

Semykina, Irina

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## Opportunities and benefits of local content requirement policy: case of Eastern Siberian oil and gas industry

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**Opportunities and benefits of local content requirement policy:**

**Case of Eastern Siberian oil and gas industry**

Irina O. Semykina, Candidate of sciences, Institute of Economics and Industrial Engineering, Siberian Branch of the Russian Academy of Sciences, Novosibirsk, Russia,  
semykina.irina@gmail.com

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**Abstract**

This paper explores the regional economic impact of mineral resource endowment and offers specific inputs to the debate on the local content requirement (LCR) policy, gaining urgency in modern economic and political environment. Focusing on the experience of the Eastern Siberia the paper examines the way national companies operate in the newly developing oil and gas provinces of Russia. The analysis of key economic indices shows that the existing approach based on rent-seeking strategy doesn't allow having any significant benefits from resource endowment in the regions. The key idea is that the establishment of completely new industry has to affect regional economic development, budget revenues dynamics, and employment, to influence the related industries and services in the region. The paper provides the review of the LCR policy which has been widely used in some countries with similar industry pattern like Norway and Brazil. The conducted analysis let to form possible scenarios and evaluate the dynamics of regional economic development depending on the scale of LCR policy. The developed approach based on statistical modeling allows assessing both direct and indirect effects of LCR policy. The obtained results allow to conclude that the implementation of LCR policy lead to the growth of real income per capita and the job creation in the region. The development of equipment and services suppliers for oil and gas industry by ripple effects can boost socio-economic development and diversify regional economy. The paper also dwells on some pitfalls and risks accompanying LCR

policy and considers crucial points of introducing this kind of policy for local and federal government.

## **Introduction**

During the last years Eastern Siberia regions have been providing the principal growth of the crude oil production in Russia. Eastern Siberia regions feedstock is presented by Talakan field and his satellites in Yakutia; Verkhnechonskoe, Yarakta, Dulisma in the Irkutsk region and Vankor field in the Krasnoyarsk region. In 2014 the production in these regions exceeded 42 million tones that are about 8% of annual production in Russia. The emergence of a new industry of the regional economy has a significant impact on the economic indicators growth: investment and GRP, personal income growth and regional budgets revenues. But the growth doesn't necessarily imply development.

The existing approach based on rent-seeking strategy doesn't allow obtaining any significant benefits from resource endowment in the region. Currently oil and gas fields' development and industry infrastructure construction in Eastern Siberia are often the sites of outsourced suppliers and human resources application [18]. This virtually eliminates the possibility of deep inter-industry linkages of the projects in the region.

The long-term increase of hydrocarbons production while maintaining the dynamics of production in other industries lead to negative structural changes in the regional economy – reducing the role of the manufacturing industries. It can be argued that structural change is unwanted, because it reduces the capacity of the economy to maintain sustainable growth after the oil boom [7]. The functioning of regional economies with a significant share of primary industries, particularly oil and gas industry has certain specificity. This accounts for by the fact that the development of the oil and gas industry in the region is influenced by a variety of external factors such as the taxation system, price trends and the investment policy of mining companies which are outside of regional authorities competences. Moreover the nature and scale of the oil and gas projects influence on the regional socio-economic development dynamics varies in time depending on the stage of the project implementation.

To eliminate these external factors influence regional authorities have to diversify the economy away from its reliance on hydrocarbon extraction industry, bolstering the manufacturing industries. The problem of diversification in resource rich regions could be solved in different ways. One of them is represented by the establishment of special funds where the revenues from implementation of oil and gas projects are accumulated. Such method is relatively wieldy and usually used in the regions with extreme climate conditions

(Arabian Desert or permafrost of Canada), low population density (Norway sea coast) or geographically outlying regions (Alaska). Another method, which is also widely used around the world, is the implementation of Local Content Requirement policy. The World Trade Organization (WTO) defines LCR as a “requirement that the investor purchase a certain amount of local materials for incorporation in the investor’s product”. In this sense, LCRs act as performance requirements that regulate the extent to which certain projects must use locally manufactured products. LCR policy represents a kind of mechanism of transformation the mining industry costs in the incomes of other sectors of the regional economy. The research aims to assess LCR policy implementation impact on the regional economic growth dynamics, to verify whether it could cause qualitative changes in key social indicators of regional development.

### **Literature review**

The local economic development arguments of natural resource-rich countries were particularly originated in the resource curse hypothesis [13]. The theories of the paradox of plenty (Karl, 1997) [10] and the resource curse (Auty, 1994 and Ross, 1999) are of the opinion that countries with total dependence on natural resources such as oil and gas become the less developed and perform significantly worse than the countries that do not have this natural abundance. R. Auty (1994, 1998), M. Ross (1999), J. D. Sachs and A. M. Warner (1995) are examples of studies showing that the increase in mineral resource revenues may impede the economic development of a country, lead to an increase of social inequality and political instability [2, 3, 15, 16]. However, the resource curse syndrome can be avoided through proper management of revenues from resource extraction (Davis, 1995) [4]. One of the strategies intended to expand and maximize the generation of externalities of extractive industries to benefit the territory is the LCR policy [5].

In the academic literature there are several definitions of LCRs, but most researchers are of the opinion that this is the requirement, which is usually expressed as a percentage of the costs, of the local labor force and raw materials used in the manufacturing process in order to create the value added to the local economy. The first study on the local content is considered to be the work of American economist Gene M. Grossman published in 1981 where he evaluates the impact of local content protection measures on the market structure and the intermediate goods production [6].

LCRs were applied by different countries at different times and in different contexts, but commonly the authorities pay attention to such a mechanism in the wake of overcoming

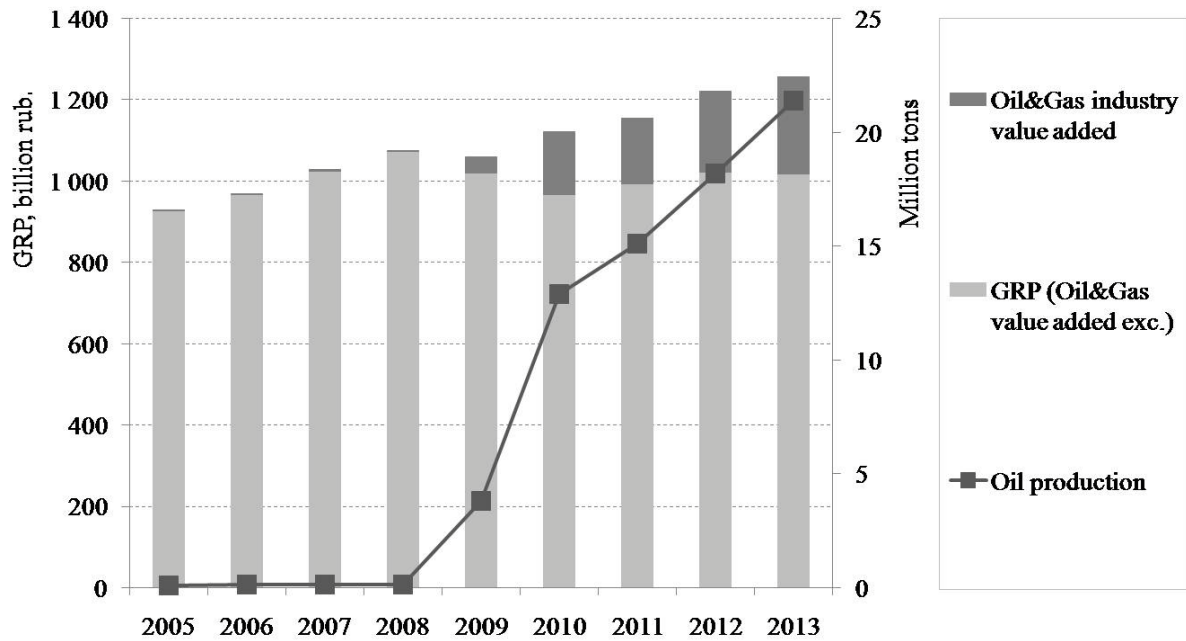
the crisis in the economy. For example after the financial crisis of 2008 both developed and developing countries have turned to LCRs: over 100 new LCRs have been imposed [9]. As for developed countries the basic motivation for implementation of such a policy appears to be the possibility of job creation, among the fundamental objectives for developing countries are the infant industries protection and the ability to provide local companies with large foreign or domestic firms orders carrying out large-scale investments. Both developed and developing countries have been using the LCR policy in such sectors as the electric power, automotive, chemical, renewable energy, mining, oil and gas industries. In the oil and gas industry LCR policy was for the first time introduced in Norway early in the 1970s while developing oil and gas fields in the North Sea and aimed technology transfer, the creation of new industries around the oil and gas projects, providing local people with jobs.

The estimates of the LCR policy usage influence on the economy are highly contradictory. While the number of scientists distinguish the effectiveness of this kind of policy in promoting infant industries, gaining competencies and the growth of production (A. Amsden, R. Wade), others notice the risks of fostering imbalances in the market, rising costs for buyers, reducing incentives for technological development of the companies supported within the bounds of LCR policy (G. Grossman, G. Hufbauer) [1, 20, 9].

## **Background**

Eastern Siberia covers an area of 7.2 million km<sup>2</sup>, which is more than 40% of the country and has the population of about 9.4 million people (as of 1.01.2010), i.e. 6.6% of the Russian population. It located in Siberian and Far Eastern federal districts and includes 6 regions. Oil and gas industry of Eastern Siberia is formed on the territory of three regions: Krasnoyarsk and Irkutsk regions and the southwest of Yakutia. But importantly, over the last few years, the bulk of the growth in crude oil production has actually come from Krasnoyarsk region. The major oil field biases the dynamics of oil production in the region is Vankor. In term of its contribution for national oil production, Vankor produces about 4.5% (24 million tons in 2014) [14]. Its share in the total production of “Rosneft” was about 10%.

The implementation of Vankor project provides federal budget with tax revenues and allows fulfilling export obligations. The questions are how this project has been contributing regional economy and how the dynamics of key regional economic indices has been changing since the start of Vankor field exploration in the mid-2000th.



**Figure 1** Oil and gas industry in GRP of Krasnoyarsk region

The investments in Vankor field development are about 10% of annual upstream investments in oil and gas industry of Russia. It would be reasonable to assume that the project plays a significant role in regional socio-economic development. In 2012 Vankor ensured about 23% of regional investments and production, and nearly 13% of GRP. If we look at the trend over the last 12 years in comparable prices, it really pops out that the growth rate of key economic indicators after the Vankor field exploration start, has been significantly changed. Figure 1 provides the dynamics of the oil and gas industry share in GRP. The growth of GRP was provided just by oil and gas industry. At the same time the growth of oil and gas industry investments is not accompanied by an increase in investment and production in related sectors of the regional economy [19].

It has to be pointed out that there are inhibiting factors in use of local materials and machinery which are occasioned by geological and technological challenges. Hydrocarbon fields in such areas are complex and multi-component. That doesn't allow using the experience and traditional approaches of mining. That is why oil and gas companies mainly employ foreign suppliers and foreign service companies. Moreover the extraction and production of oil require a range of supply industry functions, none of which exist in the same region. There are also risks of not being able to find resources in line with company's standards, or enough competent staff for the required tasks. As for Vankor the most components and equipment used in the project is coming from the abroad: top drive drilling by Canrig or Varco (USA), chisels by Hughes Christensen (USA), solutions for horizontal

wells of MI-SWACO (USA), logging technology MWD and LWD (USA). Horizontal drilling is performed by Schlumberger Company, which has its own repair base for the maintenance and restoration of drilling systems on Vankor. So the local procurement mostly consists of so called industrial upstream like building materials, metalware, and electric poles, sawmill products, cement and so on. That means the lack of domestic manufacturing, fabrication and service capabilities to support the oil and gas industry. All these factors lead to capital cost increase for oil and gas companies.

We have to take into account that the capital and operational expenditure of oil and gas companies represents a direct means for the industry to contribute to local economic and social development. Now Russian national oil and gas companies don't have a clear "local content strategy". It's mainly addressed as part of the "corporate social responsibility agenda". But in the world there are resource rich countries which have been implemented LCR policy in oil and gas industry.

When it comes to local content, Norway is one of the leading nations in terms of policy. For Russia the experience of such countries like Norway or Brazil is of great importance because of high share of the state in the oil and gas companies. Norway had been fully exploiting the opportunities arising from the North Sea oil and gas resources to develop local capabilities. These capabilities developed as a result of collaboration and coordination, orchestrated and supported by the national and local governments [8]. The Norwegian government has introduced legislation necessitating oil and gas companies contribute to economic development. Foreign operators entering Norwegian industry in the late 1970s were strongly encouraged to form R&D partnerships and joint development programs with local companies and research institution. The operators' commitment and strategies for technology transfers were made a crucial factor in the licensing processes [11]. The development of supply chain strategy and the structure of the Norwegian oil and gas industry have been developed for about 30 years. When "Statoil" launched the "Snøhvit" project it had to develop a special strategy. According to it each principal contractor had to prepare a project plan, taking into account the potential use of local suppliers, and local small and medium-sized companies in the north of Norway, which were given the role of sub-contractors for specific types of services and production.

Norwegian local content strategy has been held up as an example of good practice for other countries. Brazil, for example, represents the same concept but uses different operating model. Realizing that the network of equipment and services suppliers wasn't prepared to supply competitively to the Brazilian oil and gas industry, government introduced a clause for

domestic content in the licensing process and created a PROMINP program that intends to increase domestic supply of equipment and services. Local content based on percentage of local inputs in Brazil serves as bid factor in licensing round. It differs depending on the project phase – minimum 37% for the exploration, 55% until 2021 and 59% thereafter for the development phase [12]. They also introduced the requirement of certification of LC and audit of reports. These measures together with technological strategy proved successful, allowing “Petrobras” become a leading operator in the offshore.

A study of several countries like UK, Norway, Brazil, Malaysia that have developed models that define how technology and competence will be either transferred or developed reflects that local content is a positive development. In addition supporting local economic development by engaging local enterprises in the projects supply chain may ensure a sustainable development of the project and the area. Such benefits are of great importance especially for the Eastern Siberian regions which had been endured the alarming depopulation and deindustrialization processes since the collapse of Soviet Union in 1991. Oil and gas production is capital intensive industry, but at the same time involves quite limited number of employees. Equipment and machinery producing industries, as well as oil and gas related services and engineering, on the contrary can be referred to the highly skilled and labor intensive sectors [17]. Moreover linkages between oil and gas industry and other local industries may impact regional economic growth through investments and creating value added activities in equipment and materials.

## **Methods**

In recent years there has been a growing understanding that the diverse nature of regions may preclude “one-size-fit-all” solutions or general “best practices” for regions, and the need for policy recommendations to be differentiated is increasingly recognized. The optimization of local content target setting requires a quantitative analysis of planned project expenditure and the assessment of domestic supplier capabilities to identify a baseline scenario for local content. In order to properly assess LCR policy influence and avoid imbalances between project development and procurement functions it is necessary to study the effects of projects in oil and gas industry on the regional economy and of local variables on the projects. The proposed approach focuses not only on the assessment of the direct effects of oil and gas industry on the regional economy (additional investment in the development of mining and processing of oil and gas resources, the growth of industrial



output, tax revenue, employment, etc.), but also the analysis of indirect impacts of related servicing sectors development.

This approach, which is based on a statistical simulation model, is a development of ideas and methods which had been designed in Institute of Economics and Industrial Engineering SB RAS for old oil-producing regions of Russia. As the oil and gas industry in Eastern Siberia is the newly developing one, identifying inter-industry linkages involves the use of simulation techniques. Within the simulation model by setting certain parameters (degree of localization costs in the region, the intensity of inter-industry relations) we can execute the assessment of the impact of oil and gas projects on the socio-economic system of the region.

The main proposition of the model is that the increase in localization costs of oil and gas companies within the territory leads to the increased intensity of inter-industry relations in the region. Thus, increasing the share of local contractors in the oil and gas industry investment leads to higher levels of investment and, consequently, the production and value added in the related industries. By related industries we mean not only engineering, construction, drilling and service companies, but also such suppliers who depend heavily on oil and gas industry like transport, catering and other services. As a result, there are changes in employment and incomes, tax revenues in the regional budget. Furthermore, the model takes into account feedback showing the reducing costs by companies using local industrial products and services. Among the endogenous variables of the model there are: volume of investment by industry, output by industry, industry value added, population size, number of employees by industry; the number of unemployed and migrants, income per capita, budget revenues and expenditures. The regional economy structure is represented by the nine aggregated key sectors. For the forecast estimates on the volume of production in oil and gas industry we used forecast prices given by the International Energy Agency in the so-called 450 Scenario. The model has a forecast horizon of 20 years.

The analysis is fulfilled depending on the nature and scope of the demands made by the oil and gas industry in the region. Within the conducted research four possible scenarios have been simulated:

- Scenario I is just basic one and includes the determinants of the given Strategy of Social and Economic Development of the Krasnoyarsk region;
- Scenario II assumes that a certain part of construction works will be done by local firms. This type of activity includes exploratory drilling, construction of buildings, roads, installation of engineering equipment and other works. Estimates are made based on the

assumption that the share of local contractors will have grown from the current 20 to 50% of the total volume of construction work for the oil and gas sector by the end of the forecast period;

- Scenario III involves the deployment of oil and gas processing capacities in the region;
- Scenario IV supposes the share of local engineering products to increase from current 1 to 25% by the end of the period.

The model allows evaluating defined strategies, determining the possible futures and to test the system's response to the effects of different scenarios. Depending on the LCRs we may assess the benefits from the investments in the local content in order to maximize them.

### **Appraisal**

The analysis of the obtained results showed that the increase of local content share may have a significant impact on the dynamics of fixed assets investment in construction, transportation, and manufacturing sectors. Thus, the forecast average annual growth rate of investment for the basic scenario is about 8% and more than 10% for Scenario IV. Compared with the III Scenario (the accumulated amount of investments for the period 15.2 trillion rub.) there is a slight decline in investments for Scenario IV (15.1 trillion rub.) due to the effect of cost reducing arising from the use of local machinery and equipment, as well as services of local contractors in the construction industry.

LCRs affect the production and services rendered in the region. Thus, Scenario II compared with the basic one ensures the 13% growth of construction services volume by the end of the forecast period. Scenario III leads 15% growth in construction, which is influenced by the development of hydrocarbon resources processing capacity, the volume of products shipped by oil and gas processing enterprises is 65% differ from the basic. Scenario IV provides 16% growth of construction and 48% growth of engineering industries production compared to the basic Scenario. So the most significant increase in the socio-economic indicators at the beginning of the forecast period will be achieved mainly by increasing the share of such nonspecific services as ones referred to "Construction", which are directly dependent on investment in oil production. This is essentially due to the high capacity of construction market within the region: industrial construction ensures the demand for building materials, steel products, metal constructions, petroleum products, cable products and others. However, the slowdown in the production of hydrocarbons will lead to the reduction of the potential multiplier effects in construction. In the second half of the forecast period, starting from 2025, with the deployment of major processing facilities and the increase in engineering

products supply, industries producing high value added products will affect the regional economy.

Increased production and value added in the capital-intensive sectors of the regional economy like oil and gas industry through the multiplier effects eventually leads to an increase in GRP of the Krasnoyarsk region. So in the basic Scenario the GRP increased by 2.7 times over the period, and in the Scenario IV – 3.5 times for the period. Forecast estimates showed that the average annual GRP growth at a basic Scenario will be 4.1%, II will provide a level of 4,8%, III – 5 1%, IV – 5,2% per year. By the means of production chain formation in oil and gas related industries, the LCRs enable to achieve more than 1% increase in average annual GRP growth rate (Table 1).

**Table 1**

Forecast indicators summary by scenario

Indices	Scenario			
	I	II	III	IV
Population, ths people	3023.8	3079.6	3109.5	3116.7
CAGR of GRP, %	4.1	4.8	5.1	5.2
GRP per capita in 2035, ths rub	1048.6	1221.1	1305.1	1326.5
Industrial output per capita in 2035, ths rub	947.2	955.2	979.0	978.0
Investment per capita in 2035, ths rub	228.1	233.8	236.6	235.5
CAGR of real income, %	3.9	4.6	4.9	4.9
Average monthly income per capita in 2035, ths rub	52.0	60.5	64.6	65.7
Tax revenues per capita in 2035, ths rub	122.5	149.1	162.7	165.7
Number of employees per 1,000 people in 2035	503.2	514.2	519.6	527.5

Implementation of LCR policy will affect the real incomes: the average annual rate of growth in the IV Scenario will be 4.9% versus 3.9% at baseline. This in turn gives the opportunity to reverse the population decrease trend, which had been observed over the last 10 years. This trend is highly connected with the growth of real income per capita and the job creation in the region.

Taking into account the population size forecast and the required in the Scenario IV total number of employees, we can predict the necessary influx of people. In order to implement the planned projects it is necessary to carry out a considered migration policy, aimed to attract highly skilled workforce. It is also required training of local qualified engineering staff to serve high-tech enterprises in related sectors.

The comparative analysis of the four scenarios confirmed that the increase of local demand of the oil and gas industry companies allows achieving qualitative changes in key indicators of economic development. Development of a regional oil and gas engineering increases the efficiency of the industry by reducing capital costs. However, multiplicative effects of the development of oil and gas industry couldn't be a sound basis for economic growth in the long term. Oil and gas projects may influence the related industries and service especially at the initial stage of development, when major investments are carried out and the growing volume of work is performed in the exploration and development drilling, fields' development and infrastructure construction. In the stage of declining production multipliers effects will gradually decrease. In this regard, the sustainable development trends of the regional economy may be achieved through the establishment of the processing sector and engineering-oriented industries, or diversifying the economy, and researching other points of growth.

## **Conclusion**

LCRs are able to involve local producers and labor in the implementation of oil and gas projects, to create multiple (indirect) effects through the regional inter-industry linkages. Development of equipment and services suppliers for oil and gas industry by ripple effects is able to boost economic development and diversify regional economy. Thus, the results of the calculations support the proposition that the LCR policy may be a kind of tool generating the induced economy. Moreover the study shows a strong potential capacity for the regional economy to maintain sustainable growth exploiting and properly balancing the levers of LCR policy. Using the appropriate economic and mathematical tools it is possible to form special guidelines for either local or national governments in order to avoid situations when procurement expenditures may prop up inefficient industries instead of driving economic development.

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