries.

3. In Parliamentary Report No. 27, 1971—72, on regional policy and planning both nationally and for parts of the country, the main trends in the future pattern of settlement were discussed. These questions were examined in more depth for the economically weak areas in Parliamentary Report No. 13, 1972—73, and in Parliamentary Report No. 108, 1972—73, on a development program for North Norway. It was stipulated that goal of shaping the development of population must be the improvemeent of the opportunities the population has for attaining equal access to social and cultural offers, and opportunities for satisfactory wage earning work and free choice of occupation within geographical areas of certain sizes. By offers of equal value in this connection is not necessarily meant exactly the same type of offer, but offers which suit local conditions, and which the population itself deems acceptable in a somewhat longer perspective.

4. In the economically weak areas especially it must be emphasized that one means of attaining such development, is to bring the present widespread population pattern in these areas within a more developed center structure. It can be shown that over a number of years the population figure declines in most areas where there are long distances to a center of a certain size. It is not possible to halt the stream from all such areas completely, but with the establishment of influential centers of different sizes, from rural centers to regional and local centers, it should be possible to slow this down considerably, and also to hinder the stream of migration towards those few urban centers which already have pressure problems.

In the long term view the demands for better nearby services will increase. Centers of population which will serve as local centers, must therefore be assured further development possibilities.

5. If the development of a few larger concentrated places is stressed first and foremost, the result will be great inbalances between regions with and without such centers. The basic principle must therefore be to attempt to localize jobs and facilities at the lowest levels at which they can function and further develop. Resources such as raw materials, water power, etc., should be exploited locally as much as possible.

6. Even though there is considerable responsibility on the state authorities to use economic, administrative and legislative means and measures to effectively further such

development, the results also depend to a large degree on the local authorities seeking the same goals. It should be strongly stressed that these questions should be clarified through general, regional and county planning.

11.1.2 Effect of the Expansion Pattern

1. If effective remedies are not employed, the petroleum operation could greatly strengthen the development outlined in the introduction.

Such a development wold be directly contrary to the current goals of regional and district policy and the work being carried out by the development authorities.

2. The total effects on the Norwegian economy and society of the petroleum operation will depend in part on the direct effects of the delivery of platforms, building of the base activity, further processing in the form of refining and petrochemistry, etc., and in part on the indirect effects of the use of increased incomes from the petroleum extraction to increase consumption and investments domestically.

3. The increased incomes can be utilized domestically for private consumption, public use of goods and services, increased investments in dwellings, and increased enterprise investments. The extent of the regional readjustments will depend on how large a part of the total is used domestically, and which fields and geographical areas are given priority. Similarly, the growth in the protected industries and the general effects of a more rapid growth in income consumption could easily lead to an increase in the ordinary centralization tendencies. Because of the petroleum operation it is even more necessary to have a planned regional and district policy and new and stronger means of directing development.

4. With the estimated strong growth which is anticipated in the protected industries, a new type of regional policy is required. This will be based on restrictive measures in the pressure areas to a considerably greater degree than previously. There will be an attempt to localize both expansions and new establishments within the industries mentioned in smaller centers of population and outlying districts. This will be important for those areas which are already pressured, as well as for the opportunities of developing a fuller offer of services in the districts. The Government emphasizes that such a decentralization policy applies not only to private industrial operations, but also to various types of public services.

5. The expansion plans decided on for the petroleum industries will have great bearing on how the petroleum operation directly affects the pattern of population. If, for example, the petroleum operation is mainly developed in certain larger centers, it will probably lead to a stronger centralization of population and increased pressure on the labour market in these places. On the other hand, if a more decentralized pattern of development is decided on, it will be possible to exploit the unused resources in the districts to a greater degree, so that the pressure tendencies are minimized. A development which is more in accordance with the goals the political authorities have adopted for the pattern of settlement, could thereby be attained.

6. In order to obtain a centralized development, it could be necessary to split up the activities connected with petroleum into smaller entities than would naturally result from operational economic considerations. The Government intends to make an analysis of the practical possibilities for such a distribution.

It is further desirable to distribute the subcontractors in the inland areas and other regions which do not get any of the primary petroleum operation.

7. The petroleum industry, as is known, is an industry which involves considerable uncertainties. For example, it is not known if the exploration phase will produce discoveries which later will provide the basis for production and more permanent employment. It will therefore be of great importance to avoid situations where, when the petroleum operation is wound up, the other bases of economy in the local communities concerned have declined in the meantime. The goal must be to localize the petroleum operation, so that it can be a stimulus for the development of the local economy. This also involves activity which is not directly connected with the petroleum operation.

11.1.3 Direction of Localization of the Petroleum Activities

1. Through the development plans drawn up in county and general planning, it is the task of the locally elected bodies to establish coordinated development programs, with the aim of contributing to the best possible combined regional effect of the means which are employed. In this connection the localization of the petroleum activities is of

importance in the work of attaining the goals of regional policy.

2. In Parliamentary Report No. 13, 1972—73, on the goals and means of regional development, the Government stated:

«The exploitation of the resources in the districts — such as minerals, ores, oil — must occur as a step in a planned regional development. Companies for developing local resources must, where there is possibilities of choice, be localized in accordance with the guidelines which are drawn up for the future development of the pattern of settlement.»

In a balanced development, adapted to the country's resources and the aims of economic policy, the petroleum industry could be used as an active means of district and regional policy. The petroleum industry means a growth in some technically advanced areas. Such activity can provide impulses for further development in the areas where it is located. Therefore it is also important that this are localized in the districts.

3. Recently an increasing number of large projects connected with the oil activity on the continental shelf and within other industrial operation have arisen along the coast. These include new bases and new installations, especially within the workshop industry and different concrete platform projects.

The carrying out of such projects will have considerable regional effects on the labour market and structure of settlement in a long term perspective, as well as on other industrial development and on the local environment. Also, these projects are of such a dimension that they will influence the national economy to a considerable degree.

4. To secure better state direction of the localization and number of larger projects, on November 16, 1973, the Government proposed a temporary law on the approval of the establishment of bases for the petroleum industry and larger industrial and construction projects.

The law, which was approved by Parliament, came into effect December 13, 1973, and contains the following main points:

— The development of bases for the petroleum operation or of larger industrial and construction projects must not begin before the King has granted approval.
— The approval mentioned in point one shall be made on the basis of a total social assessment, where regional development, economic stability, the labour market, and the protection of the natural environment are taken into consideration. Conditions can be put forward to take care of these considerations.
— The law applies to the entire county, i. e. regardless of the localization of the enterprise, approval must be obtained from the King.
— It applies to the establishment of bases for the petroleum operation regardless of the size of the base.
— The building or expansion of larger industrial and construction enterprises are involved when the development requires a labour input of
  — at least 100 work years or investments of at least 20 million kroner, or
  — the operation of the new installation will require at least 100 employees.
— Before approval has been obtained, it is not permitted to begin any groundwork in the area where it is proposed to establish the enterprise, nor to bring any building and construction material into the area.
— Further, before approval has been obtained, it is not permitted to enter into any binding agreements on performance of work or delivery of goods for realizing the enterprise in the area concerned.

The law is administered by the Ministry of Labour and Municipal Affairs.

5. With a view to more permanent solutions to the need for direction and control, work on a new law on establishment control is being given highest priority. The law, which first and foremost will give the authorities effective control over new establishments and expansions within industry and service trades in pressure areas, will also extend to development connected with the oil activity on the continental shelf and other larger industrial projects, regardless of where in the country it is proposed to localize them. It will take some time before a permanent law on establishment control can be expected to be approved and put into effect. The Government intends to accomplish this by January 1, 1975, at the latest.

6. Emphasis will also be placed on including the service trades under such a law. Exploratory work will be started to clarify localization conditions and opportunities for service trades, especially with the aim of decentralization from the larger city areas. The development of legal authority requiring certain types of protected service activity to be partly or entirely localized outside the larger cities, will be considered. The Government attaches great importance to the work of decentralizing decisions in public administration and of moving public activity out of Oslo.

7. In addition to the direct means, such

as the establishment law, there are the positive means (loans and subsidies) under the Regional Development Fund. It is a primary rule that the petroleum operation must be conducted without state support. Naturally, therefore, it is not possible for it to obtain loans or subsidies from the Regional Development Fund. Nevertheless, in special cases loans and subsidies can be obtained from the Regional Development Fund further especially desirable establishments. This will apply especially to production concerns, which could also operate without the basis of the activity on the shelf, and businesses which are created as a link in the resulting secondary effects. It is stressed in this connection that the fund law (Law of June 18, 1965, on the Regional Development Fund) makes it a condition for support that the operation shall be permanent.

8. Furthermore it is possible in certain instances to make loans and subsidies to municipalities. The Ministry of Environment, in certain cases, can give planning subsidies for basic municipal investments connected with concrete projects of special importance to the development of the economy in a municipality. In addition, the Norwegian Municipalities Bank can make loans for technical building site work and for special basic investments in the growth area. There is also the possibility of using real estate obligation bonds for the municipal acquisition of land.

11.2 PHYSICAL/ECONOMIC PLANNING

11.2.1 General Goals and Decisions

1. The building law regulations on physical/economic survey planning — general, regional and county plans — state that there shall be planning and continuity in the disposal of land and in building, and that the effects of different enterprises must be clarified to a satisfactory degree before they are begun. This involves the building of dwellings, industries, schools, health facilities, communications, etc. The law will attempt to coordinate agricultural interests, conservation and outdoor interests, protection against pollution and aims for the development of population and settlement. The development will take place under the form of physical/economic plans and trade programs for the areas concerned.

The realization and force of the physical/economic planning depends on securing coordination both horizontally between different sectors and vertically between municipalitiy, county and state.

2. The general and regional plans will stipulate the use of an area and the regional plans the expansion pattern within individual communities and within two or more municipalities. General municipal planning is an especially important means of securing healthy and functioning local environments and for protective management of the natural resources.

3. The county plans will determine the main structure of the exploitation of natural resources, as well as the development of settlement and economy within the county area can thereby clarify broader guidelines for general and regional plans to a large degree, while also functioning as a framework for the coordination of the many state departments on the level of county and county municipal affairs.

4. On the national level the physical planning presented in Parliamentary Report No. 27, 1971—72, will give a greater clarification of the goals and guidelines for the State's own policy. The national goals for the development of settlement, development of the districts, and guidelines for the management of the country's national resources are especially important in this connection. Aspects of the national plans which should be mentioned, are the mapping of natural types and deposits which are worthy of conservation, and guidelines and measures for exploiting the water resources.

5. Through the coordination of national and county planning, the goals and guidelines for the various fields can be built on general regional assessments. This makes it possible to establish satisfactory concrete grounds for the practical localization policy. County planning must not be delayed, but should be pushed forward rapidly to a fully developed and well rounded planning process, where decisions on the disposition of resources, conservation measures and the development of the counties are made on the basis of politically acceptable and coordinated plans.

11.2.2 Planning Tasks and Problems

1. The need for planned development is especially apparent in situations which anticipate great expansion pressure. The nature, dimensions and development of the petroleum operation over time outlined above, clearly indicate that in the years ahead it will be a tremendous planning task to assure that possibilities and distributions represented by the petroleum operation are taken care of, while the negative effects are reduced as much as possible. In this situation it is important

that community planning be satisfactorily future oriented. This involves analysing the possible consequences which different measures will have for Norwegian economy and society at an early stage, and having the petroleum sector participate in planning in line with other activities.

2. The long term regional adjustments resulting from the domestic utilization of public income could be as great as the direct effects from Norwegian engagement in production, services and further processing for the petroleum operation.

The readjustments themselves should not create insurmountable planning problems. On the other hand, it must be stressed that these will depend on the tempo of the readjustments. With large readjustments in a short period the possibilities of solving important social problems in a cautious manner are strongly reduced.

3. The petroleum operation alone could contribute to a major part of the economic and population growth anticipated in the western and nothern parts of the country. Such development will be in line with the Government's regional policy goals. In a planning sense this represents a gain rather than a problem.

4. Nevertheless, continual strong economic activity along the stretch of coast from Rogaland north will create a pressure which could result in certain problems locally and also regionally. At the same time many districts in this part of the country will gain few advantages from the petroleum operation. They might have a stronger emigration because of the offers available in the expanding areas. Since the petroleum industry is new, however, it should be possible to obtain the desired spread of activity, adjusted to local needs and conditions. This is an extremely important argument for the authorities' securing strong social direction of the localization through future oriented planning, other organized measures and special administration.

5. The petroleum operation will have direct and indirect consequences for other industries. There must be combined business economic assessment in connection with localization policy, so that the areas which anticipate petroleum activity, and which are therefore liable to pressure problems, above all do not bring in any other new activity beyond that necessary for local needs. On the other hand, the establishment of new, one-sided industrial areas with individual concerns of a dominant nature must be avoided. The size of the employment resources in the area and the possibilities for splitting up the petroleum into smaller units, is of great importance here. Restrictive measures in different pressure areas, such as towards service trades with a greater geographical market, will be necessary. (Compare the work on a permanent law on establishment control.)

6. There could be pressure inherent in the possibility that planned projects might begin on short notice. This could create difficulties for a well-rounded and systematic development. The social result could be unfavourable localization, with the corresponding negative consequences in a number of fields.

7. There is a special planning problem with concerns where the duration of the new jobs is uncertain.

This is a general problem which also applies to industries other than the petroleum operation. Swings in the level of activity could lead to considerable problems, especially locally. These involve both the consequent employment question and the usual problems resulting from an unstable municipal economy and rapid changes in the social environment. Even if a relatively stable level can be maintained for the total dimension of the petroleum operation nationally, both local increases and decreases in activity must be expected. These will depend partly on where the self exploration and extraction takes place, and partly on which type of activity is established in the individual areas. Activities connected with building and construction, including the building of concrete oil platforms, are especially susceptible. It will often be most advantageous for those employed in such activity to commute instead of establishing residence near the place of work. For many this might mean contending with long trips to work in the expectation that the secondary effects and income effects of the petroleum operation will eventually reach their own communities. There will have to be clear signals from the authorities on which localization policy can be expected.

8. The planning apparatus will be confronted with great demands on its organization, professional competence and capacity. If the extent of the operation and the rate of development are as outlined in the high estimation for oil and gas discoveries on the continental shelf and corresponding activities in Norway, the planning apparatus, even strengthened, could be a bottle neck. If there is to be a harmonious development, the tempo of many projects must be limited.

11.2.3 Possible Planning Measures

1. Effective planning requires that the frameworks for both the extent of the petroleum operation and the basic localization policy be made concrete as soon as possible. Even if planning will be reasonably based on alternative assumptions of the nature and extent of the petroleum operation, it is very important that the unknown factors in the calculation are reduced. This is especially necessary because a number of the development measures of current interest within this sector can be so extensive that they could be decisive for development in both a local and larger regional connection. It is therefore necessary to draw up alternatives for the localization of such activity at an early stage. State authorities have a special responsibility here. They are working on clarifying their own areas and analysing different localizations for such large projects.

2. The county authorities can exert considerable influence on localization policy in the county through their own county planning. In handling applications for dispensation from the beach law and through area development plans, the county officially, could hinder the possible accomplishment of localization plans after a combined assessment of conditions in the locality and the county.

If conditions indicate, the municipalities (building councils) as well as the county board must impose building bans in the area, according to § 33 of the building law, in anticipation of the adoption of a plan or survey plan.

3. For larger projects, which must be approved by the Ministry of Labour and Municipal Affairs in accordance with the temporary law on establishment control, area development plans must be developed before expansion is begun, to assure the best possible planning solutions. The municipality takes care of this, and the county governor will supervise that the obligations are met. Area development plans in such cases can normally be ratified by the county governor.

4. Even if the county municipality and the county governor can act on localization questions in most cases, including the total activity of the petroleum operation in the county, there is the danger that by following two different practices counties could come into an unfortunate situation of mutual competition. For this reason it is desirable and necessary that there is oil policy cooperation between two or more counties, where the localization question and the distribution of the petroleum operation can be discussed at an early stage in the planning. Such cooperation is already established between the counties in North Norway and between the counties in Trøndelag and Møre and Romsdal. The Government stresses that as soon as possible similar cooperation should be established between Rogaland, Hordaland and Sogn and Fjordane.

In the present phase, with considerably activity on this part of the coast, such cooperation, with possibly the creation of oil policy committees, will be an important contact link with the central authorities on such matters as the localization question.

5. It is important that the municipalities attempt to work the expectations of the petroleum activities into the general planning. This especially concerns smaller and middlesized businesses, which normally could be absorbed locally without special problems. The arrangements for such activity must be made in close contact with the county municipal authorities, in that these will have preferences for the distribution of different types of petroleum activity within the county. On the other hand, it is important that the municipalities keep oriented with the plans and goals which the state and county bodies wish to follow at all times. There is an extensive need for two-way communication here.

6. In isolation, the individual municipality will have a justifiable desire for new jobs, with the opportunities these entail for a local society in decline or stagnation. The petroleum operation will also be used as an active means of directing the economic foundation in such places. Nevertheless, not all municipalities can count on new jobs of this nature. The municipalities must normally exercise a certain caution in reckoning with local activity within this sector.

Individual organized measures must nevertheless be carried out, but more as a follow-up of the ordinary survey planning work, than as a direct result of anticipated petroleum activity. This includes, for example, securing land for future industrial production and selecting suitable areas for new residential building. On the other hand, the municipalities must be cautious in undertaking basic investments which are specially directed towards increased competition with new petroleum jobs. State, as well as county municipal authorities, must assist municipal authorities with planning and other area development measures, so that development in the local community can take place in a sound manner.

7. Individual larger operations can be of short duration. If adaptations have been made

for this in beforehand, the prospective liquidation can probably be handled reasonably. However, discontinuation could lead to very serious problems locally, if adjustments are not made for such a possibility in beforehand. With the aim of averting and reducing these problems at locations, e. g. for concrete platforms, it will be assessed whether guidelines and rules can be evolved for production cooperation or joint production, which can take care of the need for production over a longer period. Further, the contracts entered into between the host municipality and the builder, could be very important regarding ownership conditions of the discontinued installation and the builder's responsibility and obligations to the local authorities during both the development and possible later discontinuation periods. Against this background it will be assessed what is the best possible way to secure local interests through such contracts.

8. The various projects which might gradually be established on Norwegian soil, will have both negative and positive effects. It will be stressed that the different aspects of planned projects must be assessed on a broad social basis, and that the consequences for the natural environment and resources, working life and settlement must be analysed to a greater extent than they have been so far.

Decisions will be assessed according to the requirements for carrying out such studies (consequence analyses). Among the questions this raises, can be mentioned:

— which data, information and appraisals an application for development should contain
— which bodies should carry out the studies in each case
— which forms of cooperation between public authorities, research and study institutes, and developers should be established
— who should finance the studies.

It is stressed that with the question of deciding which conditions should be analysed before a standpoint is taken on planned development measures, it is assumed that operational branches other than the petroleum activities will be included.

9. The object of strong social direction of the petroleum operation is to subject all measures and projects, especially the larger ones, to a total assessment, where industrial and oil policy, as well as regional policy, environmental and resources conditions are examined. A main principle in localization policy and in concrete localization conclusions shall be that the goals and guidelines which opply to social planning and administration, will also apply to all oil based activity.

11.2.4 Conservation and Recreation in Connection with Petroleum

1. The petroleum operation will be tied to ocean areas, the seabed, beach areas and land. Very different types of nature will thus be affected. Encroachment on land and the beach zone for establishing receiving stations and industry could lead to conflicts with conservation interests.

Competition for marsh areas should be especially mentioned. These flat, shallow areas are good industrial sites, while they also often have great importance for animal and plant life.

2. Development interests will often require the same type of land which is suitable for outdoor life and recreation. It is considered very important that the petroleum operation does not lead to too great an encroachment or overloading of valuable outdoor and recreation areas.

3. The protection of conservation and recreation interests will mainly come under general planning on municipal and county municipal levels. In connection with such planning, and in assessing concrete development measures, the environmental authorities will cooperate with local and central bodies to clarify and possibly study which environmental considerations must be taken, and which measures should be put into effect.

4. The environmental authorities consider cases of protecting or preserving natural areas and deposits, in accordance with the law on the protection of nature. The Ministry of Environment is presently in charge of mapping natural species and deposits in Norway which are in need of protection. This work has just begun. The information which is obtained, could also be of help in the localization of the petroleum operation.

In the future it will be of interest to assess the need for the protection of natural species which are especially scarce, e. g. marshes, shallow sea areas and special types of beaches. In this respect, where the protection of such rare natural conditions can be expected to come into conflict with development interests, the situation will be taken up with the parties concerned at the earliest stage possible.

11.2.5 Protection of Productive Agricultural Areas

1. Against the background of the requirements for soil conditions, topography, central

location, development of communications, etc., it can be expected that the oil operation will lead to considerable land conflicts and conflicts in connection with the exploitation of scarce agricultural resources. The following reasons for conflicts could occur:

— direct demands for agricultural land for installation areas for petroleum activity (including buffer zones)
— demands for agricultural areas for other development activity in connection with petroleum activities (building of residences, communications, local service functions, administration, etc.)
— competition pressure of the petroleum operation on the labour market which locally could lead to good productive areas lying fallow.

2. About one third of food consumption involves agricultural products from Norwegian agriculture, and this share is declining. The importance of a certain self-sufficiency and satisfactory land for future agricultural production must be assessed against the background of the uncertain and alarming future perspectives for the global food situation today. In certain sections of the country and regions, especially in North Norway, it will be socia-economically correct to maintain a high degree of selv-sufficiency in the most important agricultural products which can be produced.

3. In order to preserve the limited food producing areas and corresponding active agricultural environments, it is important that a reasonable balancing of the different sides in the conflict situation is emphasized in the localization of larger petroleum based activity. The productive agricultural areas must be considered as early as possible — through planning and court procedures — by the public agriculture and forestry departments on the municipal and county levels. In these instances the official goals of agricultural policy must be kept in mind, when assessing possible development plans at the earliest possible stage.

4. The agricultural authorities administer cases concerning the use and acquisition of land in unregulated areas, in accordance with the land law and the concession law. They are working on registering and classifying productive agricultural areas. This work will determine the basis for assessing the localization of development projects.

11.2.6 Pollution

1. Most types of petroleum activity on land will probably be of such a nature that they will not involve the danger of serious pollution. Such activity will include various types of base and service activities, the manufacture of operating equipment to be used in the petroleum operation, such as drilling and production platforms, parts deliveries from the mechanical industry, etc.

2. The pollution problems are mainly connected with operations where oil and/or gas comprise a considerable element in production. These include refining, the petrochemical industry, landing, loading and unloading from tankers, storing, etc. The localization of these operations must be assessed especially closely. Decisions on localization and regulations as to which conditions will apply, are the responsibility of the state bodies and the concession authorities.

3. The following requirements for the localization of different types of polluting activity must apply:

— Harbours must be located in places where there are possibilities for protecting the harbour area by draining, if large leaks or spills from tankers or during loading, and unloading should occur.
— Installations must be established in areas with good disposal conditions. Even with the strictest rinsing requirements smaller spills of harmful material must be expected, partly of a type which will build up in living organisms. The place of disposal must therefore have good water circulation, and spills must be avoided in closed fiord areas and areas where they could have damaging effects of long duration.
— Installations must be established in areas with good air circulation, preferably the outer, weather dominated coastal zone. In certain areas with periodically poor air circulation there will be the risk of damages to adjacent areas, even with a relatively small spill.
— Because of the noise from petrochemical installations and because of the danger of explosions, gas leaks, etc., these must be some distance from built-up areas.

4. A good deal of noise can be reduced by good insulation, but other things are difficult to eliminate. The installations must therefore be screened off by a buffer zone from built-up areas or by natural terrain obstacles which reduce the sound. In open terrain they must be at least one kilometer from built-up areas. In rolling country the

natural obstacles will make it possible to reduce the distance from built-up areas. This middle area could be used for other industry, like mechanical industry.

5. Unpleasant smells will also occur in connection with different activities, like industrial installations, storage tanks and oil harbours. Such installations must therefore be situated so that the prevailing winds blow the smells away from built-up areas.

CHAPTER 12

Trade and Foreign Policy Problems

Prepared in cooperation with the Ministry of Defence, the Ministry of Commerce and the Ministry of Foreign Affairs.

12.1 THE INTERNATIONAL IMPORTANCE OF NORWEGIAN OIL AND GAS

12.1.1 Export Possibilities

1. The estimated production of oil and gas will far exceed Norway's domestic consumption, which at present is ca. 9 million tons of oil per year. The production of oil and gas will therefore be strongly export oriented, and Norway could become an important exporter of energy internationally. A considerable part of the production will be exported in an unprocessed form (as crude oil and natural gas). Technical and economic conditions indicate that refining installations and petrochemical industrial installations have very large capacities. This means that refining and further processing must also be based on export to a large extent. Refined and petrochemical products have usually had considerable customs tariffs imposed on them, while crude oil and natural gas are duty free in most instances.

2. The international energy situation has been strongly influenced by increasing demands for oil and gas, and for refined and petrochemical products. Because the expansion of production is now considered more uncertain than previously, the market could be influenced by scarce supplies in the future. Against this background it is reasonable to estimate that Norwegian oil and gas will not be faced with any sales problems. The same vil problably apply to the traditional refined products (gasoline, heating oil, etc.), where only a small part of the production can be disposed domestically. The high oil prices will stimulate the development of other energy sources. The price development for oil is very uncertain.

The export possibilities for petrochemical products could be more uncertain. The demand here has been strongly determined by economic conditions, alternating between excess capacity and scarcity. These products are also usually faced with considerable customs tariffs.

3. Most of the important industrial countries in the world are possible markets for Norwegian oil and gas. The large industrial countries in Western Europe and the Nordic countries, which have been our most important trading partners, will now be possible purchasers. Norway's trade agreement with the EEC also covers refined and petrochemical products, the tariffs in which will be gradually reduced until 1977. However, it is reasonable to anticipate that both the United States and Japan, and possibly countries in Eastern Europe, could be purchasers of both oil and gas, and of refined and petrochemical products. Liquid petroleum and cooled liquid natural gas (LNG) can be freighted by ship over long distances.

12.1.2 The Importance of Norwegian Oil and Gas in the Recipient Countries

1. The international economic importance of the Norwegian reserves of oil and gas lies first and foremost in the fact that they represent an important energy reserve for the Nordic counties and Western Europe, within a short distance of the markets. Western Europe's need has been estimated by the Organization for Economic Cooperation and Development (OECD) to increase from 620 million tons oil and 20 milliard m^3 natural gas in 1970 to 1,100 million tons oil and 230 milliard m^3 natural gas in 1980. Against this background of strongly rising prices and the political uncertainty connected with supply, it is now felt reasonable to estimate that the consumption of oil will increase less than previously anticipated. To a certain degree oil can be replaced by coal. It is expected that the role of natural gas will increase strongly, and that it will be used as a replacement for oil, especially for heating and in the petrochemical industry, and possibly for power production in certain instances.

2. A Norwegian production of 40 million ton oil and almost 30 million tons oil equivalents of gas in 1980 will, according to earlier estimations, correspond to 3—4 per cent of Western Europe's consumption of oil and 12 per cent of the consumption of natural gas, or about 5 per cent of the combined consumption of oil and gas in Western Europe. The importance of Norwegian oil and gas in Western Europe's energy balance will increase in relation to the degree which consumption increases less than formerly calculated. Oil consumption could increase less than previously estimated in

favour of a stronger rise in the consumption of natural gas. This development corresponds more closely to the consumption distribution in the United States and the Soviet Union. The Norwegian deliveries will be important, especially where natural gas is concerned.

3. For individual countries the supply of Norwegian oil and gas could be very important as early as 1980. The pipelines from Ekofisk are of a dimension for the transport of 50 million tons of oil to Great Britain and 25 milliard m^3 of gas to Western Germany. These amounts correspond to beween one third and one half of both Great Britain's estimated consumption of oil and Western Germany's estimated consumption of natural gas in 1980. The export of gas is tied to the market where it is delivered. Norwegian gas from Ekofisk is sold to distribution companies in Western Germany, France, the Netherlands and Belgium. The landing place for an oil line is normally of little importance to the place of final oil consumption. For example, a considerable part of the oil from the Ekofisk pipeline will be re-exported from Great Britain, mainly by ship, some of it possibly to Norway.

4. In this way Norwegian oil and gas can have great importance in the energy balance in two of Western Europe's largest industrial countries. Great Britain, because of her own production and the supply from Norway, could have an a surplus excess of oil by 1980. After 1980 Western Europe's consumption of oil will possibliy increase more slowly because of the development of other sources, but Norwegian production will continue to increase.

Western Europe's consumption of oil in 1985 could be ca. 1,200 million tons. A Norwegian production of, for example, 100 million tons would thus correspond to ca. 8.5 per cent of the total consumption. As far as gas is concerned, the Norwegian share could be considerably higher.

12.2 NORWAY'S POSITION IN INTERNATIONAL PETROLEUM POLICY

12.2.1 Relationship with Consumer and Producer Countries

1. The Norwegian production of oil make the Nordic countries more self-sufficient. In the other Nordic countries oil represents a larger share of the energy balance than in Norway. In Norway oil accommodates ca. 45 per cent of the energy needs, while it covers ca. 90 per cent in Denmark and ca. 74 per cent in the energy and industry sectors in Sweden. Broader Nordic cooperation in the energy and industry sectors will be natural. The importance of the Norwegian discoveries of oil and gas in the short run is on the Nordic markets. Norway is an important supplier of oil products to the other Nordic countries. Close cooperation on energy already exists with Sweden, and this is now being expanded to include Denmark also.

2. The Norwegian production of oil and gas could also be of international importance in the short run. From 1975 Norway could be Western Europe's only net exporter of oil. Consequently Norway will have certain interests in common with the traditional oil producing countries. This especially applies to the development of production and prices. With the present pattern of organization, the world market for oil could fluctuate considerably between relative scarcity and relative surplus. It is in the Norwegian interest to obtain a stable development of prices, production and consumption. Such development can best be accomplished through organized cooperation. Therefore it is important to establish closer contacts and cooperation with the traditional producing countries, such as the member nations of the Organization of Petroleum Exporting Countries (OPEC). The OPEC now includes countries which have oil and gas as their only or most substantial source of income. Norway also has other export interests, based on a highly developed and diffrentiated economy. In Norway the relationship between the petroleum interests and other economic interests must be the object of constant assessment. General foreign policy and trade policy considerations could also enter into this. Good cooperation with the most important producing countries will therefore be important in this connection also.

3. At the same time it is in the Norwegian interests to further cooperation with the most important consuming countries, through the Nordic Council and within the framework of the OECD. Several of Norway's most important trading partners are among the world's most important consuming countries of oil and gas. They have a large and increasing need for energy. Therefore these countries could be interested in a higher production level and a more rapid rate of development than satisfies Norway. Great Britain, for example, has put a very rapid exploitation of the resources into effect.

4. The question of the rate of exploitation can arise in connection with trade policy, in that individual countries could couple deliveries of Norwegian oil and gas with the purchase of other Norwegian goods

and services or with the sale of important goods to Norway in a scarcity situation. At the same time, it is in the Norwegian interest to maintain a generally good relationship with our most important trading partners, and that these countries do not suffer economic repercussions, for example from a lack of energy. This indicates that the relationship between petroleum policy and economic policy must also be the object of constant appraisal.

12.2.2 Relationship with the International Oil Industry

1. Traditionally the production, international trade and distribution of oil has been organized by private companies. The largest of these (Exxon, Shell, Mobil, Texaco, Gulf, Socal, BP and CFP) have long dominated the international petroleum industry through their cooperation. The British state owns 50 per cent of BP, but so far it has exploited its shareholder rights to a very small degree. The French state has 35 per cent of the shares and 40 per cent of the voting rights in CFP, and has here followed a much more active policy.

In many cases the producing countries have interpreted this as a drawback, as regards a rapid tapping of the reserves, low income tax, etc. In 1972 argreements were concluded with the largest companies. These agreements will give the producing countries a gradually greater participation in the production companies, with full control in 1982. It is now expected that the important producing countries, especially Saudi Arabia and Venezuela, will attempt to take over full control of their production spontaneously. For the others development is heading in the direction of nationalization of oil production. Mexico nationalized her oil industry as early as 1938. Later Iran, Irak, Algeria, Libya and Kuwait followed this example.

2. Several important consumer countries have had state oil companies in competition with the private ones for a long time. In Europe this especially involves France (with Elf/ERAP) and Italy (with ENI/Agip). These companies have been engaged in both refining and distribution of oil in the respective countries, and in production, especially through the so-called cooperation and assistance agreements with selected producing countries.

3. This development has weakened the position of the international companies, both in the producing countries and the consumer contries. Their future role on the production side could presumably be a minority partners in state companies. Increasing state intervention means that production and trade of oil will steadily become more of a government affair. In recent times the large oil companies have become engaged in the exploitation of other energy sources such as coal, nuclear power, etc.

4. The international oil conflict, which began in the fall of 1973, is expected to increase this structural development in the international oil industry.

Oil cooperation within the OECD failed during the last oil crisis. Because of the participating countries' different national interests and opportunities for improving their own supply situation through bilateral agreements, it was not possible to institute the distribution plans which the OECD had developed. The oil companies, therefore, had to take over distribution tasks which should have been handled by national authorities through international cooperation.

This conflict situation has revealed the problems in the position of the international oil companies. The large oil companies were the only ones who had information on the oil situation. A factor of uncertainty is implied in that the authorities do not have the same perspective of the supply situation as the international oil companies' head offices, and in that this exerts considerable influence on development. It is therefore necessary to follow the oil companies' plans closely, and to have a full perspective of their activity.

5. As far as Norway is concerned, the oil operation must be organized in a way which allows strong state engagement, not only in production, but also in refining and distribution. This involves both trade in oil to Norwegian consumers and the refining and distribution of Norwegian oil abroad. The structural development in the international oil industry, which means that trade in oil will be a state concern to a steadily greater extent, emphasizes this greatly. It will therefore be natural to cooperate with the state oil companies of other countries.

The organizational pattern of the Norwegian petroleum operation must give the Norwegian authorities control over prospecting activity, the degree of exploitation and volume of production, export and marketing, and the large anticipated incomes. So far foreign oil companies have held extraction permits on the Norwegian continental shelf. In the future they could come into the picture as consultants, contractors and minority partners instead.

12.2.3 Problems of Public International Law

1. The international legal problems concerning the continental shelf are handled in detail in Chapter 12 in «Survey of the Oil Policy Question», printed as a separate appendix to Parliamentary Report No. 7, 1970—71.

2. In the Geneva Convention on the continental shelf of April 20, 1958, which Norway has signed, the continental shelf is defined as the ocean floor and subterrain in the submarine areas which are bounded by the coast, to a depth of 200 meters or as far beyond this limit as the depth of the ocean permits the exploitation of natural deposits. The technical development has since resulted in the exploitation criteria becoming of vital importance. The Royal Decree of May 31, 1963, claimed Norwegian sovereignty over the ocean floor off the coast of Norway, as far as the depth of the ocean permits exploitation of oceanic deposits, but not over natural deposits and not beyond the median line in relation to other countries.

3. The boundaries of the Norwegian continental shelf south of Lat. 62° N are stipulated in agreements with Great Britain, Denmark and Sweden. According to these agreements, separate agreements will be entered into on the exploitation of natural deposits which extend on both sides of a boundary line. This has occurred, for example, in the Frigg field.

North of Lat. 62° N the boundaries of the Norwegian continental shelf are not precisely fixed. The question here is how far the continental shelf stretches towards the great ocean depths in the west and northwest towards the Atlantic Ocean and the Arctic Ocean, and the detailed boundary in the east between the Norwegian and Soviet continental shelves.

4. The exploitation criteria, on which both Norwegian and international law are based, is problematical, in that the boundaries for the continental shelves of different countries shift in pace with the rapid technological development. A main task of the imminent United Nations' Conference on the international law of the sea will be to find more precise and definite criteria to replace the exploitation criteria. Norway, together with Australia, has presented a proposal on economic zones of 200 nautical miles, where the coastal nations shall have sovereign rights over the natural resources, including the resources on the ocean floor. In those cases where the natural extension of the land mass extends beyond the economic zone, however, the coastal nations shall maintain the rights which they have under present international law.

Where Norway is concerned, the great ocean depths begin within the 200 nautical mile line along far the major part of the coast. The special problems concerning outlying parts of the shelf are therefore of limited concern to Norway.

5. Questions have been raised about whether the resolutions of the Svalbard Treaty apply to parts of the continental shelf in the area off Troms/Finnmark and Svalbard. Here the ocean floor connects with the continental shelf at an ocean depth (maximum 400—500 meters) which already indicates the exploitation of resources. These areas constitute a natural extension of the land masses of the Norwegian mainland. Under Norwegian and international law, based on the exploitation criteria, Norway therefore has sovereign rights over these areas, regardless of the Svalbard Treaty.

6. The question of detailed boundaries between the Norwegian and Soviet continental shelves in the Barents Sea has been taken up with the Soviet Union. Agreeement in principle has been reached between the two countries to resume discussion of this question.

7. The petroleum activities of Svalbard, like all other activity on the island group, comes under full Norwegian state jurisdiction. Norwegian authorities, however, are bound by the regulations of the Svalbard Treaty on equal treatment for the citizens of the treaty partners in access to certain types of economic activity, including the petroleum operation. Article 2 of the Treaty mentions measures for protecting the natural environment of the island group. The relationship between such measures and the regulations on equal access for the citizens of treaty partners to practise certain forms of economic activity, raises difficult questions of balance. Under the exercise of their legislative and administrative authority, the Norwegian authorities are obligated to undertake the balancing involved here.

8. According to the Geneva Convention on the continental shelf the operation on the shelf must not interfere to an unwarranted degree with shipping, fishing and other measures related to the protection of the ocean's living resources. Petroleum installations cannot be established in places where they could interfer with the use of recognized sea lanes.

If a large number of drilling platforms and other installations should be established in

proximity to each other in the larger areas of the North Sea, it could create difficulties for shipping and fishing. Solutions to these problems, which take into consideration the above-mentioned economic interests, must be developed. This could best be accomplished through cooperation by the North Sea countries.

9. The danger of pollution and other damage to the environment from the petroleum operation on the continental shelf also raises international legal problems. These questions must be clarified regionally and globally. It is in the Norwegian interest that this is done as quickly as possible, before the petroleum operation in the North Sea is of too large a dimension. The fisheries in these national waters impose a special responsibility on Norway.

12.2.4 Strategic and Security Policy Questions

1. When gas production comes into effect, the total production in the whole North Sea could satisfy approximately 20 per cent of Western Europe's consumption of oil and gas in 1980. This will increase the ordinary strategic importance of the North Sea. In a situation characterized by uncertain production and increased competition of energy resources, the Norwegian reserves will be of increased importance.

2. Oil production in the ocean areas farthest north could raise problems of its own. The possibilities for solving these problems will depend first of all on international development. An extension of cooperation and a relaxation of tension betweeen the great powers, which would also affect the northern areas, would make it easier to find satisfactory solutions to our oil policy.

3. Against this background it is important to secure a firm Norwegian leadership of the exploration for and possible extraction of oil on the northern parts of our continental shelf. Norwegian national direction and control in these areas will also be in the interests of the great powers.

12.2.5 Participation in International Organizations in Connection with the Petroleum Operation

1. Important energy policy problems are increasingly prominent as international problems. These concern the world's energy resources, transport problems, trade problems, pollution problems, etc. In these fields we must therefore have increased international cooperation, both regional and global, between the producting countries and the consuming countries.

Norway is a member of several organizations which have special committees and other commissions for energy questions, where oil and natural gas play an important role.

2. The Organization for Economic Development and Cooperation (OECD) has a special committee which works both with immediate problems and with the long term energy question. The activity includes, among other things, the examination of the national energy policies of the member countries. In 1974 the Organization's most important task in the energy sector will be to complete a study of the energy situation in long term perspective, where the question of the national exploitation of the sources of energy will also be discussed. The Organization also has an oil committee. This works with current oil questions, and also develops prognoses for supply and demand of oil. In addition it has developed a crisis plan for the distribution of oil. There is a group within this committee with top level representation and limited membership. Norway is now a member of this group.

3. The Economic Committee of the NATO deals with energy questions, including oil. Here also the supply situation in a global context will be made the object of study.

4. Norway is presently a member of the United Nations' Committee on Natural Resources, which handles the petroleum question among others. Here special emphasis is placed on analysing the energy situation in the developing countries and on the development of plans for the natural resources in the countries. Norway also participates in the work of the Energy Committee of the United Nations' Economic Commission for Europe (ECE). If oil and natural gas cooperation between Western Germany and Eastern Europe is extended, this committee could play a more prominent role, and could become a useful source of information for Norway. The Conference on cooperation and security in Europe (CCSE) could lead to an activization of this cooperative body.

The United Nations' Conference on the international law of the sea, which is expected to take place in 1975, should also be mentioned. This will handle questions concerning fishery boundaries and the boundaries of the continental shelf especially. The Norwegian-Australian proposal on economic zones has already been mentioned.

5. Norway participates in the Inter-

national Maritime Consultative Organization (IMCO), in a cooperation which aims at hindering pollution resulting from the transportation of oil by sea, among other things.

6. In March, 1973, a conference was held in London between the North Sea countries, where security and compensation questions connected with the operation on the continental shelf were discussed. It is intended that this work be followed up. The Norwegian opinion is that there is a clear need for regional and global regulation of agreements on these questions.

Further initiative was taken by Norway for a sub-committee which is working with the question of harmonizing the security regulations for the petroleum operation on the continental shelf. It is of great importance that the security regulations are as uniform as possible in the North Sea area, since this would make the enforcement of the regulations more effective, and would eliminate the practical difficulties which would otherwise occur, especially for mobile devices. The Norwegian Petroleum Directorate is leading the work on the Norwegian side.

12.3 TRADE POLICY AND CURRENT POLICY PROBLEMS

12.3.1 Importance for Balance of Payments, Capital Balance and Currency Policy

1. In the Long term programme, 1974—77, the export of petroleum products from the Norwegian continental shelf, based on sources which were known to be profitable, was estimated as at least 11 milliard kroner in current prices in 1977, compared to 360 million kroner in 1973. For goods in total, without ships and petroleum, an export value of 33.5 million kroner was estimated for 1977. The export of petroleum will thus constitute about a fourth of the total export of goods, including gas and oil. In the estimation of the export of mineral and oil products, the expanded capacity which will result from the development at Mongstad, was taken into consideration. The annual maximum production quantities from the field in the Ekofisk area were calculated in this estimate as ca. 22.5 million tons of oil and 15 milliard m^3 of gas.

2. It is now reasonable to estimate with a considerably higher market price for crude oil than that which was used as a basis for the calculations in the long term programme. On the basis of the new prices the incomes from the petroleum operation could be considerably higher than previously estimated. In 1980 the market price for crude oil could lie in the area of ca. Kr. 385 per ton, which corresponds to $ 9.00 per barrel, according to today's price level, or Kr. 620 in current prices. The net export is now estimated at ca. 30 million tons of oil and almost 30 million tons oil equivalents of gas in 1980. In current export prices this would have an export value of ca. 37 milliard kroner. However, these income estimates are uncertain because the prices of oil and gas can fluctuate considerably. Petroleum products, including crude oil and natural gas, will thus assume a dominant position in Norwegian exports. A considerable part of the export incomes, however, will correspond to payments of debts, interest and dividends abroad.

3. A major part of the investments in petroleum extraction will consist of goods and services delivered from abroad. This will involve a strong increase in imports. To the extent the petroleum incomes are used to increase domestic demand, there will be an increase in import surplus, with increased import and reduced growth of other exports other than petroleum products.

In the first years especially a considerable part of the petroleum incomes will be drawn out of the country in the form of loan installments, interest and dividends. It is temporarily difficult to fix this amount of money precisely.

4. Our goods balance will radically change character when the export of oil and gas comes into effect seriously in the years immediately ahead. These changes require a reappraisal of our trade policy. Pressure on domestic reserves will increase. Measures to stimulate export must therefore be justified by offering an especially profitable application of domestic resources, or by serving regional or other social interests. Through the petroleum operation Norwegian business will gain competence within different industries which have a high degree of refinement, such as deep water technology, petrochemical technology, etc. These industries must also develop their export, parallel with the rise in export of oil and gas.

5. The Norwegian currency surplus will contribute to creating a strong position for the Norwegian kroner internationally. In recent years there have been exceptional changes in the currencies of a number of countries. It must also be expected that in the future individual countries will find it necessary to undertake parity changes. Such changes could involve a relative rise in the value of the kroner in relation to other currencies. This must also contribute to

reducing the domestic price rise, and in the long run will not harm those industries exposed to competition.

6. The public incomes resulting from the petroleum operation, provide the basis for increasing the domestic consumption of goods and services beyond that followed in the Korvald government's long term programme. With regard to the readjustments in working and economic life which will result from such an increased income utilization, however, it is not advisable that the use of goods and services in Norway, aside from in the continental shelf, increase to the same degree as the public incomes from the petroleum extraction. Even if part of the income is used for investments on the continental shelf, and even if interest and dividend payments abroad increase as a result of the extraction of oil and gas, there will be a considerably increased surplus in the balance of payments with other countries in the latter half of the 1970's, if the oil incomes are as anticipated.

7. Because the Gross National Product will increase as a result of the oil and gas extraction, Norwegian development assistance will increase accordingly when Parliament implements its decision to donate 1 per cent of the GNP to developing countries, in accordance with the request of the United Nations. There will be an extensive increase in Norwegian financial contributions to multinational assistance. The composition of our dual contribution must also gradually be converted in the direction of more financial assistance. A part of the surplus in the balance of payments could also be used for the purchase of foreign ownership interests in Norwegian business.

It could be difficult to direct loans and liquidity to the extent that the surplus in the balance of payments increases short term private claims abroad. A reduction in foreign borrowing and a gradual increase in outward going long term capital movement is also possible.

The export of capital from Norway must primarily be administered by bodies under state control, and according to guidelines handed down by the political authorities.

12.3.2 Norwegian Engagement Abroad in Connection with the Petroleum Operation

1. Norway is involved in the development which is taking place within petroleum technology, and in certain areas is on the way to taking a leading position. This involves special technology in connection with the petroleum operation on the continental shelf. Mobile drilling platforms of a Norwegian type are under construction in several Norwegian shipyards, and the licences are sold abroad. A Norwegian developed type of stationary platform, Condeep, is under construction in Norway for British interests.

2. Norwegian shipowners have become relatively strongly engaged in the petroleum operation, especially with mobile drilling platforms for exploration. These are under contract at both Norwegian and foreign shipards, in some instances together with foreign interests. Norwegian shipowners are also partners in foreign registered drilling platforms. The employment of Norwegian registered platforms outside the Norwegian continental shelf is considered as an export of drilling services. In the national budget for 1974 this item is estimated at 70 million kroner in 1973 and 730 million kroner in 1974.

3. Norwegian companies are engaged in the exploration for oil and gas abroad to some degree. As of the beginning of the third quarter of 1973, currency permits for ca. 120 million kroner were given, mainly to cover operating expenses. The activity often takes place in partnership with foreign interests.

4. Norwegian companies could also become engaged in the refining and distribution of Norwegian produced oil abroad. Norsk Hydro is on the way to developing its own distribution apparatus in Denmark. In regard to the general direction of state engagement in the petroleum operation, it must be assessed whether state interests shall also become engaged at this point.

12.3.3 Trade, Shipping and Other Industrial Considerations

1. The Ministry of Industry has included a regulation in the extraction permits allotted since 1969 to the effect that Norwegian goods and services shall be used to the extent that this is competitively profitable. These regulations are felt to be in the Norwegian interests at present. The shipowners and the Norwegian owners of mobile drilling platforms do not want these regulations to concern shipping services and services from drilling platforms. They maintain that the regulation could be interpreted as an expression of preferential policy. This would weaken the basic principle of Norwegian shipping policy, and in the long run weaken the possibilities for Norwegian industries to export to the continental shelves of other countries.

The purpose is not to give Norwegian industry a preferential position. But Norwegian industry must secure competitive access on equal terms in an area which has been characterized by well established connections between companies and traditional suppliers. It is Norwegian policy to develop Norwegian activity, expertise and technology in as many stages as possible in the petroleum operation. But it is not desirable to stimulate too large a volume of Norwegian deliveries to the operation on the continental shelf.

2. An important task for Norwegian shipping policy is to secure competitive access for Norwegian ships on the international market. The great majority, at least 90 per cent, of the Norwegian merchant fleet is exclusively employed in transport between foreign countries. In a situation characterized by increasing protectionism, not least by the United States, it is important for Norwegian authorities to uphold the basic viewpoint of its shipping policy, and to avoid discrimination to the advantage of Norwegian shipping, e. g. in connection with service and transport from drilling and production platforms on the continental shelf.

3. Norwegian owners of mobile drilling platforms wish to compete on an equal basis in other countries, in preference to risking the limitation of this access as a result of Norwegian preferential policy. Norwegian shipowners today have interests in more than 20 oil drilling platforms and drilling ships, and further have a large number of supply vessels in operation or under contract. Therefore it is indicated that there should not be any Norwegian preferential policy concerning the transport of oil and the servicing of platforms.

12.3.4 The Question of Financing

1. So far the petroleum operation, mainly considerable exploration activity, has been financed by imported capital. In the period 1965—70 this was a net ca. 1 milliard kroner. For 1971 and 1972 the figures are 850 and 1,150 million kroner respectively. For the first half of 1973 the net capital import was 1,170 million kroner. For 1974 the need for foreign capital is assumed the oil sector's estimated operational deficit, 3.4 million kroner.

The future need for capital import will rest especially on the tempo in oil exploration and the degree of exploitation of the oil reserves. The need will be reduced gradually, as the surplus from the petroleum operation is channelled back into this sector.

3. The law on currency regulation of July 14, 1950, give the Ministry of Commerce, through currency regulations, and the Bank of Norway (Norges Bank) extreme powers of attorney to regulate currency transactions. The regulation permission also applies to borrowing by the oil companies. The regulation has so far been practised liberally. Gradually, as Norwegian industry becomes stronger in delivering to the operation on the continental shelf, it could be necessary to tighten the regulations on the supply of credit to the petroleum sector.

3. The Norwegian State Oil Company (Statoil), which holds 50 per cent of the share capital in the pipeline companies Norpipe A/S and Norpipe Ltd. UK, has partially financed its operation through loans from the European market. Further borrowing must be coordinated with other Norwegian loan transactions abroad. It could be expendient to undertake this borrowing on a broad basis. According to the information now available, the cheapest solution could be to let the state undertake the necessary borrowing on behalf of the company. In the long term view, however, the operation could be mainly financed from Norwegian sources.

CHAPTER 13

Further Research and Study

Prepared in cooperation with tre Ministry of Education and Ecclesiastical Affairs and the Ministry of Industry.

13.1 INTRODUCTION

1. The incomes anticipated in the years ahead will make Norway a materially richer society. This will provide increased opportunities for solving large and important social problems, and for improving conditions for those parts of the population which have lagged behind in the development of prosperity. The petroleum operation could be undertaken in coastal districts which have laced economic activity, and it will confront industry with new and challenging tasks. The petroleum operation and the increased incomes, therefore, will confront Norwegian society and the political authorities with a greater opportunity for choice of the future, than there has been previously.

In order to exploit this opportunity, an extensive research and development will be required. Because the problem discoveries will strongly influence all parts of social life, such a program must not be especially directed towards this factor, but must embrace the entire social development.

In this chapter research and development are discussed in connection with the individual tasks in the other chapters.

2. The Government places great emphasis on exploiting the opportunities the petroleum operation and petroleum incomes offer for developing a qualitatively better society. In order to accomplish this, it is very important that there is the capability for exploiting the knowledge, insight and techical know-how available through research, teaching, industry and the public administration and planning apparatus. Emphasis must especially be placed on research and study activity which clarify the requirements for a greater equality in living conditions for different districts and groups, the prevention of social and health problems, and the development of production favourable to the environment and resources.

The petroleum activities and the use of the increased incomes will lead to increased readjustments and migration. This challenge must be met by exploiting the knowledge which we already have on such conditions, so that the social problems and the inbalance in the distribution of benefits and burdens are minimized. The working environment and local societies must be developed, so that there are fewer problems for the weaker groups. New social research will not be of help in the immediate future. But if it is entered into in a larger sense, parallel with the ordinary planning and administration, in the long run it can influence social planning and industry.

The research areas involved here, are those which would be given high priority in any case, but which are of especially great importance in meeting the opportunities and challenges which are inherent in the petroleum operation and the use of the increased income.

3. The petroleum activities represent a new challenge for Norwegian industry. Engagement in exploration, production and distribution can be on a large scale. Extensive technological knowledge is required to exploit these opportunities, and to establish a basis for the elected bodies to control and direct the new operation.

It will be possible to build on the basic knowledge already available in our educational and research institutions. The knowledge constantly acquired through industry, can largely be adapted for use in the new operation. We already have several examples of such a rearrangement. New institutions must be established with caution. It is probably most advantageous, if the existing institutions for industry and research reorganize their activity, and orient themselves to the new tasks.

4. When a choice must be made between two alternatives, the conception of the advantages and disadvantages will depend on who assesses, their positions, time perspectives, interests and values. Interest and value conflicts could occur between Norway and other coutries, between social groups, between sectors of industry and between generations. The individual groups will attempt to further their goals by influencing the formulation and definition of the study and research tasks. Care must therefore be taken that the direction is not dominated by established special interests. Also, groups which do not have the possiblity of

formulating their own research needs, must have their interests taken care of.

5. Research is usually a long term measure. It often takes several years from the time the initiative for a research program is taken, until the results are available in such a form that they can be used in production, administration or social planning. Even if there is considerable uncertainty connected with the Norwegian petroleum operation, it can be anticipated that the operation will be an element of long duration in Norwegian economy and society. It is first and foremost in the long term perspective that research can play an important role, through the development of new knowledge and understanding. But at the same time it is in periods with great changes and readjustments that research can especially contribute new insight.

Still, in some fields the research inputs will be a necessary link in current activity, and should precede the economic activity. Certain research explorations of the continental shelf and parts of the technical research are of this nature.

6. Even with the moderate tempo in the petroleum operation which the Government plans, it is clear that the consequences in individual areas will be strongly noticeable in only a few years time. Where readjustments occur, there must be alternatives for directing the development, so that the advantages are exploited and the disadvantages limited as much as possible.

Norwegian society is already well equipped in several of the areas discussed here. However, the ability to exploit available knowledge should be improved. In a number of areas the petroleum operation raises the neeed for new thinking. Many of these consequences, though, will not differ fundamentally from other consequences and readjustments on which there is already considerable knowledge. Research and studies must not be an excuse for putting of activity.

7. Much could be gained through greater contact between all levels of the research and consumer milieus. Planning of more long term research and the building up of competence should take place in close contact with the consumers and the groups concerned.

Royal Norwegian Council for Scientific and Industrial Research (NTNF) has established a well developed mediation apparatus for industry, mining and building and construction activity. The Agricultural Research Council of Norway (NLVF) and Norwegian Fishery Research Council (NFFR) function correspondingly for agriculture and fishing. Norwegian Research Council for Science and the Humanities (NAVF) plays a central role in the more long term building up of competence. Further, the Norwegian Fund for Market and Distribution Research could be of importance for the research and study of trade and private services. However, the structure of the research councils must also change as the need indicates. The Government will present a parliamentary report on research policy where these questions will be discussed more closely.

8. Socially directed research, i. e. research which is directed towards social problems in a wide scope, and which shapes some of the basis for public policy and social planning, has a much weaker mediating and contact apparatus at present than the other research fields.

The readjustments resulting from the petroleum operation, and the increased demand for stronger social direction will increase the need for such an apparatus. Therefore a Research Council for Social Planning will be created. It will presumably have close cooperation with the other research councils. Detailed guidelines for the new research council and the date for its etablishment will be discussed in the previously mentioned research report.

13.2 IMPORTANT AREAS TO EXAMINE

1. The increased public incomes will provide the basis for increased public input in a number of areas, including research, study and development work. The purchase of foreign research results will be more possible, but Norwegian competence will be necessary to appraise and exploit such results. It goes without saying that the resources of a small country like Norway, not least in regard to personnel, will make it necessary to select the most important tasks. A strong input of money and personnel for solving individual tasks must partially depend on the cost of the input in other fields.

2. Accordingly, certain tasks must be given high priority:

— understanding of life in the ocean and factors which influence it
— knowledge of the continental shelf and the resources found on it
— technology for participating in and controlling of exploration for and extraction of petroleum
— technology for the participation of Norwegian industry in petroleum related activity and also for selected branches of industry which are faced with strong competition from the petroleum operation
— the basis for social planning, to

obtain better understanding of and control over readjustments in working life, industry and settlement
— petroleum as a link in the global resource perspectives
— relationship with other nations and economic power groups

3. The effect must take place on several levels:
— First of all it will be necessary to direct the basic knowledge. This involves knowledge of the shelf itself, ways of using petroleum, the effects on the natural environment and what is taking place in our own society.
— There will also be a need for mapping and registering the actual conditions and development tendencies, and a systemization of such knowledge. It is important to follow and utilize experiences of countries, as well as their research and study work, and to participate in international research programs.
— Thirdly, there is a need for extensive consequence analyses on the basis of the knowledge available at each point in time, with the object of analysing and making prognoses of development. These analyses must include the direct consequences for the natural resources and environment, as well as for economic life and settlement.
— Forthly, there must be an attempt to exploit both new and previously established knowledge, so that it is utilized by the elected bodies and in administration and industry.

4. A central area of research is the consequences the petroleum operation will have for life in the ocean. The exploitation and protection of fish resources connected with the continental shelf is of vital importance in a global resource and food supply perspective. But the petroleum resources are limited, and will gradually be drained, while the fish resources can be renewed. It is therefore basically important that petroleum extraction is carried out without damaging the fish resources and the possibilities for exploiting these in the future. Norwegian oceanic research, as well at the newly organized measures under the Norwegian Fishery Research Council and the fishery's education at university level will be of valuable assistance here.

High priority must be given to a program for observing pollution conditions in the ocean environment and changes in living conditions for the organic resources. International cooperation is necessary, so that this observation can include the entire ocean area concerned with the petroleum operation on the Norwegian and adjoining continental shelves.

Ocean research is generally a demanding research area. In addition to an increase in total input, it will be necessary to transfer input to the fields within this area which are especially important for surveying the possible effects of the petroleum operation.

In stipulating concession terms, the aim should be to have the claimholder carry a considerable share of the costs of research and development on hindering and mastering possible oil spills and other forms of pollution.

5. Research of the continental shelf should be undertaken by our own research institutions to the greatest degree possible. This includes research on what the shelf consists of, the structure of the rock formations, and the contents of and possibilities for discoveries of petroleum and minerals. Norwegian compentence for evaluating the dimensions of petroleum discoveries and the security question connected with production and landing, must also be further developed. Such knowledge and the technical basis for control and direction of exploration and extraction is of the greatest importance. Administration here involves directing other petroleum activity as well as its indirect consequences.

6. There is a good technical basis for Norwegian participation in and control with the exploration and extraction on the continental shelf. Continental shelf technology is still in the starting stage, so that the traditional oil producers do not have considerably more experience than we do. This especially applies to the depth and climatic conditions which exist on the Norwegian continental shelf. Research and development work aimed at solving problems in exploration, extraction and landing from the great ocean depths, will be given high priority.

In order to meet such challenges, and to exploit the opportunities, individual parts of industry oriented research and development must be stressed. Exploration for, extraction and processing of petroleum, and the production and equipment for such activity require a strong increase in competence in a number of areas which are all very resource intensive. The basis for allocating priority to research input in this field must be the industry policy and general social aims.

After a discovery is made and put into production, there will also be a need for control and direction. Research and development must put Norway on a level with foreign

extraction interests and capable of appraising their operational presentations as much as possible.

7. Norwegian industry is already engaged in the petroleum operation on broad fronts. Through energetic development work a good basis has been established for the Norwegian production of drilling rigs and production platforms. In addition experience is being amassed in all phases of exploration activity. The operation of refineries and the petrochemical industry could have secondary effects through knowledge, which could contribute to developing other branches of industry further. Industries with small profit margins which produce for export, or which are faced with strong competition from imported goods on the home market, will be tapped of workers in the pressure situation which is anticipated. To reduce the effects of these readjustments it would be practical to strengthen the technological level in the individual fields within these branches.

In addition, considerable emphasis will be placed on not tying research and development input one-sidedly to exploration and extraction, but also gradually to a greater degree to activities aimed at exploiting and processing petroleum raw materials. On an international scale our inputs in these areas will always be modest. Our building up of industry must therefore be based on cooperation with foreign research institutes and companies.

8. The basis for social planning in a wide relationship must be strengthened. The goal must be to assure the elected bodies control and direction of social development generally. There is a special need for directing the reform processes resulting from the petroleum incomes.

Through the creation of the Research Council for Social Planning the socially directed research and the competence already available can be better exploited. In addition, it is expected that this will contribute to stimulating the research milieus to work with more practical social problems.

With further development emphasis must be placed on realizing a geograpical distribution of production, including the service trades. The possibility of splitting the operation up into smaller units than has so far been natural according to traditional technological and economic assessments, will be analysed.

As a result of petroleum extraction and the growth in the protected industries, opportunities will open up for many persons to obtain better paying and more satisfactory work. Among other things this will require more advanced schooling. Research on adult education and changing of place of work will therefore be even more important than it is today. Through research on the labour market means must also be sought for increasing the occupational participation of young people, the elderly, persons with limited occupational choice and persons who wish a shorter than normal working time, while at the same time there should be an attempt to satisfactorily solve problems in the homes. There must also be an attempt to learn more about living conditions for different groups in the population, and to correct undesirable development as much as possible.

9. In order for Norway to contribute to the formation of an international resource policy, it is necessary to direct basic information. The petroleum resources not only represent a possible source of energy. They also provide the basic raw materials for a very wide spectrum of other products. Input in this field must be assured, independent of Norwegian competence and information. This applies not only to the dimensions and use of the resources, but also to ownership conditions and possibilities for management.

10. We must expand our knowledge on the effects which the petroleum activities will have on Norway's relationship with other nations and with multi-national companies. The petroleum income offers new perspectives for Norwegian development assistance and Norwegian trade policy towards developing countries. There are several research miliens with knowdledge in this area which can be better exploited. We will thereby be better able to offer help which the inhabitants of these countries need.

Other strategically important goods in addition to petroleum, such as different ores and metals and certain foodstuffs, are supplied by a fews nations which are also developing countries. It is expected that these countries will attempt to direct their economies towards a merger according to the pattern now evident among oil exporters. The consequences of such a development should be analysed eventually. To prevent an exhaustion of these resources, it should also be a goal to limit the consumption of these raw materials.