Tax incentives as the tool for stimulating hard to recover oil reserves development

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Abstract. The share of hard-to-recover oil reserves, principally from unconventional hydrocarbon sources, has significantly increased in the world petroleum market. Russian policy of subsurface management is directed to stimulate the development, survey and involvement into production of hard-to-recover oil reserves by tax-financial and economic-organizational tools among which tax incentives is the most effective one. The article highlights different categories of hard-to-recover oil reserves as a basis for generating tax incentives. Also the aspects of tax influence on petroleum business (involved in production of had to recover reserves) in Tomsk region are revealed, both positive and negative.

Introduction

The issue concerning hard-to-recover oil reserves is becoming now extremely relevant in rapidly changing macroeconomic conditions. This could be determined by the following factors:

1) change of quantitative and qualitative characteristics of hydrocarbon reserves as well as the growth of total share of hard-to-recover oil reserves. For the year 1960, 50-60% of oil was produced from newly discovered deposits; in 1990 – 20-25%; at present time – 12-15% and according to the geological forecast, the number will be 7-10%. It should be considered that Russian oil industry raw material base could be characterized by high concentration of hydrocarbons. State Register of Mineral Reserves estimates 2885 deposits with oil reserves; more than a half of recovered reserves are buried in 11 unique deposits (with the reserves of more than 300 mln.t.) and in 85 large deposits (60-300 mln.t.); among them 9 unique and 56 large deposits are situated in West Siberian petroleum basin. Besides, most of newly developed deposits in Russia refer to the category of small with the average reserves amount of 4 mln.t. [1, P. 54].

2) change of energy producing and energy consuming structure due to the increase in alternative energy sources significance and production of hydrocarbons (HC) from unconventional reserves [2,3]. This fact influences strongly the strategy of financial trading organizations. Long-term and risky investments for production and development of HC from conventional reserves are becoming less attractive. This reflects on the financial possibilities of petroleum enterprises and principally on Russian enterprises. Another factor is the growing interest of international petroleum enterprises to shale hydrocarbon reserves. For instance, «ExxonMobil» quit the Shtokman deposit development project in September 2012 and got the full control over the shale oil production on Bakken shale formation in the north of the USA.

Thus, fulfilling the task "the effective use of natural energy resources and potential for sustained economic growth and increasing the life quality of people" [4], as well as saving natural-resource potential for further generations is impossible without resource-innovative operation of petroleum enterprises involved in the production of hard-to-recover hydrocarbon reserves.

Consequently, state tax policy is directed to exploration, production and development of hard-to-recover hydrocarbon reserves, especially oil.

The article aims to analyze current tax policy – positive and negative aspects as well as its influence on production operation of petroleum enterprises on the example of Tomsk region petroleum sector.

Hard to recover oil reserves: general characteristics

Currently, there is no precise definition for hard-to-recover hydrocarbon reserves in the Russian legislation. In accordance with the order of Ministry of Natural Resources and Environment of Russian Federation from 1st November, 2013, to the recoverable reserves refer "the part of geological reserves, which could be extracted from the formation (reservoir) during the whole period of developing within optimal project decision with the appliance of available technology, considering environmental and subsurface using requirements". Taking into account this definition, the reserves of the developing formations could be referred to the recoverable reserves, and the reserves from the exploration deposits – to the hard-to-recover reserves (ranging of deposits according to the degree of commercial development [5]).

For petroleum industry the basic criteria is the quality of oil, consequently, considering abnormal physical and chemical properties, the following types of oil could be defined: hard, viscous, sulfurous, paraffin oil, tarry oil, with high (more than 500 m^3 /t) or low (less than 200 m^3/t) gas saturation, with the presence of more than 5% of aggressive components (hydrogen sulfide, carbon dioxide) in non-associated and (or) associated gas [6, C. 32]. The data, obtained by Institute of Petroleum Chemistry, Siberian Division of the Russian Academy of Sciences, shows that the present types of oil are common for many deposits in the world.

According to the instruction of oil reserves, resources and flammable gas classification, oil (considering the content and physical properties) could be subdivided depending on its properties, hydrocarbon-type content, fractional composition, sulfur and other non-hydrocarbon components, asphaltenes and tars [5].

Geology considers reservoir properties of surrounding formation which influence physical and chemical properties of raw hydrocarbons. The key property of the reservoir is porosity – when water and gas can flow freely through pores at pressure changing [7].

Depending on the degree of porosity, the productive formations could be subdivided into: low permeable (from 0 to 100 mD); medium permeable (from 100 mD to 500 mD); high permeable (more than 500 mD). Reservoirs could be classified into 5 types (μm^2): extra permeable (>1); high permeable (0.1 - 1); medium permeable (0.01 – 0.1); low permeable (0.001 – 0.01); extra low permeable (<0,001).

According to the decree of the Russian Federation № 700-r from 3rd May 2012, four categories of hard to recover oil extraction projects, based on reservoir permeability and oil viscosity, are defined:

1) projects to extract oil from low permeable reservoirs - from 1,5 to 2 mD inclusive (from $1{,}5\cdot10^{-3}$ μm^2 to $2\cdot10^{-3}$ μm^2 inclusive);
2) projects to extract oil from ultra low permeable reservoirs - from 1 to 1,5 mD inclusive (from $1\cdot10^{-3}$ μm^2 to $1{,}5\cdot10^{-3}$ μm^2 inclusive);
3) projects to extract oil from extra low permeable reservoirs – up to 1 mD inclusive (up to $1\cdot10^{-3}$ μm^2 inclusive);
4) projects to extract ultra-viscous oil under formation conditions of more than 10 000 mPa·s.

The other characteristics of formations are – low porosity, deep bedding or permafrost, interbedding temperature ($100\,^{\circ}C > t < 20\,^{\circ}C$), high water content in the extracted oil [6, C.33].

Economic efficiency of hydrocarbon reserves production is the basis for oil producing companies' business strategy. If under current economic conditions and tax system, at application of hydrocarbon production technique and technology, which provide the compliance with the requirements of rational subsurface use and environmental protection, the development of the reserves is not profitable, then these reserves will be considered as hard-to-recover.

It should be taken into consideration that the category of hard-to-recover is constantly changing due to the development and implementation of innovative technologies. For example, in 80-90's of the last century in Western Siberia, Achimovskaya and Bazhenov suites, as well as Paleozoic deposits were not included in the category.

Hard to recover oil reserves of Tomsk region

At present, hard-to-recover reserves account for 65% (18.7 bln. t.) from 28.9 bln. t. of oil extracted in Russia from the reservoirs of ABC1+C2 category. The initial reserves amount:

a) The Bazhenov suite in Western Siberia - 330 mln.t.
b) Domanic formations of Timano-Pechorskoj and Volgo-Uralskoj provinces - 300 mln.t.

Besides, Low Silurian formations of Kaliningrad region are very perspective for unconventional hydrocarbon resources development (the initial gas reserves amount - 530 bln. m^3), as well as low permeable reservoirs of Vendian Cambrian formations (Talakanskoe, Verhnechonskoe, Danilovskoe deposits) in Western Siberia.

"Russia is not among the leading countries in production of shale hydrocarbons. There are only 35 wells (from which 700 thousand tons of shale oil was extracted last year) while in the USA there are 113 wells. This fact shows that the USA is the leading country in shale hydrocarbons production (40% of the world's production) [8, p. 24]."

The potential of Tomsk region in developing of the Bazhenov and Tjumen suites, as well as Low Jurassic deposits, is very high (table 1).

Table 1. Potential of hard to recover oil reserves development in Tomsk region.

Stratigraphic complex	Reserves, mln.t.		% of hard to recover reserves from approved reserves
	Total	Hard to recover	
Paleozoic	90.1	14.5	16.1
Low Middle-Jurassic	279.7	193.7	69.3
Upper Jurassic	908.7	103.6	11.4
Bazhenov	37.6	37.6	100.0
TOTAL	1278.5	349.4	26.5

Thus, for oil production companies of Tomsk region the developing hard-to-recover reserves is one of the promising areas. Tomsk region, due to its geological history, has a lot of small and middle size deposits. This is the reason why petroleum business of Tomsk region is marked only by one leading company OAO "Tomskneft" VNK and some small producing companies, which develop the sites where the amount of hydrocarbon reserves is less than 5 mln.t.

Hard to recover reserves and tax legislation

One of the most effective tools to stimulate hard-to-recover reserves is tax incentives.

Tax legislation has the following incentives for the production of oil [9]:

a) in the following Russian regions:
   - Republics of Bashkortostan and Tatarstan (article 343.2);
   - Republic of Sakha (Yakutia), Irkutsk region, Krasnoyarsk region (subparagraph 2 paragraph 4 article 342.5);

− Nenets Autonomous region, Yamal peninsula in Yamal-Nenets Autonomous region (subparagraph 5 paragraph 4 article 342.5);

b) from offshore deposits of Azov, Baltic, Pechora, White, Japan, Okhotsk, Caspian, Black, Barents, Kara, Laptev, West-Siberian, Chukotsk, Bering seas (paragraph 5 article 338);

c) from the formations placed north of the Arctic Circle, fully or partially on the borders of inland sea waters and territorial waters of Russian Federation continental shelf;

d) from the formations placed within the borders of inland sea waters, territorial waters of Russian Federation continental shelf or in the Russian sector of Caspian sea floor;

e) from the types of geological formations – deposits (subparagraph 21 paragraph 1 article 342), referred to Bazhenov, Abalaksk, Hadumsk or Domanikov productive formations [9];

f) from the formations containing oil with the viscosity of 10 000 mPa x s and more (in reservoir conditions). Formations containing oil with the viscosity of more than 200 mPa x s (in reservoir conditions) are having zero tax rate. Thus, raising marginal threshold points to the dual character of tax incentive, firstly introduced in 2006, which stimulated business to apply new technologies in order to reduce the tax burden. In case when oil viscosity varies in the range of more than 200 mPa·s and less than 10 000 mPa·s (in reservoir conditions), the coefficient $К_{rp}$ (coefficient characterizing region of oil production and oil properties) will be equal to 0 in the equation of calculating Severance Tax (ST) (equation 1).

$$\text{Total ST} = Q \times (К_{sT} \times К_{p} - D_{s}), \text{ where} \quad (1)$$

D_{s} – index, characterizing the specificity of oil production (Equation 2)

$$D_{s} = К_{sT} \times К_{p} \times (1 - К_{fd} \times Кr \times К_{c} \times К_{rd} \times К_{rp}), \quad (2)$$

where

$К_{rp}$ – coefficient, characterizing region of oil production and oil properties

$К_{p}$ – coefficient, characterizing dynamics of world oil prices

$К_{fd}$ – coefficient, characterizing degree of definite oil field depletion

$К_{c}$ – coefficient, characterizing the degree of oil production complexity

$К_{rd}$ – coefficient, characterizing degree of definite oil reservoir depletion

Decreased value of $К_{c}$ coefficient at calculating the amount of ST is applied to oil, which is extracted from the definite hydrocarbon deposit depending on permeability and thickness of the formation (subparagraph 2,3, paragraph 1, article 342.2 Tax Code of the Russian Federation):

0.2 – at permeability not more than $2 \cdot 10^{-3}$ μm^2 and effective oil height not more than 10 meters;

0.4 – at permeability not more than $2 \cdot 10^{-3}$ μm^2 and effective oil height not more than 10 meters.

At the extraction of oil from definite formation of Tyumen suite - $К_{c} = 0.8$.

For the republics of Bashkortostan and Tatarstan, tax deductions are applied to the calculated sum of ST concerning oil which was extracted from deposits with initial reserves (on 1st January, 2011) of 2 500 mln.t., 200 mln.t. and more. Calculation of tax deductions depends on the amount of export tax.

For oil extracted from the formations, which are situated fully or partially on the territorial entity of Russian Federation (Sakha republic (Yakutia), Irkutsk region, Krasnoyarsk region) - $К_{rp} = 0$.

At the development of new offshore hydrocarbon deposits, special order of tax calculation is applied as well as special ST rate of 15% is added to the taxation base. Taxation base is defined as the cost of crude hydrocarbons. Cost of crude hydrocarbons is the product of extracted hydrocarbon amount and minimal marginal value of crude hydrocarbon unit. Minimal marginal value of crude hydrocarbons (here oil) is defined as the product of average oil price in the world market per barrel in US dollars during the last tax period and the average rate of US dollar to Russian ruble (during that tax period) established by Central Bank of Russia.

Production of oil from the Bazhenov suite is beneficial for oil companies. For a long period of time, the Bazhenov suite (square -1 mln. km^2, thickness - from 5 to 40 m) was considered to be a good impermeable environment for oil and gas traps. Current scientific research proved the presence of large amount of high quality light industrial reserves of oil. The Bazhenov suite differs from traditional reservoirs in microcavity, flaggyness, foliation and bedding. This fact points the necessity of using special technology, and consequently applying qualitative approach to choosing of service company and staff [10].

Thus 313.3 mln.t. of oil in Tomsk region deposited in the Bazhenov suite, 927.5 mln.t. of oil from Tyumen suit, not less than 50% from 1150 mln.t. of oil from Low Jurassic formations could get under preferential taxation.

Conclusion

1. Variety of approaches to understand the notion, hard-to-recover reserves, explains the necessity of applying different stimulating tools for the development of such reserves.
2. State tax policy is characterized by the increase in tax burden on oil and gas production enterprises due to the constant raise of specific rate at calculating of Severance Tax (ST) on oil from 2008 till 2014 and changing of calculating algorithm in 2015. This significantly reduces financial and investment ability of the companies. Comparative analysis showed that change of ST calculating algorithm leads to the increase in tax amount by 17% per one ton of oil.
3. Variety of tax incentives for different types of hard-to-recover reserves (zero ST rate, reduced coefficients in the equation of calculating ST, special order of tax base calculation for a number of deposits), complicate the calculation of ST and negatively influence the management of tax system.
4. Large amount of hard-to-recover hydrocarbon reserves in Russia and their variety, requires considerable financial and investment resources as well as applying innovations in production-technological process and attracting highly qualified specialists, thus there is a necessity in rational state tax-financial policy.
5. Incentives are more tangible for large companies involved in developing large deposits as they allow multiplying financial and investment resources for implementing new technologies. Small petroleum companies in Tomsk region, which are involved in production of hydrocarbons from small deposits, do not have significant financial benefits from the reduction of tax burden on the development of hard-to-recover reserves. High cost of special technology and equipment, need of highly qualified staff, obtaining investment funds – all these is a challenging task for small petroleum companies.
6. The effective method to support small petroleum business is, according to the authors' opinion, application of additional income tax instead of severance tax during 5 years. Shortfalls in taxes into budgetary system will be partially compensated by income tax.

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