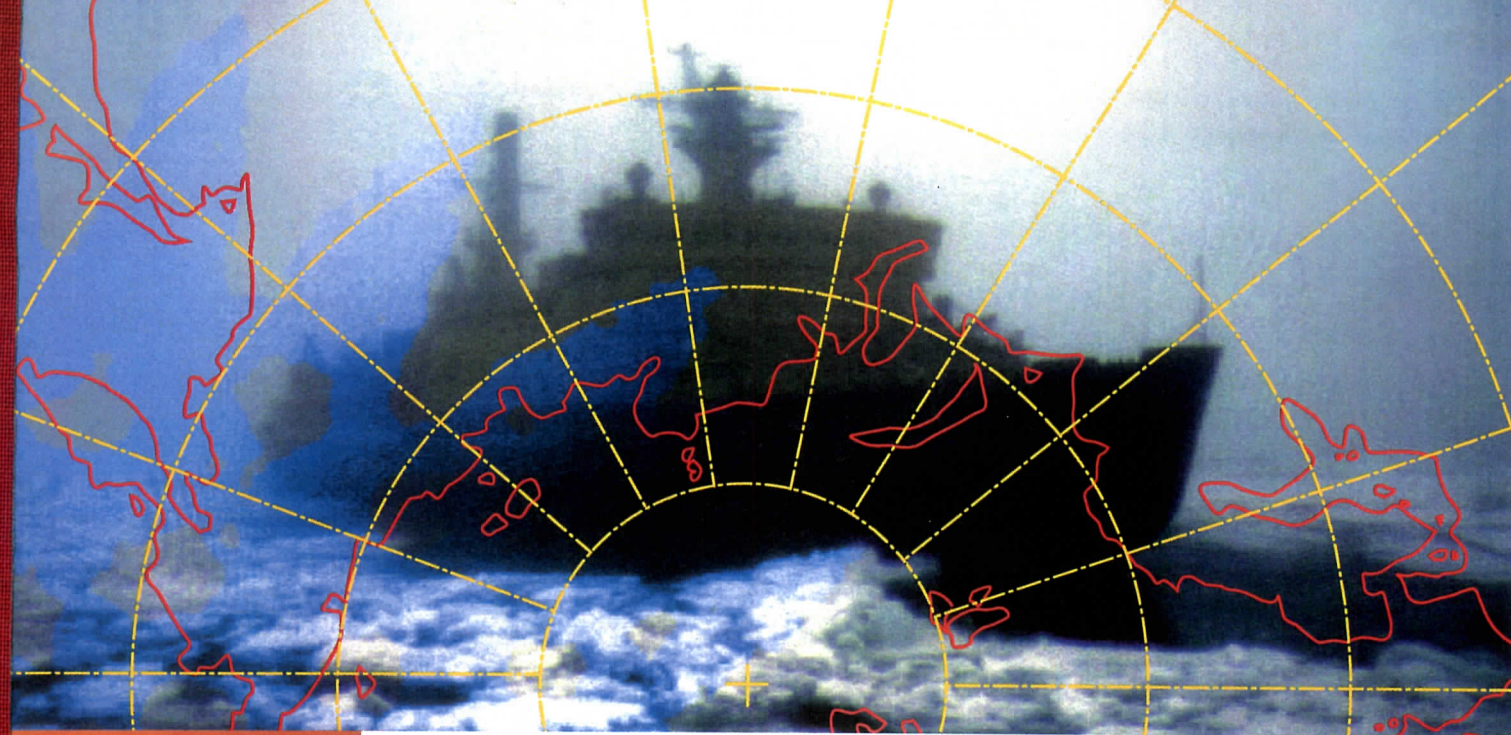
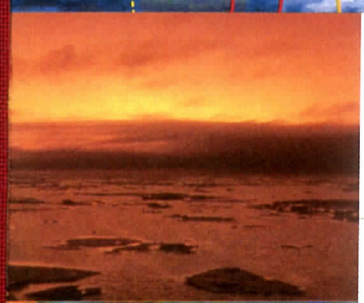


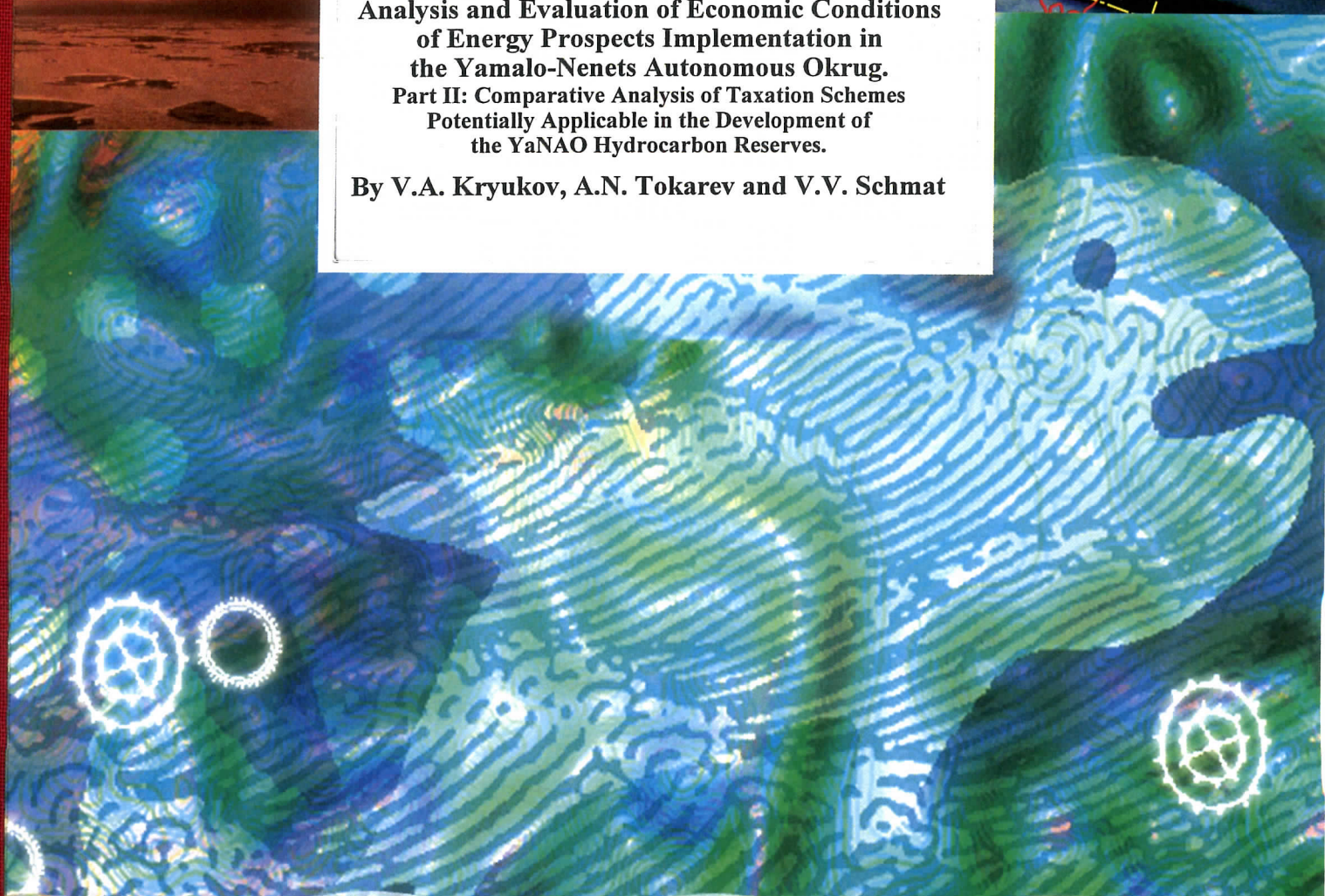


INSROP WORKING PAPER NO. 130 - 1999, III.07.7

Analysis and Evaluation of Economic Conditions of Energy Prospects Implementation in the Yamalo-Nenets Autonomous Okrug.

Part II: Comparative Analysis of Taxation Schemes Potentially Applicable in the Development of the YaNAO Hydrocarbon Reserves.

By V.A. Kryukov, A.N. Tokarev and V.V. Schmat



INSROP International Northern Sea Route Programme

Central Marine Research & Design Institute, Russia

The Fridtjof Nansen Institute, Norway

Ship and Ocean Foundation, Japan

International Northern Sea Route Programme (INSROP)

Central Marine Research & Design Institute, Russia

The Fridtjof Nansen Institute, Norway

Ship & Ocean Foundation, Japan

INSROP WORKING PAPER NO. 130-1999

Box C LS
Sub-Programme III: Trade and Commercial Shipping Aspects

Project III.07.7: Energy Prospects in Yamalo-Nenets Autonomous Okrug. Hydrocarbon Potential for the NSR.

Supervisor: Valery A. Kryukov, IEIE

Title: **Analysis and Evaluation of Economic Conditions of Energy Prospects Implementation in the Yamalo-Nenets Autonomous Okrug.**
Part II: Comparative Analysis of Taxation Schemes Potentially Applicable in the Development of the YaNAO Hydrocarbon Reserves.

Authors: **V.A. Kryukov, A.N. Tokarev and V.V. Schmat**

Address: Institute of Economics and Industrial Engineering,
Siberian Division of the Russian Academy of Sciences,
17 Ac. Lavrentiev Av., Novosibirsk 630090, RUSSIA

Date: 22 January 1999

Reviewed by: Director Michael N. Tamvakis, Department of Shipping, Trade and Finance, City University Business School, London, UK.

What is an INSROP Working Paper and how to handle it:

FOREWORD - INSROP WORKING PAPER

INSROP is a five-year multidisciplinary and multilateral research programme, the main phase of which commenced in June 1993. The three principal cooperating partners are **Central Marine Research & Design Institute (CNIIMF)**, St. Petersburg, Russia; **Ship and Ocean Foundation (SOF)**, Tokyo, Japan; and **Fridtjof Nansen Institute (FNI)**, Lysaker, Norway. The INSROP Secretariat is shared between CNIIMF and FNI and is located at FNI.

INSROP is split into four main projects: 1) Natural Conditions and Ice Navigation; 2) Environmental Factors; 3) Trade and Commercial Shipping Aspects of the NSR; and 4) Political, Legal and Strategic Factors. The aim of INSROP is to build up a knowledge base adequate to provide a foundation for long-term planning and decision-making by state agencies as well as private companies etc., for purposes of promoting rational decisionmaking concerning the use of the Northern Sea Route for transit and regional development.

INSROP is a direct result of the normalization of the international situation and the Murmansk initiatives of the former Soviet Union in 1987, when the readiness of the USSR to open the NSR for international shipping was officially declared. The Murmansk Initiatives enabled the continuation, expansion and intensification of traditional collaboration between the states in the Arctic, including safety and efficiency of shipping. Russia, being the successor state to the USSR, supports the Murmansk Initiatives. The initiatives stimulated contact and cooperation between CNIIMF and FNI in 1988 and resulted in a pilot study of the NSR in 1991. In 1992 SOF entered INSROP as a third partner on an equal basis with CNIIMF and FNI.

The complete series of publications may be obtained from the Fridtjof Nansen Institute.

SPONSORS OF INSROP

- Nippon Foundation/Ship & Ocean Foundation, Japan
- The government of the Russian Federation
- The Norwegian Research Council
- The Norwegian Ministry of Foreign Affairs
- The Norwegian Ministry of Industry and Energy
- The Norwegian Ministry of the Environment
- The Central and Eastern Europe programme
- State Industry and Regional Development Fund, Norway
- Phillips Petroleum Company, Norway
- Kværner a.s.
- Norwegian Federation of Shipowners
- Norsk Hydro
- Fridtjof Nansen Institute

PROFESSIONAL ORGANISATIONS PERMANENTLY ATTACHED TO INSROP

- Ship & Ocean Foundation, Japan
- Central Marine Research & Design Institute, Russia
- Fridtjof Nansen Institute, Norway
- National Institute of Polar Research, Japan
- Ship Research Institute, Japan
- Murmansk Shipping Company, Russia
- Northern Sea Route Administration, Russia
- Arctic & Antarctic Research Institute, Russia
- Norwegian Polar Research Institute
- SINTEF (Foundation for Scientific and Industrial Research - Civil and Environmental Engineering), Norway.

PROGRAMME COORDINATORS

- **Yuri Ivanov, CNIIMF**
Kavalergardskaya Str.6
St. Petersburg 193015, Russia
Tel: 7 812 271-5633
Fax: 7 812 274 3864
E-mail: cniimf@neva.spb.ru

- **Willy Østreng, FNI**
P.O. Box 326
N-1324 Lysaker, Norway
Tel: 47 67 11 19 00
Fax: 47 67 11 19 10
E-mail: sentralbord@fni.no

- **Hiroyasu Kawai, SOF**
Senpaku Shinko Building
15-16 Toranomon 1-chome
Minato-ku, Tokyo 105-0001, Japan
Tel: 81 3 3502 2371
Fax: 81 3 3502 2033
E-mail: sofkawa@blue.ocn.ne.jp

Contents

INTRODUCTION

The present study is a logical continuation of an earlier study within the "International Northern Sea Route Programme - INSROP" project - concerning the implementation of energy potential in North-West Siberia.

In the first phase (1995-1996), potential energy resources of North- West Siberia were evaluated in terms of their closeness to the Northern Sea Route (NSR) and of possible routes for hydrocarbon transportation.

In the second phase (stage1: 1997-1998) of the work on Topic III.07.7 "Energy Prospects in Yamalo-Nenets Autonomous Okrug. Hydrocarbon cargo Potential for the Northern Sea Route (Working Paper "Analysis and Evaluation of Economic Conditions of Energy Prospects Implementation of the Yamalo-Nenets Autonomous Okrug" by V.Kryukov, A.Tokarev and V.Schmat, INSROP Working Paper # 102 - 1998, III.07.7), methods were developed for the evaluation of marginal costs of hydrocarbon production depending on the assumed transport directions (implying loss-free sales of extracted hydrocarbons on various markets).

In the second stage (1998-1999), i.e. in the present work, approaches to identification of conditions under which the implementation of the energy potential of North-West Siberia can be efficient are considered in the case of exemplary individual projects (hydrocarbon fields). As input parameters ensuring economic development of deposits, DAF prices determined in the first stage of the studies are chosen. In the present stage, the taxation schemes and marginal values of their parameters (possible variations) are defined under which development of hydrocarbon fields can be efficient. Such evaluations are performed with respect to exemplary hydrocarbon fields chosen according to the results of comparative analyses of parameters of different fields. These exemplary fields are characterized by different levels of capital and operating costs, by volumes of recoverable reserves. The future prices were estimated on the basis of the calculated DAF prices in a pessimistic, most probable and optimistic scenario.

The **objective** of the present subproject is to identify possible taxation schemes under which oil and gas projects will be implemented, and define bounds within which their parameters may vary without loss of profitability in the development of

hydrocarbons on the YaNAO fields close to the NSR catchment area.

In order to achieve this goal, the following tasks must be solved:

- Analysis of potential taxation schemes which can be employed in the development of the YaNAO hydrocarbon resources.
- Development of a methodical approach to the evaluation of taxation scheme parameters.
- Estimation of permissible variations of taxation schemes parameters under which development of the YaNAO energy potential (the case of oil fields) remains efficient.

The most difficult circumstance to be taken into consideration here is that in Russia as a federal state (according to the 1993 RF Constitution and "Basic Regulations of Federal-Regional Budgetary Relations" (1998)), the units of the Federation (including YaNAO, Nenets AO, Khanty-Mansi AO, Taimyr AO etc.) have certain powers in the sphere of tax regulation. This involves both the power at the regional level to impose certain taxes and the presence of a "regional" corridor in the federal regulation of taxes and payments.

As the process of designing a flexible taxation system is only half-completed in Russia and the federal arrangement is rather specific, all this makes it necessary to thoroughly analyze and evaluate ways to form such a system of taxation which might, to the highest possible degree, promote realization of the energy potential of the oil and gas territories.

1. Analysis of taxation schemes potentially applicable in the development of the YaNAO hydrocarbon resources

By taxation schemes which are already being used or supposed to be used in Russia are meant:

- The present taxation system (PTS) with differentiated excise tax (principal parameters include the level of average weighted rate of Excise Tax; Royalty, Profits Tax);
- Production sharing agreements - PSA (principal parameters are Royalty, Profit Tax; formula of sharing profit production; "cost" oil);
- Tax Code draft (principal parameters are Royalty, Profit Tax; the formula for calculation of the tax on additional income from hydrocarbon production - Hydrocarbons Tax - HT).

1.1. General analysis of the present taxation system

General principles of the taxation system in Russia (taxes, levies, duties and other payments as well as rights, obligations and responsibilities of tax payers and tax offices) are defined in the RF Law of 27 December 1991 "On Principles of the Taxation System in the Russian Federation".

In Russia federal, regional and local taxes are imposed. We will mention those taxes that are closely related to the **oil and gas sector** (therefore, the list below is not exhaustive).

Federal taxes include tax on added value (VAT); customs duties; Mineral Rehabilitation (Mineral and Raw Material Restoration) Tax (MRT); Royalty (Subsoil Use Tax); payments for the rights to find, evaluate and explore the resources; Profit Tax; taxes that constitute the funding source for roads.

Federal taxes (their rates, objects of taxation, and tax payers) and their assignment to budgetary or off-budgetary funds are established by the RF legislative acts and collected on the whole of its territory.

Taxes collected in favor of **subjects of the Federation** include Property Tax; Water Tax; tolls from legal persons assigned to the needs of educational institutions.

These taxes are imposed by the RF legislative acts and are collected on the whole of its territory. The concrete rates of these taxes are determined by the laws of the subjects of the Federation (including the YANAO laws).

Local taxes include: tax on the property of physical persons; Land Tax; target levies to the maintenance of police, improvement of the territory, education requirements; Social and Accommodation Tax; levy assigned for maintenance of the territory in local places.

Key taxes and compulsory payments in regard to the Russian oil industry, their rates, and distribution among budgets and objects of taxation are shown in Table 1.

The present system of taxation in the Russian oil and gas sector is clearly of a fiscal nature. It undergoes frequent changes and does not help to attract internal or external investments.

According to the Fuel and Energy Ministry's data, the share of taxes in the price of Russian oil industry is more than 53%, in the gas industry 62%, in the oil-refining industry 50%. Too high taxes are catalysts of outstanding debts.

Notably **changeable** are special taxes imposed on the oil and gas sector. Such is, for example, the case of the Excise Tax on oil. And the most annoying thing is that the very approaches to calculations of excise payments are constantly being changed. At first they were related to the volume of sold products, then they began to be taken on the basis of a fixed rate per ton of oil indexated according to the dollar exchange rate. At present new methods for the calculation of excise payments have been developed. They are different for different fields, being linked to average weighted national rates and variations in mining-geological conditions, regional levels of wages and transportation tariffs (Fig. 1).

Table 1.

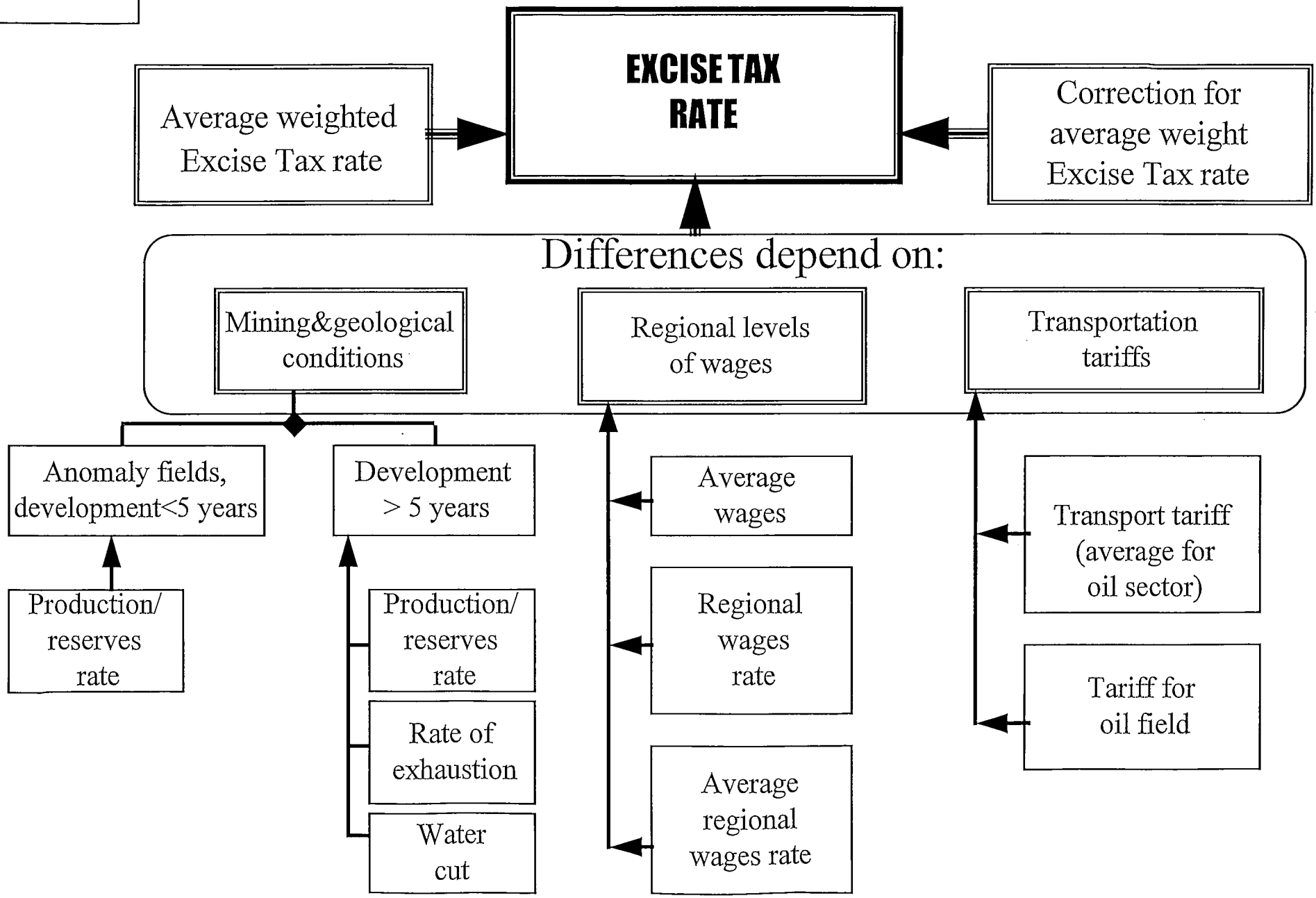
Taxation of the Russian oil sector

Tax type	Tax recipient	Tax rate	Object of taxation
Turnover taxes			
VAT	FB (75%), RB (25%)	20%	Value of goods and services purchased in Russia
Gas Excise Tax	FB (100%)	30%	Proceeds from sales estimated on the basis of state-regulated wholesale prices in the industry
Oil Excise Tax	FB (100%)	55 ruble/ton (average per ton)	Quantity of sold oil
Taxes and payments included in self-cost			
Land Tax	LB (100%)	Area (ha)	Per ha rates approved by local authorities
Mineral Rehabili-tation Tax	FB, RB	10%	Net price of oil sales
Royalty	FB (40%), RB (30%), LB (30%)	6-16%	Net selling price of produced oil and gas
Payments for finding and evaluation	LB	1-2%	Budgeted cost of finding and evaluation
Payments for exploration	LB	3-5%	Budgeted cost of exploration
Road Tax	RB/FB	2.5%	Net selling price of produced oil and gas
Taxes related to financial results			
Property tax	RB	2%	net assets
Social and Accommo-dation Tax	LB	1.5%	net selling price of produced oil and gas
Profits taxes			
Initial payments for the right of production	FB(40%), RB (30%), LB (30%)	No less than 10%	Size of regular payment per average annual designed capacity of extracting enterprise
Profit Tax	FB (13%) RB (22%)	35%	profits

Notes: FB - federal budget; RB - regional budget (budget of the subject of the Federation); LB - local budget; RF - road fund.

Fig.1

Methodology of differentiation of oil Excise Tax rates



The taxation mode in the Russian oil industry is based mainly on **revenue taxes instead of profit taxes**. A large share of payments have a fixed absolute value per physical unit of output, for example, Excise Tax rates fixed per ton of oil.

The present taxation system differs somewhat from approaches widely applied in the international oil business, where tax rates often depend on one or a few parameters, for example, on profitability or oil production.

The excessive taxation pressure is one of the major reasons for the drop in industry output which is detrimental both to producers and to the state as it results in reduced allocations to the budgets at different levels. The improvement of the taxation system, on the other hand, would lead to increased hydrocarbon output, including increased production in the areas of new development along the NSR.

The improvement of the investment climate in the RF depends on the creation of a legislative infrastructure of production sharing agreements with an emphasis on practical implementation of such agreements (Section 1.2) and on adoption of special parts of the Tax Code draft (Section 1.3).

1.2 Special features pertaining to the application of production sharing agreements

Since the beginning of 1996 the Federal Law of December 30, 1995 225-FZ "On Products Sharing Agreements" has been in effect.

Practical implementation of the projects based on PSA involves the formation of a complicated **legislative infrastructure**. Its obligatory elements defined by the RF Law "On the PSA" are:

- As a precondition for agreement, the presence of **a list** approved by the federal law on **sections of fields** which can be allocated on PSA conditions;
- **A production sharing agreement** between the state and the investor;
- The subsequent **approval** of the PSA **by the federal law** in case it is connected with the use of offshore areas, is in an exclusive economic zone or in places included in special strategic national interests as well as agreements made without tender or auction;

- An agreement between the RF Government and the executive body of power of the subject of the Federation about **sharing** between them **the state's share of production;**
- The existence of a license on which the area of the field indicated in the agreement is developed.

In addition, the practical use of the RF Law "On the PSA" assumes the existence of a whole package of normative specifying documents, including:

- A regulation on PSA conclusion and enforcement in the use of mineral resources;
- A regulation on the taxation mode in PSA operation, including: obligatory requirements to operators of the agreements and a manual on accounting.
- An exemplary PSA in using mineral resources, i.e. finding, exploration, and production of oil and gas;
- Instructions on compensation and calculation of capital and operation costs for PSA implementation when using mineral resources in the RF.
- Principles of sharing the receipts between federal, regional and local budgets.

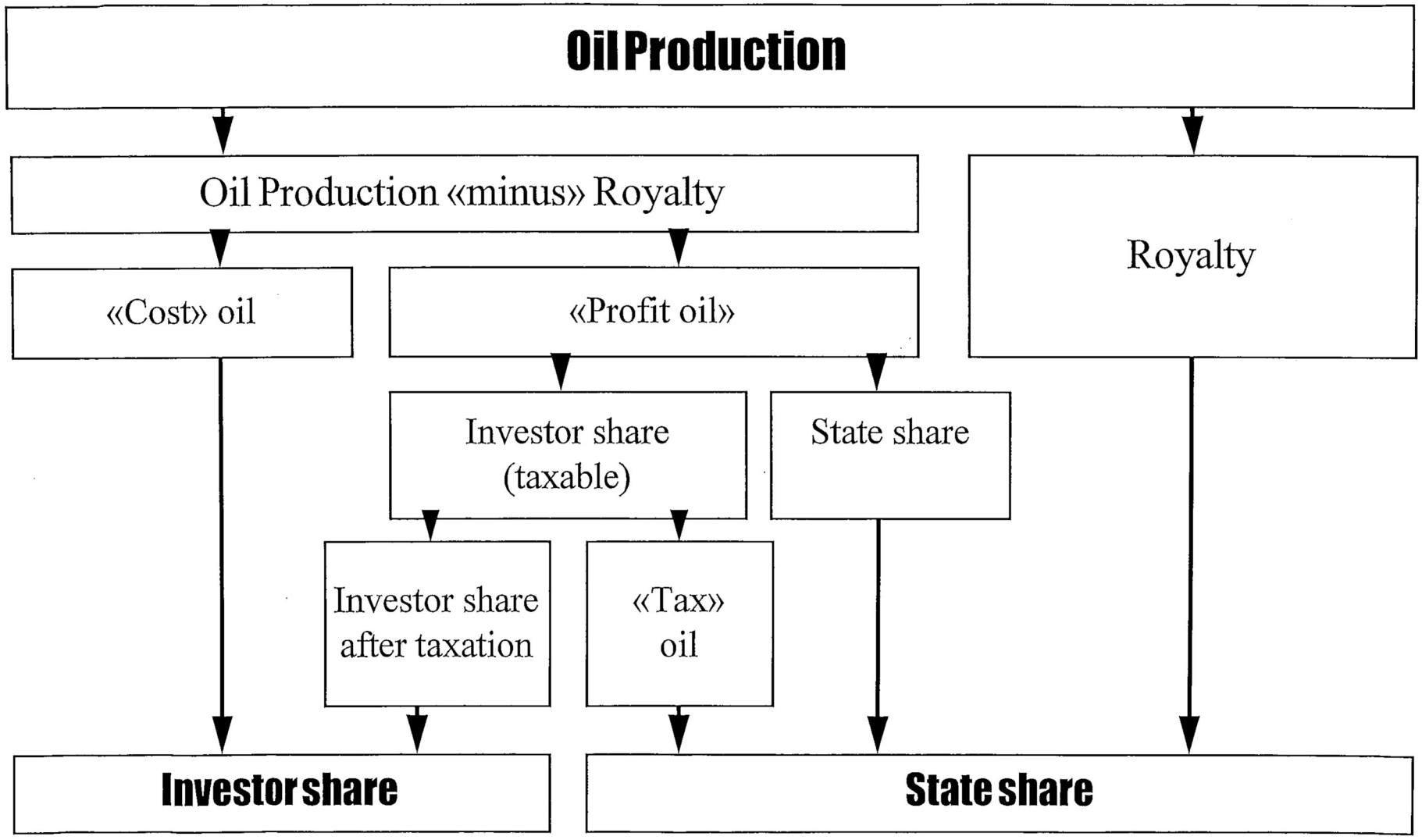
Up to now, the State Duma has failed to adopt changes and additions to the RF legislative acts that are required by the law of "On the Production Sharing Agreements" thus containing practical implementation of the projects on the PSA conditions.

The amendments concerning the use of mineral resources are directed to circumscribe the sphere of laws of administrative regulation of use of mineral resources from that of "On PSA" Law operation. With adoption of these amendments the administrative and civil legislative systems of the use of mineral resources will be clearly delineated from each other.

The significance of the amendments to the taxation legislation is that they will bring legalization to the Russian model of PSA (Fig.2).

Fig.2

Oil Production Sharing under Russian model of PSA



Non-adoption of changes and amendments associated with the RF Law "On PSA" impedes the Government to complete its work on preparation of a package of normative documents specifying a number of legislative regulations and, in fact, impedes the implementation of oil projects on the PSA conditions.

At present, a number of projects (for example, development of the Sakhalin offshore hydrocarbons) are already being implemented on the PSA conditions (they were authorized before the adoption of the federal law). The first list of fields which could be developed on the PSA conditions was approved by Federal Law N112 of July 21, 1997 "On Sections of Fields of Mineral Resources Allowed To Be Developed on Production Sharing Conditions" ("Russian Gazette" of July 25, 1997). In all, seven fields of mineral resources were included in the list, five of them pertained to oil and gas. The list includes also Prirazlomnoye oil field located on the Barents Sea offshore area. Its user is a joint stock company "Russian Company on Offshore Development" ("Rosshelf"). In the development of this field the NSR opportunities will be used.

The PSAs, therefore, may have a great impact on the development of hydrocarbons on the North of West Siberia with the use of the NSR advantages. The attractiveness of PSAs to investors is that they grant stability and flexibility of production sharing conditions.

1.3 Opportunities for project implementation under Tax Code conditions

At present major changes expected from the Russian tax legislation are associated mostly with the draft of the Tax Code geared to systematize and introduce order in the whole legislative basis of taxation.

In 1998 Part 1 of the Tax Code (RF Law N 146 of 31 July 1998) was passed, which considerably increased the "chances" for its special parts also to be adopted. Their adoption (mostly due to the introduction of the HT) ought to push on the development of new hydrocarbon fields in North-West Siberia.

By introducing substantial alterations in the Russian taxation system, the Tax Code will make it possible for companies to foresee future changes in taxation policy for long-term planning of their activities.

The Code developers had the following major goals:

- Stability, clarity and predictability of tax legislation;
- Reduction of the number of taxes;
- Alleviation of the tax burden and a more uniform and fair distribution.

Major **changes** planned in the present taxation system that directly relate to the oil and gas sector are as follows: **(Table 2).**

- To gradually **abolish all taxes on proceeds from sold products** as well as numerous "petty" taxes and levies that yield no more than minor revenues to the budgets. It is planned, in particular, to abolish taxes on the sale of fuel and lubricants, on purchases of motor vehicles, securities transactions, Road Tax, Social and Accommodation Tax, to supply the needs of educational institutions, target taxes to pay for the maintenance of police and improvement of territories.
- **To stop using the concept of "self-cost"**. Taxable profits will be defined as the difference between incomes received by the taxpayer in a tax period and his expenses associated with production and sale of goods over the same period. Also introduced is the internationally accepted definition of a taxation base as the profit actually received over the tax period. It is supposed to abolish many constraints to defining as expenses certain items associated with making profits (costs of advertising, property insurance, payments of loan interest).
- **The depreciation order** will be changed: instead of object-wise depreciation of each capital asset, plans are to form 7 groups of fixed assets subject to depreciation. For each group, summary balance sheets will be made and it is these groups that will be depreciated. The periods of depreciation will be shortened, and the depreciation itself non-linear.
- A tax on **capital gains** (dividends, interest, income from securities) is to be imposed.
- It is planned to abolish gradually (over 5 years) **allocations to MRT** as well as the Road Tax imposed for two years to compensate losses of regional road funds as the result of the abolishment of present allocations to the use of highways.

- In order to create a favorable and stable investment climate **for new fields,** the Excise Taxes on oil and gas are planned to be replaced by HT (additional income tax on hydrocarbon extraction). Its rate (from 0% to 60%) will depend on the level of the R-factor, i.e. on the relationship between accumulated incomes and accumulated expenses. It is planned, therefore, to introduce a net income tax instead of a turnover (excise) tax; to switch to a calculated, predictable indicator instead of the administratively appointed size of payment and thus to improve the stability of economic conditions for development of deposits. In the initial stages of deposit development, before the capital costs are compensated, companies will be exempted from HT which corresponds to the scale of the rate of this tax.

At present, therefore, the likelihood of special parts of the Tax Code being adopted seems fairly high, and this will substantially increase the attractiveness of hydrocarbon development in North-West Siberia.

Table 2.

Taxation of Russia's oil and gas sector (according to the Tax Code draft)

Tax	Tax status	Tax rate	Tax base
Taxes and deductions included in expenditures			
VAT	FT	20%	value of goods and services purchased in Russia
Excise Tax on gas	FT	30%	net price of oil sales (with account of price indexation and equivalent to actual heat of combustion)
Excise Tax on oil	FT	Average rate 60 rubles/t	Physical quantity of sold oil
Land Tax	LT	0.1-2%	Cadastre value of the land or its nominal price
Mineral Rehabilita-tion Tax	FT	10% -> 0%	net price of oil sales (over 5 years tax to be reduced from 10% to 0%)
Royalty	LT	6-16%	net selling price of produced oil and gas
Payments for finding, evaluation & exploration	FT	500-3000 rubles/sq.km	Area of the licensed section
Initial_payments for the right of production	FT	not less than 10%	Royalty rate per average annual designed capacity of the extracting enterprise
Hydrocarbon Tax	FT	0-60% depending on R-factor	Incremental Revenue of produced hydrocarbons
Property Tax	RT	2.5%	net assets
Taxes on profit			
Profit Tax	FT	30%	Profit

2. Approach to the evaluation of taxation schemes parameters

2.1. Methods for evaluation of taxation schemes parameters

Methods for evaluation of the parameters of taxation schemes securing profitable development of hydrocarbon resources include the following stages.

M1. Model building

In the first stage, models are being designed to evaluate projects for development of hydrocarbon fields under different taxation schemes (PTS, Tax Code draft and PSA). The hypotheses used in these models are presented in paragraph 2.2.

To solve the assigned tasks, the internal rate of return (IRR) is used as a method for calculation. This is because use of the net present value (NPV) method, for example, would require determining the discount coefficient (cost of capital) but this is a very complicated task, and for a transition economy particular study is required

M2. Formation of scenarios for key parameters

As key parameters making the greatest impact on the efficiency of the development of oil and gas resources (based on sensitivity analysis) the recoverable reserves and oil price were chosen.

The fields were grouped by **level of reserves** in accordance with regulations governing the development of hydrocarbon resources (KhMAO Law "On the Development of Hydrocarbon Fields on the Territory of the Autonomous Okrug", The principles of methods for geological oil and gas exploration work (Russian) M.: Nedra, 1991). Small fields contain extractable oil resources up to 10 m tons, average fields from 10 to 30 m tons, large from 30 to 300 m tons, the exceptional ones are fields with resources of 300 m tons upwards (Table 3).

Scenarios of **price forecasting** are based on the estimations conducted in the previous stage of the project (V.Kryukov, A.Tokarev, V.Schmat, INSROP Working Paper No.102 - 1998). The average DAF estimated price was chosen as the average

value in the most probable (moderate) scenario. The minimum estimated DAF price was chosen as the minimum value in the pessimistic scenario (low prices scenario). The maximum DAF price was accepted as the maximum value in the optimistic scenario (under high prices).

Table 3

Ranges of variations of basic parameters

Values	Recoverable reserves, m tonnes	Oil price, $/t
Optimistic scenario		
Minimum value	30	138,4
Average value	150	149,8
Maximum value	300	**161,1**
Most probable scenario		
Minimum value	10	115,8
Average value	20	**127,1**
Maximum value	30	138,4
Pessimistic scenario		
Minimum value	0	**93,1**
Average value	5	104,4
Maximum value	10	115,8

M3. Implementation of series of calculations

Two key parameters (reserves and prices) vary (within the given limits in accordance with scenarios for initial parameters) in such a way that the IRR of the field development will be at the preset (fixed) level.

Therefore, an evaluation is made of many different combinations of conditions pertinent to values of extracted resources and prices of oil allowing development of the fields with the required level of IRR. The result of these calculations is diagrams of minimum marginal level of resources dependent on the level of prices (for each taxation scheme) characterizing zones of combinations of conditions (reserves/prices) providing for profitable implementation of YaNAO hydrocarbon development.

The **basic task** of such calculations is identification of the **relationship** between "profitable" zones (i.e. combinations of reserves and prices ensuring profitable development) for different taxation schemes and ranges of reserves the levels of which are most probable within the period of consideration (YaNAO).

M4. Calculation of taxation schemes parameters ensuring profitable development

In this **stage,** an evaluation is performed of the marginal parameters of taxation schemes under which the profitability of development of the **whole group** of fields ensuring an average (most probable) level of resources.

In case the taxation system does not ensure a profitable development of "average" resources, possible privileged variants are evaluated. If the taxation scheme secures the required profitability, then it is necessary to search for changes to be introduced in the basic variant of the taxation system to provide profitability for the whole "average" (the most probable) scenario of forecast prices.

The marginal values of tax parameters being varied are presented in Table 4.

Table 4

Marginal values of tax parameters being varied

Parameters of tax schemes	Minimum values	Basic values	Maximum value
PTS			
Royalty	6	10	16
Excise Tax	10	55	55
Profit Tax	13	35	35
PSA			
Royalty	6	10	16
Profit Tax	11	30	30
"Cost" oil	40	60	60
Tax Code			
Royalty	6	10	16
Profit Tax	11	30	30

The minimum values of privileged rates of profit tax depend on the regions' opportunities. A reduction of taxes, which can be implemented only within the competence of regional authorities, is being considered. The limits of Royalty

variation are accepted in accordance with the operating legislation and draft of the Tax Code.

If marginal possible tax privileges (within the regional competence) do not allow efficient development of fields with a minimum value of "average" resources (10 million tons), several approaches are possible allowing a characterization of the marginal values of taxation schemes parameters:

- An evaluation of the minimum level of reserves or prices allowing profitable development of a field;
- An evaluation of the profitability level corresponding to these conditions;
- An evaluation of marginal privileges including powers (competence) of the federal level (for example, privileges in Excise Tax).

As basis, the third approach was chosen implying "fulfilment" of the investor's requirements for profitability level and implementation by federal and regional authorities of a coordinated policy on the development of the hydrocarbon resources.

An estimation of taxation schemes parameters by the proposed methods is given in Section 3.

2.2 Basic hypotheses used in the calculations

In the evaluation of taxation scheme parameters the following major assumptions were used.

- It is assumed that all oil production from the implemented projects will be exported by means of NSR possibilities.
- As forecast future oil prices, DAF prices according to minimum, average and maximum variants (under NSR oil transportation profitability at a level of 15%) were chosen for an evaluation of the efficiency of oil field development. These prices were calculated in the previous stage of the project (V.Kryukov, A.Tokarev, V.Shmat, INSROP Working Paper No. 102 - 1998).

- Taxation conditions within the PTS (present taxation system) framework correspond with the operative legislation (Table 1).
- Taxation conditions within the Tax Code comply with the variant of the special parts of the Code draft sent by the RF Government to the State Duma on the 31st of January 1998 (Table 2).
- Basic economic conditions of the PSA have been developed on the basis of the "On the PSA" Law and the information about projects being prepared and implemented in Russia on the PSA conditions. They are characterized by the following parameters: compensation production - up to 60%; Royalty - 10%, Profits Tax - 30%; profit production is shared between state and investors depending on the IRR.
- Total capital costs (I) for the given field are calculated with the formula

$$I = i_0 * R * (R / R_0)^a,$$

where

i_0 - specific capital costs (per 1 t of extracted reserve) for the basic level of resources;

R_0 - reserves of the basic level;

R - reserves of the field under consideration;

"a" – parameter characterizing rates of reduction of specific capital costs depending on the level of growth of the reserves (the effect of economies of scale). As basis resources are chosen corresponding to the minimum value in the category of fields with average reserves (10 million tons).

Concrete parameters for the above formula have been determined as the result of processing the available information on the producing development fields and projects of developing new oil fields in North-West Siberia.

- The general investment cycle of development is characterized by the following distinctive features: Investments in the development of fields are made during the first 8 years of project implementation; 65% of the investments will go to drilling wells, and 35% to settlement of fields.

- Dynamics of investments and of oil production are evaluated on the basis of information on the development of functioning oil fields and projects for development of new oil fields in North-West Siberia. Maximum oil production falls after 7-10 years and will remain at a level of 6% of the initial recoverable reserves.
- Specific present expenses (per 1 ton of oil) are increasing at a rate of 5% a year which is the result of lower yields (well capacity) and higher water content of the extracted product.

3. Evaluation of taxation schemes parameters ensuring profitable development of the YaNAO oil fields

3.1. Evaluation of "profitable" levels of reserves under different scenarios of future oil prices

According to the methods discussed in the previous section, calculations were made on the evaluation of minimum marginal "profitable" levels of resources under different scenarios of future oil prices.

Diagram 1 shows that the **most preferable scheme of project implementation from the investor's viewpoint is PSA, then the Tax Code draft with HT. The least preferable is project implementation under PTS.**

Diagram 2 shows the most probable scenario of future prices. It shows that under all "resources/prices" combinations located above this diagram or to its right (for PTS conditions it is "A" zone) the fields can be developed with an IRR over 20%. Therefore, this diagram is the bottom line of the range of "profitable" resources for the appropriate level of prices.

A similar situation is characterized by diagrams for the Tax Code draft (combination of "A" and "B" zones) and PSA (combination of "A", "B" and "C" zones). Therefore, the whole "profitable" domain for PTS is included in the profitable domain for Tax Code conditions. In a similar way, the whole "profitable" domain for the Code draft is included in the "profitable" domain for PSA.

Diagram 1. Relationship between "profitable" reserves and price (all scenarios of oil prices)

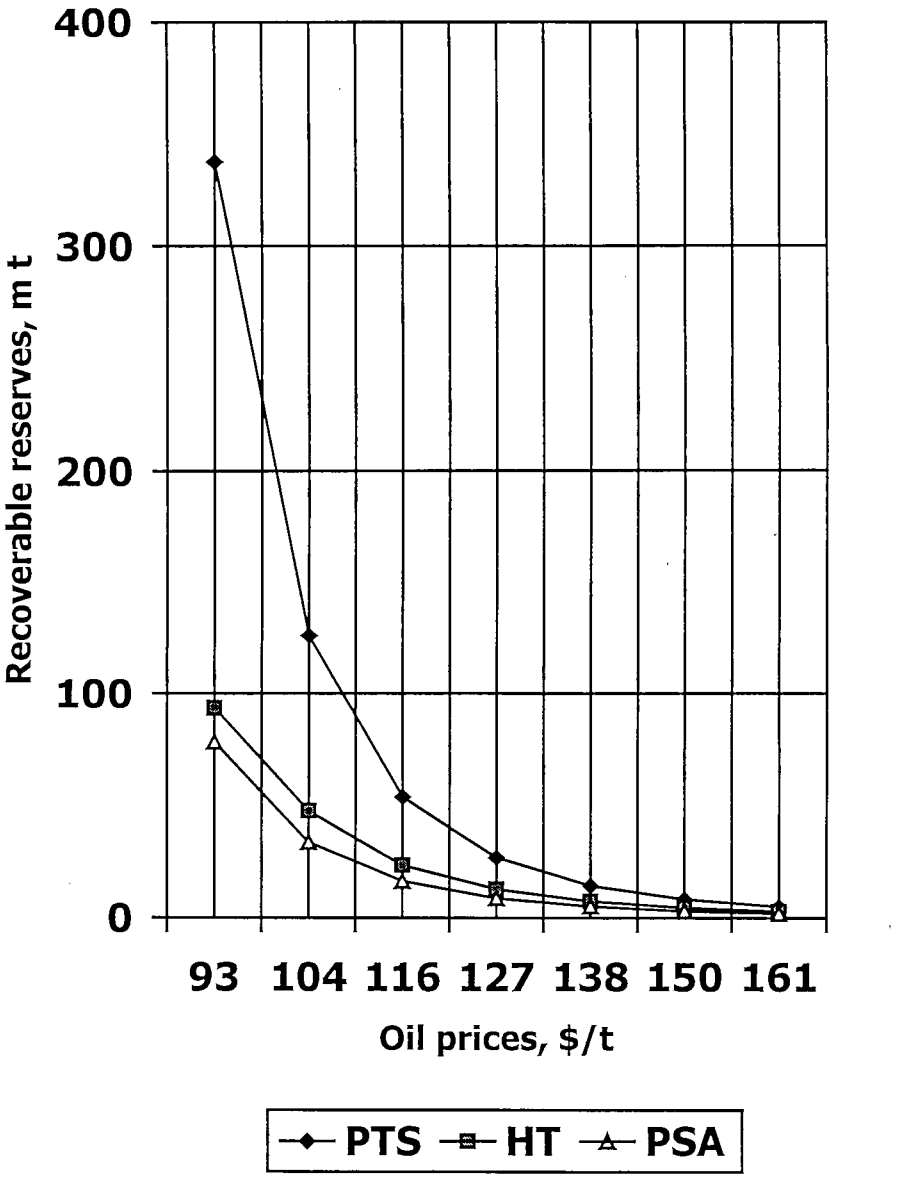


Diagram 2. Relationship between "profitable" reserves and oil prices (scenario of most probable price)

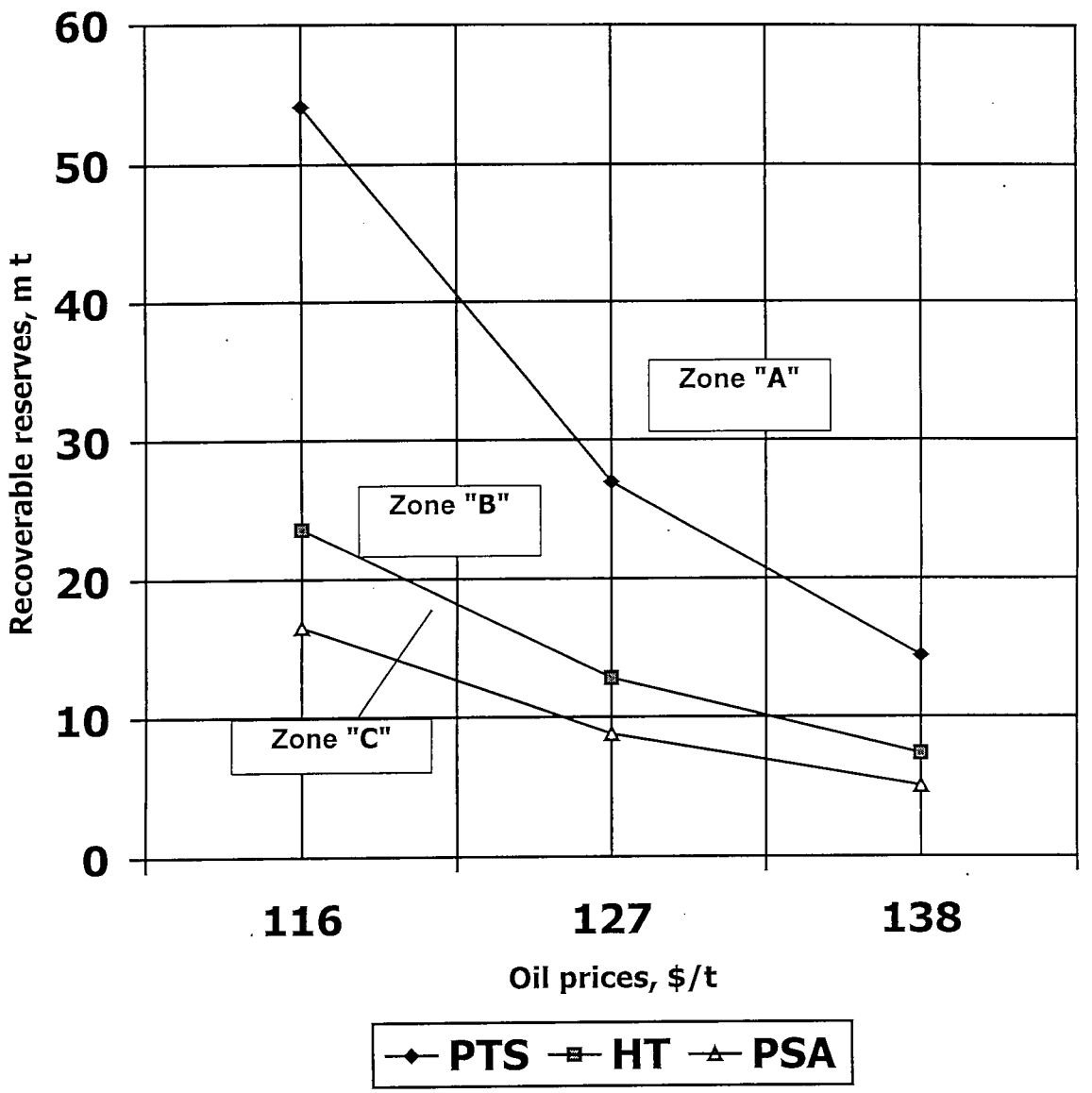


Diagram 2 shows that under PTS only a relatively small part of fields with an average level of reserves (from 10 to 30 million tons) can be developed with a preset level of profitability (20%) under the most probable value of the future price of oil ($/t 127). Under this same price (the most probable one) the major part of average-sized reserves under conditions appropriate to the Tax Code draft can be developed with the preset profitability. Under basic conditions of PSA all "average" resources can be developed efficiently under average level of prices.

Therefore, the results of the calculations permit us to formulate two groups of tasks:

- An evaluation of privileged tax rates within the framework of the present taxation system and a Tax Code draft under which the development of all average resources can be profitable;
- An evaluation of taxation parameters under Code Tax and PSA conditions, in which the development of all average resources (the most probable scenario of oil prices, that is, including the minimum value of prices of the most probable scenario) is profitable.

Evaluations appropriate to these tasks are given in Section 3.2.

Therefore, the performed calculations have shown that the most preferable from the investor's viewpoint are PSA conditions, next are conditions of the Tax Code draft. For profitable development of the whole group of fields with the most probable level of resources under the PTS conditions, a large number of taxation privileges are required.

3.2 Evaluation of taxation schemes parameters providing profitable development of oil fields with average level of reserves

An evaluation of marginal parameters of taxation schemes providing profitable development of the YaNAO oil fields was made for an average level of resources since most (prospected and evaluated) oil fields in North-West Siberia represent just this category.

The present taxation system

Table 5 shows variants of privilege schemes for the **present taxation system** allowing efficient development of all fields with an average level of resources, i.e. fields with a volume of extracted resources over 10 million tons for the most probable price scenario. Variants №1 and №2 have been calculated for the average value of a future price, while variants №3 and №4 are evaluated for the maximum value of a future price in **the most probable price scenario**.

Table 5

Marginal "profitable" parameters of the present taxation system

Indicators	Variants of parameters of the taxation system			
	№ 1	№ 2	№ 3	№ 4
Royalty, %%	6	6	10	6
Profit Tax, %%	**10**	26	21	35
Oil Excise Tax, rub/t	55	**11**	55	55
Reserves, m t	10	10	10	10
Oil price, $/t	127	127	138	138

The results of calculations for PTS have shown that the profitable development of all average-sized extracted reserves of oil is possible only with substantial taxation privileges. Under the minimum (in accordance with the RF legislation) rate of Royalty (6%), the Profit Tax rate should be reduced to 10% (variant 1). In the other case the Profit Tax rate is reduced to 26% (equally between federal and regional budgets), and the Excise Tax to 11 rubles/t (variant 2).

For the case of high prices within the framework of the most probable scenario substantially lower privileges are required - either a reduction of Royalty only down to a minimum marginal level (variant 4), or of Profit Tax only down to 21% (variant 3).

It should be noted that the development of the **whole** category of average-sized resources under the most probable (average) value of future oil price is **possible only with joint privileges granted by both regional and federal authorities.**

Tax Code

Less essential (compared to the present system) tax privileges for "average" resources are required within the framework of the Tax Code draft (Table 6). Profit Tax reduction can even be compensated by increasing the rate of Royalty (variant 2). For the case of a high level of future price the Royalty can be raised to 14% (variant 3).

Table 6

Marginal taxation parameters for Tax Code draft conditions

Indicators	Variants of parameters of Tax Code			
	№ 1	№ 2	№ 3	№ 4
Royalty, %%	8	12	14	**6**
Profit Tax, %%	28	**19**	30	14
Reserves, m t	10	10	10	10
Oil price, $/t	127	127	138	116

Low oil prices will require certain exemptions, but under the Tax Code conditions they can be presented within the competence of regions (variant 4).

PSA

The combination of parameters of PSA conditions (Table 7) shows that the development of all fields with average levels of reserves can be provided under conditions more preferable for the state than the basic conditions (at average price). For example, the Royalty rate can be increased up to 12% (variant 1) or the marginal share of "cost" oil can be reduced from 60% to 55% (variant 2).

Table 7

Marginal parameters for PSA

Indicators	Variants of parameters of PSA			
	№ 1	№ 2	№ 3	№ 4
Royalty, %%	12	10	16	10
Profit Tax, %%	30	30	30	13
"Cost" oil, %%	60	55	48	60
Reserves, mln tonnes	10	10	10	10
Oil price, $/ton	127	127	138	116

In the case of prices at the maximum level within the most probable scenario, the Royalty rate may increase to 16% with a simultaneous reduction of the marginal level of "cost" oil down to 48% (variant 3). In the case of low prices, privileges for Profit Tax within the region's competence may be required (variant 4).

***

These evaluations are **marginal** in terms of the whole category of average fields, that is, profitability is ensured even with regard to the "smallest" resources in the "average" group. Therefore, a profitable development of large resources (including the average scenario) requires lower exemptions.

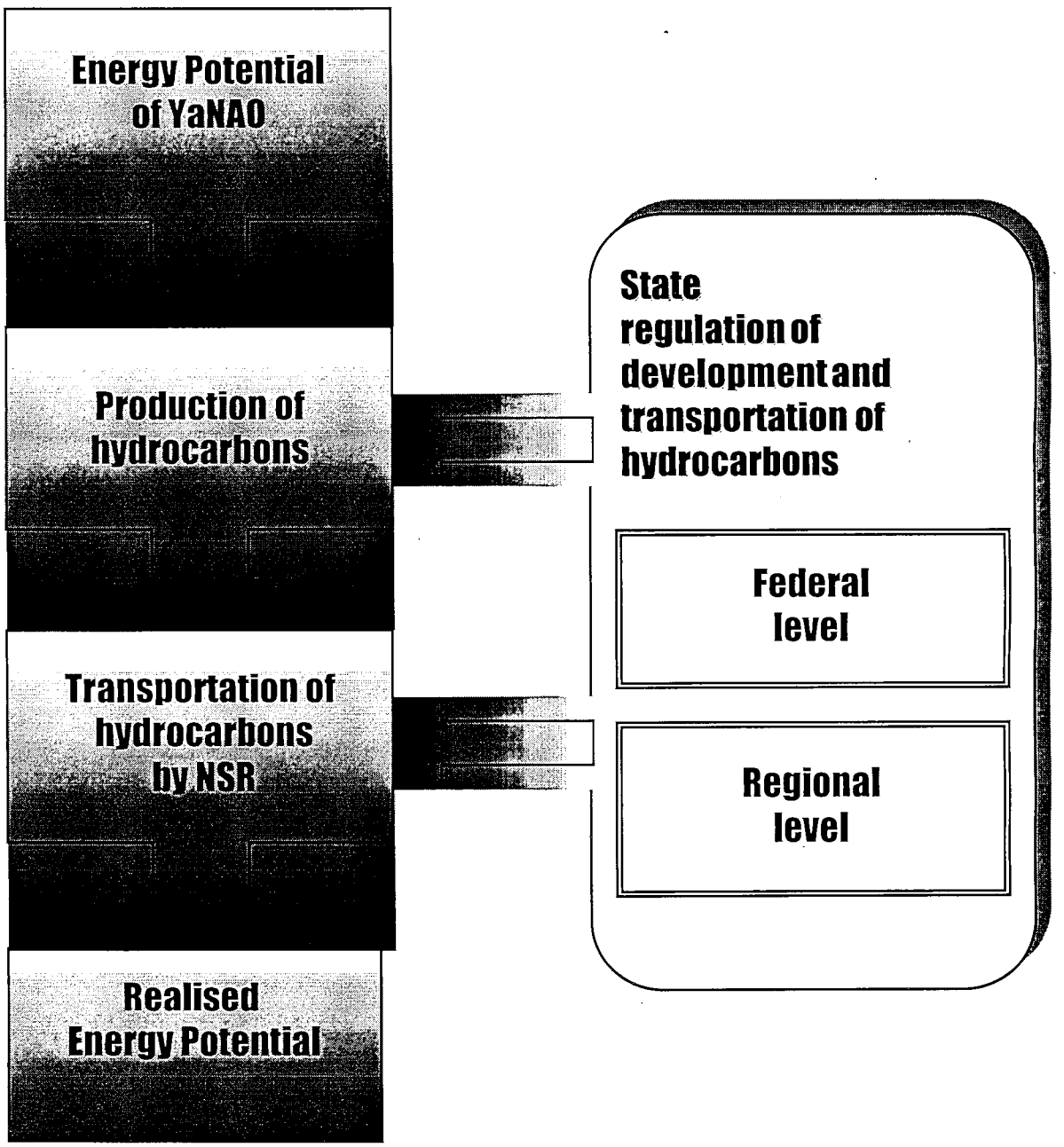
Therefore, the results of the calculations show that under development of "average" oil resources, certain conditions are required which cannot be granted within the competence only of regional authorities (YaNAO). In the development of hydrocarbon reserves of North-West Siberia a well-coordinated policy of regional and federal authorities aimed at efficient development of the hydrocarbon resources in the NSR zone is required (Fig. 3).

All hydrocarbon fields assumed to belong to the YaNAO territory in the NSR zone can be divided into three categories:

1. Profitable fields under basic conditions of taxation schemes;
2. Profitable fields with privileges within the competence of regional authorities (YaNAO);
3. Profitable fields with privileges within the competence of regional and federal authorities.

Fig. 3

Realisation of YaNAO Energy Potential



3.3. Principal conclusions to the results of the calculations

The evaluation of an economically efficient implementation of energy potential of exemplary oil fields in North-West Siberia under different taxation schemes and with federal and regional regulation of taxation has shown the following:

- The implementation of oil and gas projects (average by size of produced hydrocarbons) in North-West Siberia in areas directly contiguous to the NSR catchment zone, within the present taxation system (PTS) can be profitable only with high oil prices.
- In the case of the most probable scenario of future prices, profitable implementation of most projects under PTS conditions will require substantial taxation privileges or a transition to Tax Code conditions with HT or PSA conditions.
- The implementation of projects under PSA conditions will require introduction of substantial changes in the legislative infrastructure and adoption of a large number of laws and normative documents regulating the operation of these agreements. This may check the development of YaNAO resources in the nearest future.
- From the investor's viewpoint, the implementation of projects under Tax Code conditions seems more preferable than under PTS conditions. In the first place, this is because the introduction of a tax on additional income from hydrocarbons production - additional income tax (HT) to replace the excise tax. HT (unlike the excise system) permits reliable forecasts of tax payments and flexible changes of its level depending on a number of conditions affecting the profitability of field development (including level of prices, recoverable reserves and capital and operating expenses).
- The employment of Tax Code and PSA conditions reduces risks associated with changes in the taxation system (most of all in the total level of excise payments). In this case it is possible to speak about a lower profitability level required by the investors of projects.
- The fields assumed to be developed in the YaNAO territory within the NSR

catchment zone can be divided into 3 categories - profitable fields: (1) under basic conditions of taxation schemes; (2) with privileges within regional competence; (3) with privileges within regional **and** federal competence.

- The third group of resource fields requires a well-coordinated federal-regional policy in regard to problems connected with hydrocarbon development in the NSR catchment zone.

4. General conclusions and recommendations based on the results of the 1st and 2nd phases of the research

The studies conducted in the 1st and 2nd phases of the research project (including an earlier evaluation of the resource potential in North-West Siberia conducted by the authors) show not only the presence of substantial hydrocarbon resources in the NSR catchment zone, but also an adequate economic potential for efficient development of the oil and natural gas fields.

A methodical approach has been proposed for the evaluation of the economic expedience of development of hydrocarbon resources conditional on the economic characteristics of the fields and the routes of hydrocarbon transportation. For the latter, the findings obtained in other INSROP subprojects were used.

The most general conclusion made in the study is that implementation of the energy potential in North-West Siberia (both oil and natural gas resources) requires that the present paradigm of state regulation of the oil and gas sector in Russia be changed. Thus, it is necessary to give up the inflexible fiscal pattern of taxation which although aimed to enhance total tax payments and levies is based mainly on the taxation of gross income.

In order to keep up the economic potential of the Russian North and create zones of intensive economic activity in areas close to the NSR zone it is urgently required to switch to more flexible forms of taxation in the oil and gas sector and to gear them to the realization of the energy potential.

The changed paradigm of state regulation will permit the creation of an attractive investment climate in the oil and gas sector and provide not only an inflow of investments but also employment of new and more effective technologies for search, exploration and production of energy resources. The latter seems very significant since most of the resource fields in the territory under consideration are in the categories of difficult, hard to reach, average and small-volume resources of liquid hydrocarbons.

The proposed methods permit, at the stage of preliminary evaluation of the energy

potential (on the basis of the data on forecast resources), an estimation of the economic efficiency (expedience) of its economic development. The general conclusions are as follows:

- the potential of large and average gas fields in North-West Siberia can be efficiently realized within the framework of the existing systems of land trunklines (in a southern direction);
- the potential of the average gas and almost all oil fields can be developed only in a high price (favorable) situation on probable hydrocarbons markets and in combination with measures of target state regulation.

On the whole, development and bringing into operation of hydrocarbon resource fields in North-West Siberia require a well-coordinated federal and regional policy in the Russian Federation. It is also necessary to give up as soon as possible the policy of fiscal regulation of the oil and gas sector which appeared in the period of economic crisis and to switch to a flexible policy stimulating the development of hydrocarbon resources.

Department of Shipping, Trade and Finance

Michael N. Tamvakis
Director, MSc in Shipping
Trade and Finance

CITY University
BUSINESS SCHOOL

Frobisher Crescent
Barbican Centre
London EC2Y 8HB

Tel: 0171 477 8668
Fax: 0171 477 8853
Email:
m.tamvakis@city.ac.uk

25 November, 1998

Mr Claes Lykke Ragner
Deputy Head of INSROP Secretariat
The Fridtjof Nansen Institute
P.O.BOX 326 Lysaker
NORWAY

Dear Mr Ragner,

Re: "Analysis and evaluation of economic conditions of energy prospects implementation of the Yamalo-Nenets Autonomous Okrug. Part II: Comparative analysis of taxation schemes potentially applicable in the development of the YaNAO hydrocarbon reserves" by V.A Krykov, A.N. Tokarev and V.V. Schmat

I have read the paper with great interest. The authors discuss the viability of oil projects of different sizes, under a number of different tax regimes. The main conclusion derived therein is that, for moderate world oil prices ($15-20 per barrel), a proposed production sharing agreement (PSA) ensures the viability of even smaller projects, with recoverable reserves of 10-30 million tons. The paper proposes, therefore, a change in the current taxation regime and, in addition, recommends the co-ordination of regional and federal taxation to ensure the profitability of such projects.

Overall, I commend the authors for the considerable amount of effort they put in such an interesting an important area. I have only one or two points to make, in terms of methodology.

- I noticed that the NPV methodology was very quickly dismissed due to the difficulties in determining a proper discount rate for the cash flows. Instead the IRR criterion was used to evaluate investments. I am a bit sceptical on the use of IRR given that it is known to be problematic both theoretically and practically, especially when several negative cash flows are generated during the life of the project. I would argue that NPV analysis should be attempted, using returns on similar projects (e.g. oil projects in other frontier areas, like Alaska) and then properly adjusting cash flows for the political and economic uncertainties anticipated in the particular operating environment.

- I also noted that in diagram 2 comparisons of the different taxation systems are made on the assumption of a "pre-set level of profitability at 20%". How was this 20% chosen? Setting an arbitrary benchmark return is no different to selecting an arbitrary discount rate.
- As the research aims to ascertain the effect of taxation, the authors could perhaps resort to the use of the APV (Adjusted Present Value) methodology, whereby the source of positive present value for the project are separated in operational returns and financial returns. In the first case cash flows from operations only (i.e. operating income minus costs) would be discounted to determine NPV from operations. The effects of taxation could then be looked at separately in another cash flow in order to compare the different regimes.

- It would also be useful to see one or two more diagrams, similar to diagram 2, whereby tax rates are plotted against oil prices (for small, medium and large projects) assuming that profitability remains stable. This could illustrate the need (or lack thereof) for adjustments to fiscal policies under different oil price conditions.

Finally, the paper would benefit from a re-checking of spelling and grammar mistakes, as well as the elimination of non-standard letters (À, Â and Ñ) in the text boxes of diagram 2.

Concluding, I would like to reiterate that despite some shortcomings, the paper is on the right path of addressing the very crucial issue of taxation in oil exploration and it is very well known that fiscal policies have been instrumental in the viability of such projects around the world.

Yours sincerely,

Michael N. Tamvakis

To: Mr Claes Lykke Ragner
Deputy Head of INSROP Secretariat
The Fridtjof Nansen Institute

Dear Mr Claes Ragner,

In general, we agree with the reviewer's comments which are mainly connected with methodological aspects of our study. But we would like to add the following.

We think that the proposed approach of NPV analysis (using returns on similar projects) leads to new problems. As the reviewer noted, it will be necessary to adjust cash flows for the political and economic uncertainties anticipated in the particular operating environment. This task is comparative with evaluation of the discount rate.

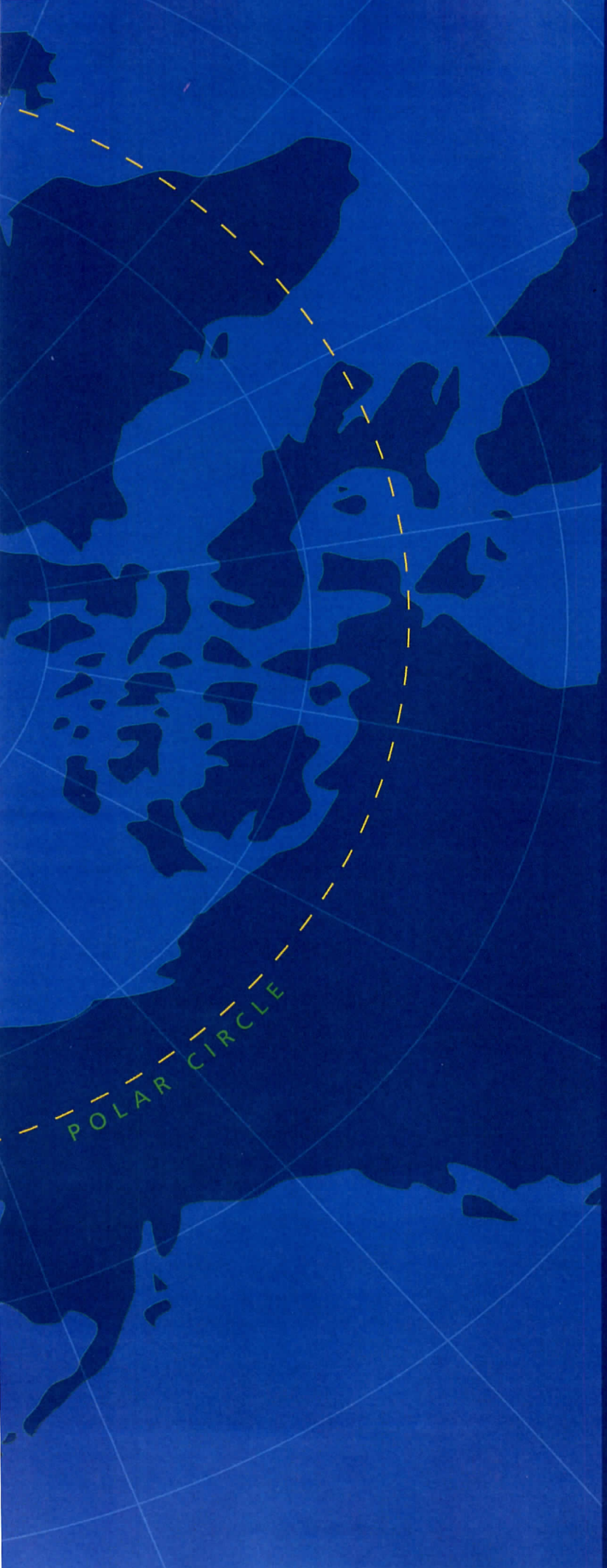
In diagram 2 comparisons of the different taxation systems are made on the assumption of a "pre-set level of profitability at 20%". This benchmark return was chosen on the base of conditions of production sharing terms (profit sharing) in Russian oil sector under the conditions of existing production sharing agreements.

Among the main aims of our research, is to make comparative estimations of different tax schemes. That is why we are sure that the IRR criterion is an adequate method for the decision of such tasks.

Concerning tax rates and oil prices, results of our analyses have shown that the Tax Code draft and PSA are flexible fiscal schemes also in case of different oil price levels. It is possible to adjust tax rates to changes in project conditions (including oil prices) in the above mentioned tax systems. Unfortunately, the present tax system (with excise tax) can't adapt adequately to oil price changes.

Yours sincerely,
Valery A. Kryukov

Novosibirsk,
December, 1998



The three main cooperating institutions of INSROP

Ship & Ocean Foundation (SOF), Tokyo, Japan.
SOF was established in 1975 as a non-profit organization to advance modernization and rationalization of Japan's shipbuilding and related industries, and to give assistance to non-profit organizations associated with these industries. SOF is provided with operation funds by the Nippon Foundation, the world's largest foundation operated with revenue from motorboat racing. An integral part of SOF, the Tsukuba Institute, carries out experimental research into ocean environment protection and ocean development.

Central Marine Research & Design Institute (CNIIMF), St. Petersburg, Russia.
CNIIMF was founded in 1929. The institute's research focus is applied and technological with four main goals: the improvment of merchant fleet efficiency; shipping safety; technical development of the merchant fleet; and design support for future fleet development. CNIIMF was a Russian state institution up to 1993, when it was converted into a stock-holding company.

The Fridtjof Nansen Institute (FNI), Lysaker, Norway.
FNI was founded in 1958 and is based at Polhøgda, the home of Fridtjof Nansen, famous Norwegian polar explorer, scientist, humanist and statesman. The institute spesializes in applied social science research, with special focus on international resource and environmental management. In addition to INSROP, the research is organized in six integrated programmes. Typical of FNI research is a multi-disciplinary approach, entailing extensive cooperation with other research institutions both at home and abroad. The INSROP Secretariat is located at FNI.