

State Support of Delivery of Fuel & Energy Resources to the Subarctic Zone of the Russian North-East: A View & Recommendations

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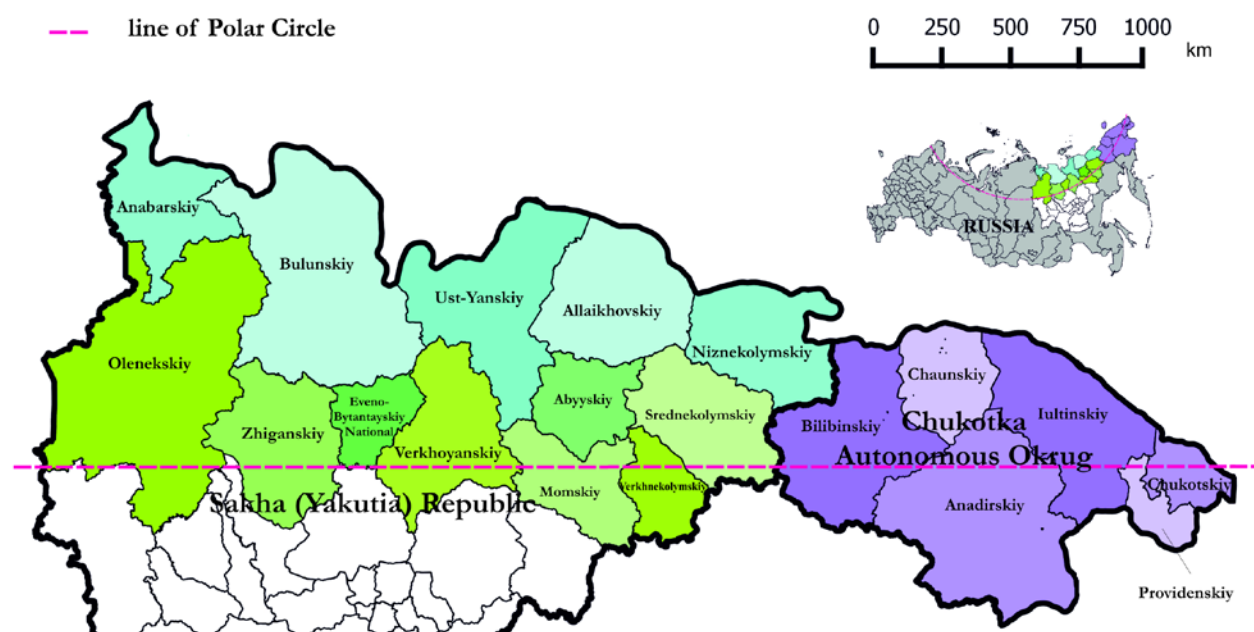
Existing approaches of state support of fuel and power delivery to the Chukotka Autonomous Okrug and Polar regions of the Sakha Republic (Yakutia) are discussed in the article. Considerable attention is focused on remotely located regions of Yakutia which are in more difficult conditions and have special features of goods delivery. Complicated transportation-logistic schemes of fuels delivery, difference in the launch and completion of river and marine navigation, ice roads, thousand kilometer length of the routes lead to a significant increase of time and costs of goods delivery and thus to deterioration of its quality. Since 2003, subventions from the Fund of Financial Support for the Russia's Federal Subjects have not any longer been targeted. A general transfer is allocated by the federal budget subsidize Russian regions. Fiscal support of delivery of freights is carried out by means of transfer of subsidies from to the budget of the Sakha Republic and Chukotka as subsidy by an authorized operator of the governments, annually selected in bidding and performing goods delivery to the north. The advantages and disadvantages of the current system of fuel and power delivery to the Arctic regions of Yakutia and Chukotka are evaluated in the article. An effective way of strengthening energy safety in Yakutia and Chukotka and decreasing expenses is an arrangement of fuel mining locally to replace fuels transported from other regions.

Introduction

The Sub-Arctic zone of the Russian North-East encompasses the Chukotka Autonomous Okrug and Arctic regions of the Sakha Republic (Yakutia), and is characterized by extremely harsh climate, a low population density, substandard living conditions, underdeveloped economic and social sectors, and the total dependence of community sustainability on delivery of goods in summer (Figure 1).

These territories cover the least studied and underdeveloped eastern Arctic and Polar zones of Russia. The Sub-Arctic areas of Yakutia encompass 13 municipal districts, 5 of which are located within the Arctic zone, where the population of 70,000 people occupy 1.7 million km² (Fondahl et al. 2014). The total area of Chukotka makes 721.5 km² with a population of 50,500 people.

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Figure 1: Arctic and Sub-Arctic areas of the Sakha Republic (Yakutia) and the Chukotka Autonomous Okrug

In the Soviet time, intensive development of the Russian North-East was related predominantly to geological survey, operation of mining enterprises, management of the North Sea Route, and combating state security issues. A reliable system of support of ahead of schedule delivery of goods to northern territories (Vasiliev et al. 2009; Pelyasov 2005) was established and operated.

Since 1989, in Yakutia and Chukotka, the number of permanent residents in the areas under study has decreased respectively by 2.1. and 3.1. (Table 1).

Table 1: Population of the Arctic regions of Yakutia and Chukotka

Administrative area (ulus)	Population, persons, 1989. ¹	Population, persons, January 2014. ²	Population in 2014, in % as compared with 1989.	Number of settlements
13 Arctic areas, Sakha Republic (Yakutia)				
Abyyskiy	6097	4196	68.8	6
Allaikhoyskiy	5218	2764	53.0	7
Anabarskiy	3903	3403	87.2	4
Bulunskiy	17,257	8507	49.3	13
Verhnekolymskiy	10,072	4317	42.9	6
Verkhoyanskiy	24,259	11,665	48.1	17
Zhiganskii	5678	4245	74.8	5
Momskiy	5505	4237	77.0	7
Nizhnekolymskiy	13,692	4414	32.2	12
Olenekskiy	3993	3963	99.2	4

Srendnekolymskiy	9441	7535	79.8	10
Ust-Yanskiy	41265	7359	17.8	11
Eveno-Bytantayskiy National ³	0	2790		2
Total 13 Arctic areas	146,380	69,395	47.4	104
Chukotka Autonomous Okrug				
Anadirskiy	40,475	23,329	47.2*	16
Beringovskiy ⁴	8968			
Bilibinskiy	27,847	7855	28.2	10
Iultinskiy	15689	5197	16.5**	10
Providenskiy	9778	3771	38.6	6
Chaunskiy	32,167	5800	18.0	12
Chukotskiy (rural population)	6878	4603	66.9	6
Shmidtovskiy ⁵	15,726			
Total Chukotka Autonomous Okrug	157,528	50,555	32.1	60

In Yakutia, a marked population decline is evidenced in the areas of incessant industrial development in the Ust-Yanskiy region – by 5.6 times; in the Nizhnekolymskiy region – by 3.1; and in the Bulunskiy region – by 2.1. In regions with traditional economies, the population decline was less evident: in the Abyyskiy region – by 1.5; in the Anabarskiy, Zhiganskiy, Momskiy, and Srendnekolymskiy regions – by 1.1-1.3; while the population density in the Olenekskiy region was not subject to a change. In Chukotka's Anadirskiy (by 2.1) and Chukotskiy regions (by 1.5) a less marked population decline was evidenced. The population in the Bilibinskiy, Iultinskiy, and Chaunskiy regions declined by 3.5 - 6.0 times.

Similar dynamics resulted from a shift in Russian state policy towards the Arctic by the end of the 20th century and a significant reduction of mining production in northern Yakutia (Table 2) and Chukotka, as well as the deterioration of other subsidiary sectors.

Table 2: Production volumes in the Arctic areas, Sakha Republic (Yakutia)

Mineral / year	1995	2000	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Diamonds												
Joint stock company "Almazy Anabara"⁶												
Diamond production, thousand carats	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	2534	2408	2521	3059
Production cost millions USD	N/A	N/A	N/A	N/A	N/A	N/A	157.7	136.3	175.4	153.1	N/A	N/A
Joint stock company "Nizhne-Lenskoe"⁷												
Diamond	N/A	N/A	984	1297	1301	1372	1351	1253	1508	1521	2010	1818

production, thousand carats												
Production cost million USD	N/A	N/A	81.53	97.1	90.8	92.94	100.9	86.4	116.9	110	132.9	
Gold, kg⁸	2242	956.5	614	2152	594	785.4	593	642	432	482	415	446
Inclusive the Ust- Yanskiy region	1137	491.8	6	1350	22.0	26.6	35.3	29.0	2.0	24.0	15.0	43.0
The Verkhoyanski y region	1105	327.8	262	308.0	316.0	323.2	224.1	310.0	130	106.0	123.0	137.0
The Momskiy region		60.0	96	107.0	118.0	217.8	153.4	149.0	141	176.0	125.0	133.0
The Nizhnekolym skiy region		8.9	154	280.0	20.0	0.0	26.8	5.0	0	0.0	27.0	
The Verkhnekoly mskiy region		8.0	0	0.0	0.0	0.0	0.0	0.0	0	0.0	0.0	0.0
Tin, ton (the Ust-Yanskiy region) ⁸	3707	2569	1957	2001	674	187	No production					
Coal, thous. ton (the Verkhnekoly mskiy region) ⁸	N/A	279	182	123	152	150	195	172	243	200	171	160

Currently, management and governance of settlements in the polar areas of Yakutia and Chukotka are predominantly oriented towards social needs of the communities (Vasiliev et al. 2009). These remote Arctic settlements have no industry and are generally used as terminals for supply of sparse mining enterprises, transportation of their production and personnel (Huskey 2011). The production and infrastructure are bound to diamond, gold and other mineral industries (Fondahl et al. 2014), and labor force is attracted in a shift work arrangement.

Rearrangement of the Russian economy resulted in changes of approaches towards its Arctic territories development, notably the eastern regions. In the 1990s, the operating system of delivery of goods to northern territories collapsed resulting from misunderstanding of the role of the Arctic and the prospects of its development in the framework of the country's economy and the demolition of branch-wise and departmental principles of management and governance (Pelyasov 2005; Vitjazeva & Kotyrlo 2007; Vasiliev et al. 2009).

In 1991, the State Committee for Affairs of the North (Goskomsever), Russian Federation, was established as a federal body responsible for northern policy, its characteristic feature being a

territorial (horizontal), non branch-wise principle of management (Vitjazeva & Kotyrlo 2007). In 2000, the Committee was eliminated, and its functions were transferred to the Ministry for Regional Development (Russia) and Ministry for Economic Development and Trade (Russia). According to some Russian economists (Pelyasov 2005; Vitjazeva & Kotyrlo 2007), the Commission liquidation was a mistake. The northern territories and the Arctic region are autonomous in state governance due to complicated and diverse problems to be solved under special conditions.

Delivery of fuels to Arctic regions of the Sakha Republic (Yakutia) and Chukotka Autonomous Okrug

Transportation-logistic schemes for delivery of fuels as a large share in the total volume of delivered goods, in terms of quantity and finance, to the northern regions under study are complicated, as the launch and conclusion of river and marine navigation and the operation of winter roads differ in timespans, with resultant delivery risks (Huskey et al. 2014; Vasiliev et al. 2009; Stephenson et al. 2014).

The extent of fuel and energy delivery routes is measured in the hundreds and thousands of kilometers, while annually delivered volumes of goods to each community are generally small, sometimes composing only a few tons for small settlements.

The Sakha Republic (Yakutia)

Oil, gas condensate, oil products (diesel fuel, petrol, and aviation kerosene), and coal produced either in the republic or in other Russian regions, are delivered to the Arctic regions for production of electric and thermal power, supply of facilities, and transport fuel.

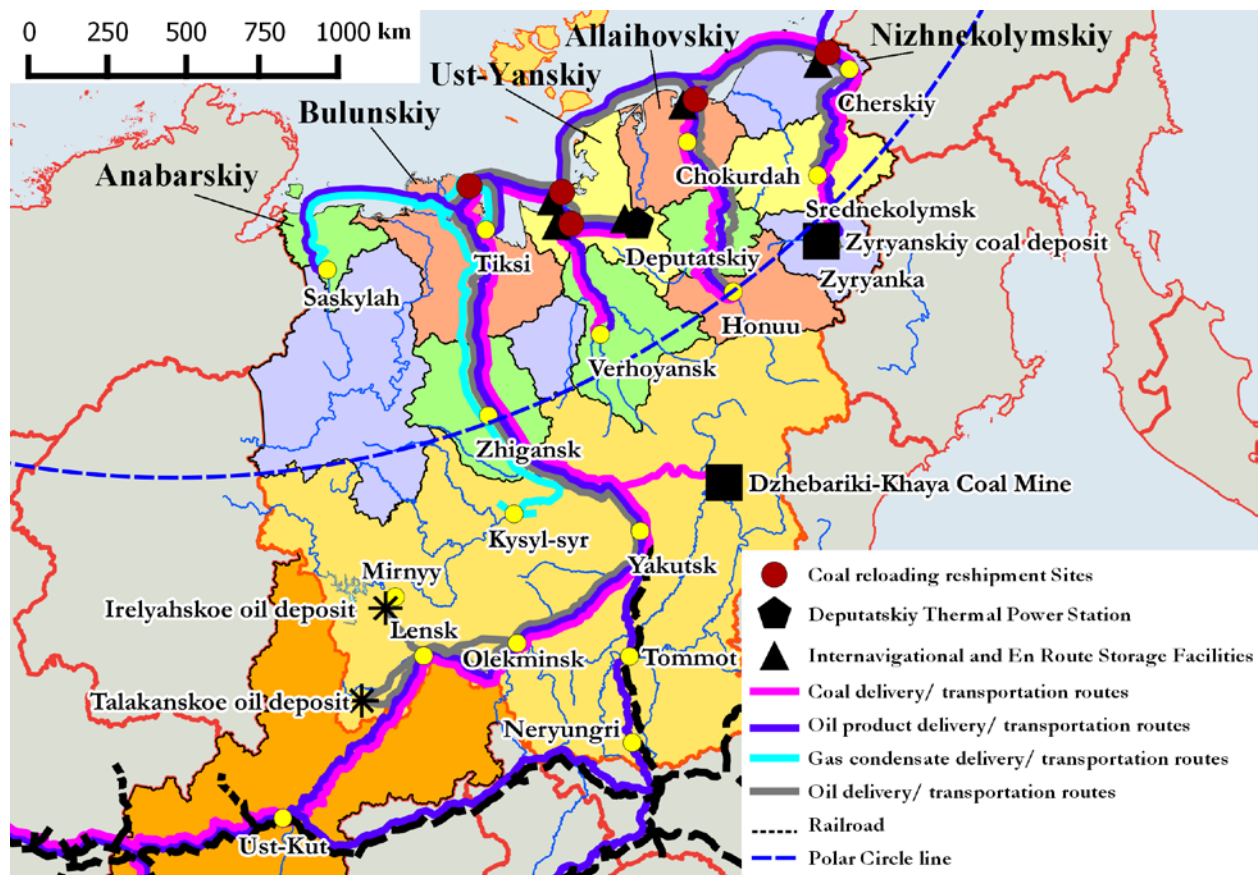
Required fuel and energy resources come from various areas. Oil products are delivered from plants via railroad to the town of Ust-Kut located on the Lena River in the Irkutskiy Oblast, where they are subsequently loaded on to vessels and transported down the river. With the construction of the railroad on the right bank of the Lena in the vicinity of Yakutsk (a settlement of Nizhniy-Bestyakh) and a large-scale reconstruction of the highway in South Yakutia–Yakutsk, new schemes for goods delivery have been elaborated to facilitate a significant decrease in the risks relating to shallow waters in the upper reaches of the Lena in the shipping season.

Oil and gas condensate are transported from deposits located in West Yakutia via pipelines to river ports and are then loaded onto river vessels. Coal is delivered from the Dzhebariki-Khaya mine through the Aldan and Lena rivers and from the Zyryanskiy mine on the Kolyma River (Figure 2).

Motor vessels with goods (fuel energy and coal) for northern territories go down to the Lena estuary and the Kolyma River. If necessary, the goods are shipped on to river boats and seagoing vessels, and take the sea route for estuaries of the Anabar, Yana, Indigirka, and Kolyma rivers, where they are transshipped aboard shallow-draught crafts.

Correspondingly, delivery schemes are formed with respect to the navigation seasons and terms of operation of winter roads used for transportation of goods to remote communities located far from rivers and seashore.

Figure 2: Major routes of fuel and energy resource delivery to regions of the Sakha Republic (Yakutia).



In 2014, thousands of tons of product were shipped to meet the needs of housing and communal services, including coal from the Dzhebariki-Khaya deposit (128 tons), from the Zyryanskiy coal deposit (70.6 tons), and from the Arkagalynskiy deposit (1.78 tons) in the Magadanskiy oblast, as well as 41 thousand tons of oil, 10.9 thousand tons of gas condensate, and 2.4 thousand tons of diesel fuel. In addition, to supply the joint stock company Sakha energo (the Deputatskiy thermal power station), 37 thousand tons of coal and 59.1 thousand tons of oil products were delivered by the Russian joint stock company SUEK (Government of the Sakha Republic (Yakutia) 2014).

Currently, subventions to the Russian Federation regions are no longer target-oriented. Subsidies from the federal budget to the regions are part of an aggregate transfer, without specification of purpose or sectors of application. The only objective is a guarantee of balanced state payments to regions with a budget deficit, regardless of their geographical location and long-term product delivery.

In 2011-2014, expenditures on fuel delivery and storage in the 13 Arctic regions of the Sakha Republic rose by a factor of 1.5 and reached 4 billion rubles per year (Table 3). The most marked increase in expenditures is obvious in the Anabarskiy (1.6 times), Verkhoyanskiy (2 times), and Eveno-Bytantaiskiy regions (2.7 times), mostly due to increased costs of coal and crude oil delivery.

Table 3: Fuel costs (current market price and the costs for transporting and storage fuel to the community) according to Arctic regions of the Sakha Republic (Yakutia), (thousand rubles)

Arctic areas, Sakha Republic (Yakutia)	2011	2012	2013	2014
Abyyskiy	169,665.1	187,364.5	242,069.8	250,329.9
Verhnekolymskiy	66,490.5	66,742.7	76,224.5	87,308.7
Momskiy	241,331.1	249,288.7	310,519.3	357,324.3
Srendnekolymskiy	199,053.2	203,700.5	247,738.5	271,869.9
Eveno-Bytantayskiy National	57,453.7	67,938.9	83,400.6	157,694.9
Allaikhovskiy	161,865.2	164,432.8	231,095.9131	223,654.3
Anabarskiy	111,070.1	119,745.1	187,327.7	181,009.2
Bulunskiy	356,774.2	365,730.2	443,009.5	492,973.8
Verkhoyanskiy	404,211.2	451,970.8	589,274.2	833,730.4
Zhiganskiy	96,034.6	101,031.7	65,726.1	88,125
Nizhnekolymskiy	207,634.3	210,447.6	275,078.1	258,638.8
Oleneksky	160,223.1	183,390.1	211,391.2	232,145.2
Ust-Yanskiy	398,337.1	475,375.8	625,655.4	606,764.8
Total	2,630,143	2,847,159	3,588,510	4,041,569

Source: Data of the State Committee for Pricing Policy – the Regional Power Commission, Sakha Republic (Yakutia).

The situation varies from region to region: in the Ust-Yanskiy region, a share of shipped coal for housing and utilities services is 90%, in the Nizhnekolymskiy region it is 28.4%, while in the remainder a share of liquid fuel ranges between 90-100%.

Table 4: Fuel costs over Arctic regions of the Sakha Republic (Yakutia) (thousands of rubles).

Fuel	2011	2012	2013	2014
Coal	902,434.2	990,359.7	1,380,552	1,765,780
Crude oil	1,028,624	1,100,543	1,457,008	1,548,331
Gas condensate	412,296.9	463,615.9	424,916.1	455,962.4
Diesel fuel (the needs of housing and communal services)	253,454.9	250,281.3	250,721.7	246,768.9
Woods	33,333	17,968.1	33,130.3	24,726.1
Total	2,630,143	2,847,159	3,558,510	4,041,569

Source: data of the State Committee for Pricing Policy – the Regional Power Commission, Sakha Republic (Yakutia).

Storage and distribution costs of major fuels increased by 2 times for coal and by 1.5 times for oil over the four-year period, while the share of coal in the structure of fuels expenditures has increased from 34% in 2011 to 43% in 2014, as the share of oil has not changed (Table 4).

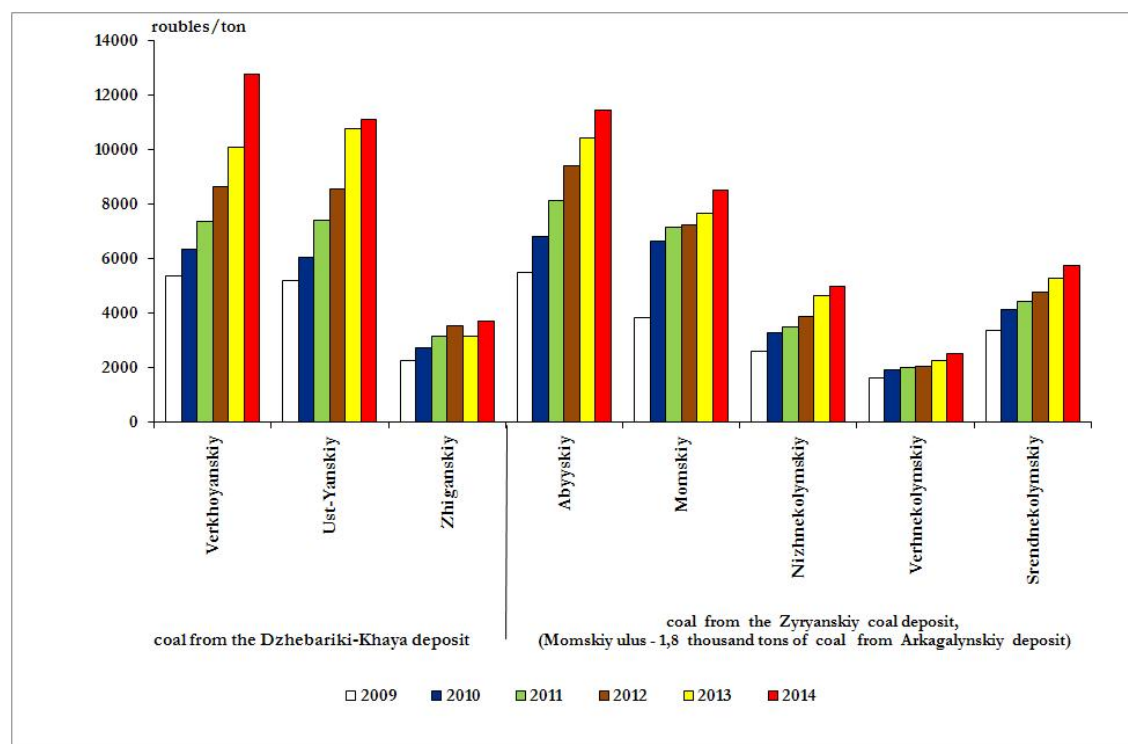
According to the data of the Sakha Republic Regional Power Commission, the share of coal itself in the structure of its prime cost for consumers in remote regions composes only 15-20% for the Abyyskiy, Momskiy, Ust-Yanskiy, and Verkhoyanskiy regions, and 37-50% for other Arctic areas - the Zhiganskiy, Nizhnekolymskiy, Srednekolymskiy, and Verkhnekolymskiy regions.

In 2014, according to data available from the Regional Economy Commission, State Committee for Price, Republic of Sakha (Yakutia), the cost of fuel oil including delivery to regions ranges, for coal, from 5 thousand rubles per ton (to the Nizhnekolymskiy region) to 11 thousand rubles per ton (to the Ust-Yanskiy region), which exceeds world prices by 2-3 times (Figure 3); for oil, from 20,600 rubles per ton (to the Bulunskiy region) to 22,600-23,400 rubles per ton (to the Allaikhovskiy and Nizhnelenskiy regions); and for gas condensate 23,700 rubles per ton (to the Anabarskiy region) to 24,300 rubles per ton (to the Bulunskiy region).

The recent large price rises for gas condensate in Yakutia resulted in costs significantly exceeding the cost of oil produced in the republic, leading in 2013 to the Allaikhovskiy region's refusal of gas condensate deliveries and a transfer to oil. Such transitions, however, usually requiring additional investments into the re-equipment and renovation of boilers.

We will now look at coal delivery to Yakutia's Arctic regions from the Dzhebariki-Khaya and Zyryanskiy mines, which supply consumers living in the lower reaches of the Lena, and the basins of the Yana, Kolyma, and Indigirka rivers. The special feature of these delivery schemes is the availability of en-route storage facilities.

Figure 3: Cost of coal in view of transportation and storage in Arctic regions of Yakutia, rubles/ton



Source: Data of the Regional Economy Commission, State Committee for Price, Republic of Sakha (Yakutia)

Part of the delivery of coal to consumers on the Yana and Indigirka rivers, where annually navigable depths meet their upper reaches for an average of only a month's time, is stored in the river estuaries due to a non-concurrency in the river and marine navigation seasons. Coal may be stored in various storage facilities and river estuaries as required by operational and hydrological situations.

Located in the Yana basin are the Ust-Yanskiy, Verkhoyanskiy, and Even-Bytantaiskiy regions (uluses). Delivery of fuels via vessels (Figure 4) is performed with 2-3 or more transshipments and en route storage, in some cases in the second navigation year. Coal is shipped by water for most of the route from deposits to the settlements of Nizhneyansk (Figure 5), Ust-Kuiga (Figure 6), Saidyy, and Batagai.

Volumes of coal delivery to these destinations depend on the hydrological conditions on the Yana and the quality of operation and logistics management. The coal is delivered to end-point consumers by motor-vehicle transport via winter roads (Figure 7). Any planned volumes of coal from the previous navigation season which haven't yet been shipped by water are also transported by winter roads with an operation period of around 3.5-4.5 months.



Figure 4: Coal shipment by river (Figure 4-7 Photos by V. Zaharova, V. Gavrilova)



Figure 5: Transshipment coal storage unit (Nizhneyanskiy)



Figure 6: Coal storage unit (Ust-Kuiga)



Figure 7: Coal loading on to motor-vehicles (Ust-Kuiga)

The delivery period for a particular volume of coal can range from 3-4 to 30 months, with 3-4 transshipments. Such a transportation scheme, even absent technological difficulties, implies huge losses in terms of quality and quantity (Zaharov 2013). The total length of the coal transportation

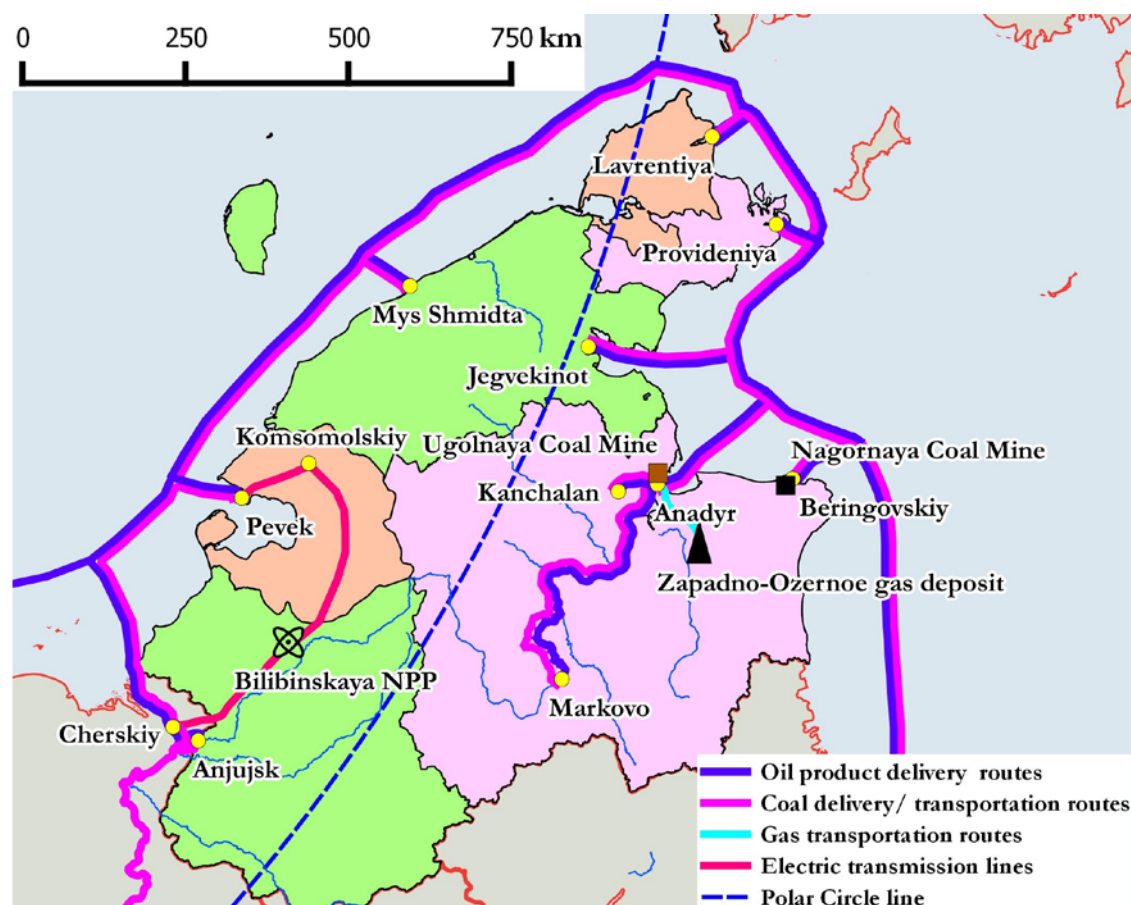
route produced by Yakutia's enterprises for remote consumers can reach 2700–2900 kilometers. The distance multiplies for oil product suppliers from other Russian regions.

The Chukotka Autonomous Okrug

The Chukotka Autonomous Okrug utilizes gas produced in small quantities (25.4 million m³, 2014) in the Zapadno-Ozerny deposit (100 km south to Anadyr) for NGV stations; black and brown coal from the Nagornaya (202,000 tons) and Ugolnaya (233,500 tons) deposits and black coal transported from the Zyryanskiy open-pit mine and Sakhalin (>110,000 tons); and oil products (in 2014, 106,400 tons of diesel fuel; 24,400 tons of jet fuel; 5500 tons of petrol) supplied from Russian plants via Russian Far East ports and the Northern Sea Route from Murmansk. Moreover, a nuclear power station operates in Bilibino connected to the Chaunsky thermal power station by electric transmission lines.

Fuels are delivered to storage facilities mostly via marine transport to five major ports (Figure 9).

Figure 9: Major fuels delivery routes to the Chukotka Autonomous Okrug.



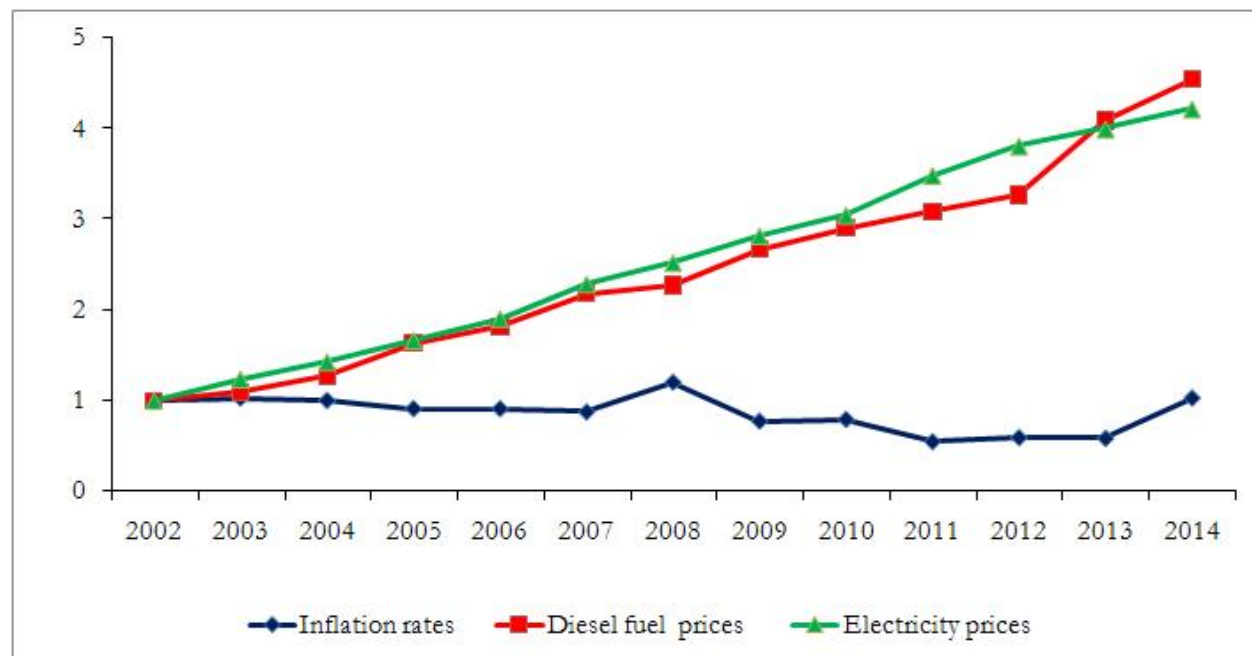
Fuel is shipped in small tonnage vessels by sea and navigable rivers to the settlements. In cold seasons, winter roads are operable for the delivery of goods to remote and difficult to access locations.

In northern Yakutia and Chukotka, waterway and highway networks are not reliable for supplying consumers and enterprises with fuels given the settlement and productive force pattern now in place. In recent years, shallow waters in navigable sections of rivers have added to the complexity of the long-standing issue of northern delivery. In 2013, for example, this resulted in a delivery failure to the Indigirka and sudden freezing of winter roads to deliver fuels by more expensive motor transport, and even usage of a military helicopter to transport diesel fuel, to a small remote village. The updating of the delivery scheme led to additional expenses totaling up to 900 million rubles financed from the regional budget. In addition, the forced outage of vessels was estimated at 900 million rubles (Tajurskij 2013). The high risks of delayed goods delivery in the required volumes will continue given the existing levels of transport infrastructure development. In the short- and medium-term, a significant rise in energy consumption is unlikely.

During the past decade, a decrease in the efficiency of fuels transportation and usage has been evident. Delivery and consumption of oil, gas condensate, natural gas, and oil products are increasing alongside a reduction in coal mining, including those coals extracted from the Arctic zone.

In 2002-2014, costs of diesel fuel increased by almost 5 times (from 11 to 50 rubles per liter), and that of electric power by 4 (from 1.05 to 4.43 rubles per kW/hr) (Figure 10).

Figure 10: Fuel price movement in the Sakha Republic (Yakutia), 2002.



Source: data of the Russian Statistics and the Regional Economy Commission, State Committee for Price, Republic of Sakha (Yakutia), various years.

Rates of diesel fuel and electricity price increases were higher than inflation rates, which averaged 8-11% annually and in 2014 reached its peak at 16%. In 2014, fuel expenditures cost 1.2 billion rubles.

Comparison of delivery mechanism for fuels in Alaska and Chukotka

The Chukotka Autonomous Okrug is relatively similar to Alaska (USA) in terms of fuel delivery conditions. Similar to Chukotka, Alaska is characterized by a poorly developed transportation network, as compared with other American states.

However, there are significant varieties in organization of fuel delivery in both the regions. The characteristic feature of the transportation system in Chukotka is a total lack of railroads and pipelines.

Major cargo transportation over Chukotka is performed via marine, air, and motor transport, while in Alaska, southwards from the Arctic zone borderline, the Alaska Railroad is in place (760 km). Although the railroad runs within the state limits and has no access from outside the region, its mere existence significantly simplifies cargo transportation to nearby settlements.

In Chukotka, the network of roads accessible all year round was constructed only in 2011-2012. Their total length makes 4500 km, including 568 km long dirt roads, 1300 km long winter roads with prolonged terms of exploitation, and 2700 km long winter roads (Voroncova 2015). In Alaska, the network of motor roads with concrete surface covers the central and southern parts of the state, the roads' total length being about 20,000 km.

Northern areas of Chukotka are accessible for less than 3 months. Limited terms of goods delivery to these areas are due to severe climatic conditions. Waters in the region are navigable for about 3 months, and ice breaker steering is required to deliver goods for the rest of the year, which significantly increases expenditures.

Southern areas of Chukotka depend on marine navigation for 3-6 months, as goods delivery is performed predominantly via the sea route (Vasiliev et al. 2009).

By contrast, ice-free coastal areas of Alaska where big cities and settlements are located are open to goods delivery all the year round. The so-called “northern delivery” is performed only for settlements located in Central and Western Alaska (Szymoniak et al. 2010).

Most of the rural settlements in western Alaska and northern Chukotka are road-less and are not interconnected. As such, fuel delivery to some rural settlements is performed by air. Coal and oil products in Chukotka and diesel fuel in Alaska form the backbone of fuel delivery.

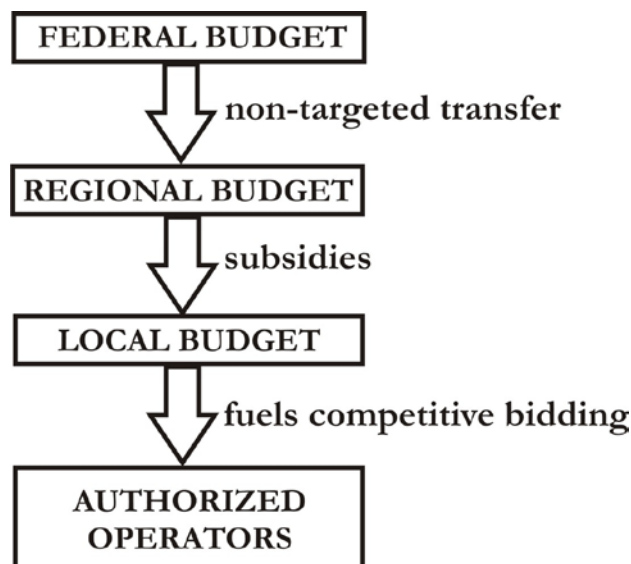
State regulation of long term product delivery in Sakha Republic (Yakutia)

Financing schemes for goods delivery to the north comprise one of the most complicated areas of finance (Gritsevich 2008). The system of state support of fuel delivery has undergone several changes in its long history. Under a centralized planning framework, the purchase and delivery of goods was performed by assigned enterprises, financed from the state budget.

However the state financing of pre-scheduled delivery of goods was terminated as an article of budget expenditures in 2003, and subventions from the Fund for Finance Support of Russian Federation Subjects ceased to be purpose-oriented.

A general transfer is allocated by the federal budget to subsidize Russian regions. Financial guarantees for the pre-scheduled delivery of goods are now conducted through a fund transfer from the budgets of the Sakha Republic and Chukotka as a subsidy to authorized operators, who are selected annually in a bidding process and then perform the goods delivery to the north (Figure 11).

Figure 11: Financing scheme of pre-scheduled fuel deliveries



In Yakutia, the criterion for defining settlements as Arctic and northern is an inaccessibility by transport for more than 180 days a year (State Assembly (Il Tumen) of the Sakha Republic (Yakutia) 2004).

All operations connected with state involvement in northern delivery, referring to fuel purchase, delivery, transshipment, and storage, are performed through competitive bidding. According to statutory regulations on the placement of orders for goods and services to meet state and municipal needs, all purchases by states are made through open-bid auctions. The bidding for goods delivery is an open procedure intended to select a production supplier and to define the prices of the agreements. The multi-link and complicated conditions of delivery have been responsible for a significant fuel price increase for consumers.

Today's structure of pre-scheduled fuel delivery implies a shared responsibility for various stages of delivery among federal (timely financing), regional (purpose-oriented draft of funds, timely and full supply of northern communities with fuel), and local (fuel supply for housing and communal services) state bodies.

Thus, the redistribution of responsibility and financing from the federal level (the Ministry for Economic Development) to the regional and municipal levels is evident. The major source of financing of pre-scheduled goods delivery is now the regional budget, while a right for guaranteed

prices is granted to enterprises, including profit-making organizations of housing and communal system, thus complicating control over consumer choice and price formation by state authorities.

Currently, no systematized approach towards pre-scheduled goods delivery management in the region under study has been elaborated. No unified regulatory legal act of the Russian Federation to define the order of legal regulation of subjects, sources of finance, rights and obligations of the parties of agreements on goods delivery, or division of responsibility between different government bodies and levels are currently in place.

Information on the fuel prices considered in the formation of electric and thermal energy rates for each year supplied to enterprises of the Chukotka Autonomous Okrug is provided by the State Committee for Price and Tariff Regulation, and by the State Committee for Price Making Policy, Regional Energy Commission Sakha Republic, in the Sakha Republic (Yakutia).

Measures on improvement of pre-schedule fuel and power resources delivery

The data here and above allows us to summarize the pros and cons of the existing system of pre-scheduled delivery of fuels to the polar regions of Yakutia and Chukotka (Table 5).

Table 5: Pros and cons of the existing system of pre-scheduled delivery of fuel and power resources to the polar regions of Yakutia and Chukotka.

Pros	Cons
Unified system of delivery of different types of fuel and power resources	Need for usage of multiphased transportation and logistics scheme
Strictly centralized transport and financial support for fuels delivery State support for pre-schedule delivery of fuel and power resources including payments to suppliers, transport and energy companies	Long period of fuels delivery to ultimate consumers High delivery expenses; 2-3 times higher than the cost of fuel and power resources Multiple re-loading and inter seasonal storage of fuel and power resources in en route storage facilities Huge losses of resources in terms of quality and volumes along the technological chain “fuels producer - consumer “
State control over delivery and consumption of fuel and power resources	Exceptional dependency on petroleum products supply from outside the regions Necessity for storage of large reserves of petroleum products
Large suppliers and consumers of fuel and power resources capable of organizing relatively efficient delivery and fuel resources usage (Joint Stock companies “Sakhaneftegazsbyt” and “Yakutskenergo”, State Unitary Enterprise “Chukotkasnab”, etc.)	Insufficient levels of usage of local energy sources, notably, coal
Competitive selection of suppliers of fuels and transportation companies	Lack of standardized boiler equipment and noncompliance with fuel types

State and regional programs on support of pre-schedule delivery and consumption of fuel and power resources and regular up-grading of such programs	Low energy efficiency of fuel usage Social and economic inequality of population in various regions with similar climatic conditions
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The analysis of pros and cons allows us to formulate recommendations aimed at the improvement of mechanisms of goods delivery to the northern territories.

For improvement of fuels delivery to remote areas of Yakutia and Chukotka, it is necessary to not focus on an efficiency estimation of the separate stages of production, purchase, storage, and delivery. Rather, it is advisable to analyze the whole system of providing the region with fuel and power resources. Here, volumes of fuel and power resources consumed and paid for by the ultimate consumers should be used as a criterion in comparison of existing and proposed options of delivery.

Currently, the economic efficiency of pre-scheduled goods delivery is due exclusively to the savings from separately calculated expenses on the purchase and delivery of fuels, and is owing to an absence of the necessary financial efficacy (Vasiliev et al. 2009).

It is worthwhile to note here the issues related to the prospective re-settlement of the population from remote and difficult to access Arctic areas to places with more favorable climatic and transportation conditions. In spite of the expected economic efficiency of resettlement, we should take into consideration the required solutions of various social problems, which may require a long period of time. It is also obvious that the financial expenditures for resettlement will exceed the annual expenses on maintenance of communities, which will result in delayed economic benefits (Gritsevich 2008).

An effective way of strengthening the energy security of Yakutia and Chukotka and decreasing expenses would be the arrangement of local fuel production to replace fuels transported from other regions. As proposed in the Strategy of Russian Arctic Development, an optimization of the economical mechanisms of goods delivery to the north is required, predominantly “using local energy sources and energy-saving technologies, as well as upgrading power facilities” (Putin 2013). However, profit maximization should not necessarily be the main goal for companies already mining or planning to mine in the Arctic zone. Feasibility and needs for companies oriented towards population welfare, rather than commercial interests, is predetermined by increased energy requirements for safety, the creation of new jobs etc.

Coal mining in the Arctic is hardly possible without the participation of the state, as coal production projects are characterized by high capital intensity, long-term pay-back periods, and significant investment requirements.

However, no federal incentives are currently offered to utilize local coals in the Arctic regions of Sakha in substitution of delivered fuels. Recently, the proportion of regional and local budgets taken up by the supply of energy to municipal entities has been shown to be rising.

Special preferences at the federal level for coal production enterprises that mine or plan to mine in the Arctic region would be feasible, including fixed tax rates at 0% for mineral production; and an exemption from income, private property, company property, and transport taxes. In addition, simplified procedures for outgoing and licensing document execution for field development are required.

State guarantees for credits granted to Russian enterprises for the implementation of investment projects, technical equipment upgrading, etc., and subsidies to cover part of their expenses on interest rate discharge are also required at the regional and municipal levels.

For a number of regions in Yakutia and Chukotka, the transportation costs exceed the costs of one ton of delivered fuel so substantially that the development of local deposits near the key points of consumption would significantly increase the energy security of the local population and decrease regional budget expenses.

Development of local coal deposits by small scale and very small opencast mining producers should be conducted with the active participation of regional authorities. Coal prices should be fixed at such a level that they would allow mining companies to operate normally with low economic risks and to be able not only to cover operating and capital costs connected with exploration, but also to achieve the profits necessary for mining. Currently however, the state refuses to use mechanisms of direct and indirect pressure, thus equating small-size and very small coal opencasts to typical enterprises in European Russia.

Our calculations reveal the potential for a three-fold coal price decrease, compared to the price of coal delivered externally, if local coal deposits were developed on the Indigirka river in the Abyiskiy region (rayon). Even if the price of coal from newly developed coal mines which are close to the consuming communities was equal to the price of transported fuels (11-12,000 rubles per ton for the Ust-Yanskiy and Abyiskiy regions), energy security issues should demand significant improvements in the transportation schemes in the Arctic. Such an approach furthermore conforms with market economy principles.

Conclusions

This article has addressed mechanisms of state support for fuel and power delivery to the Chukotka Autonomous Okrug and polar regions of the Sakha Republic (Yakutia). The focus has been on the difficulty to access areas of those territories, which experience harsh climatic conditions and specific difficulties in goods delivery.

Complicated transportation schemes of fuels delivery, differences in the launch and completion of river and marine navigations, and operation of winter roads lead to a significant increase of time and costs of goods delivery and thus to the deterioration of its quality.

Annually, hundreds of millions of rubles are allocated from the federal, regional and municipal budgets for these expensive goods delivery procedures. Transportation expenditures account for 70-75% of the cost of fuel for consumers in the Arctic.

The system of state support of fuels delivery has undergone many changes in its long history. During the centrally planned economy, the purchase and delivery of goods was performed by specialized organizations and were financed from the Russian state budget. Since 2003, however, subventions from the Fund of Financial Support for Russia's Federal Subjects have no longer been purpose-oriented.

Given the redistribution of responsibilities among federal, regional, and municipal authorities, the maintenance of state control over a feasible choice of suppliers and price-formation has become much more difficult. Organizational and economic mechanisms of interaction and division of powers among federal, regional, and municipal authorities, and business entities participating in goods delivery, have not been regulated yet. As such, no system of organization for pre-scheduled goods delivery in Chukotka and Yakutia has been elaborated.

The potential for improvement of the economic mechanisms of pre-scheduled fuels delivery, predominantly through the establishment of local production of petroleum products to replace fuel types delivered from other Russian regions, has been demonstrated.

The survey and recommendations given in the article confirm the significance of the theme of the study.

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Notes

1. See http://demoscope.ru/weekly/ssp/rus89_reg1.php.
2. See http://www.gks.ru/free_doc/doc_2014/bul_dr/mun_obr2014.rar.
3. By the Decree of the Presidium of the Supreme Soviet, Yakut Autonomous Soviet Socialist Republic, April 21, 1989, the Eveno-Bytantaysky National Ulus (Rayon) was split out of the Verzhoyanskiy region (rayon).
4. By the Law of the Chukotka Automonous Okrug #44-03, May 26, 2011, the Beringovskiy region (rayon) was liquidated as an administrative and territorial entity and was joined to the Anadyrskiy region (rayon).
5. By the Law of the Chukotka Automonous Okrug #44-03, May 26, 2011, the Shmidtovskiy region (rayon) was liquidated as an administrative and territorial entity and was joined to the Iultinskiy region (rayon).

6. Reports of the Joint Stock Companies “Nizhne-Lenskoe” and “ALROSA” (<http://alanab.ykt.ru>, www.alrosa.ru).
7. Reports of the Joint Stock Company “Nizhne-Lenskoe” (<http://nlykt.ru>).
8. Data of the Ministry for Industrial Development of the Sakha Republic (Yakutia).
9. Annual reports of the Joint Stock Company “Yakutskenergo”. (http://yakutskenergo.ru/shareholders_and_investors/open_information/Year-reports.php).

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