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Regional State Programs as an Energy Supply Development Tool in the Russian Arctic *

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Abstract. Organizing reliable and affordable energy supply for consumers in the Arctic area is an important and difficult task. An effective solution of this task requires taking into account many factors. This paper analyzes how various factors are taken into account in the state programs of the Arctic regions of the Russian Federation, aimed at regional energy development. Natural resource, economic, social, technological, environmental, legal factors of energy supply are considered. The study is conducted on the example of four subjects of the Russian Federation, fully assigned to the Arctic zone (Murmansk Oblast, Nenets Autonomous Okrug, Yamalo-Nenets Autonomous Okrug, Chukotka Autonomous Okrug). The main research method is content analysis of the relevant information sources. The role of regional state programs in regulation of regional energy development is specified. A review of the main state programs of the considered Arctic subjects of the Russian Federation is carried out. It was revealed that the tasks of energy supply development are unevenly distributed in the state programs of the constituent entities of the Federation, and program measures are differently detailed. The content of the analyzed state programs is compared with the factors of energy supply. It is shown that regional state programs are primarily compared with economic factors. As instruments of regional policy, the state programs of the regions act as legal factors. Factors of other groups are taken into account in state programs to a lesser extent.

Keywords: *energy supply, region, Arctic zone, factor, state program*

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Introduction

This article was prepared as part of a research work on the topic “Interaction of global, national and regional factors in the economic development of the North and the Arctic zone of the Russian Federation”. At the previous stages of the study, the factors influencing the development of energy supply were identified and systematized, the basics of energy supply regulation in the constituent entities of the Russian Federation (regions) were studied, the tasks and powers of re-

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gional state authorities in the field of energy supply regulation were analyzed using the example of several Arctic regions.

The study examines the natural resource, economic, social, technological, environmental, legal factors of energy supply to consumers in the Arctic zone of the Russian Federation (AZRF). These factors were described at the first stage of the study and clarified in [1, Gasnikova A.A., pp. 132–133]. It is important to note that the factors under consideration are interrelated, often influence each other and should be considered comprehensively. A brief description of the energy supply factors of the Arctic regions is given below.

Natural resource factors of energy supply imply the availability of energy resources in the region, as well as climatic features that may affect the organisation of energy supply. Energy resources include fossil fuel reserves, hydropower from water reservoirs, as well as non-traditional renewable energy resources (NRES), primarily wind energy. Climatic features of the Arctic are manifested by low temperatures, high humidity, permafrost, strong winds [2, Popel O.S., pp. 48–49]. Severe climate, firstly, causes increased demand for electricity and heat energy, and secondly, it leads to higher production costs. In [3, Bogoyavlenskiy V.I., pp. 63–64] it is noted that the main hydrocarbon deposits and resources in Russia are located precisely in the Arctic, but permafrost complicates the construction and operation of fuel and energy complex (FEC) facilities, including coal mines, wells, oil and gas pipelines. It should be noted that for the energy supply of small dispersed consumers in the Arctic, the creation of power plants based on local renewable energy sources, as well as hybrid power plants using both traditional fuel and non-traditional renewable energy resources is promising.

Economic factors are related to objectively high production costs, the need for “northern delivery” of fuel, geographical remoteness and dispersion of energy consumers. The dispersal of consumers and their remoteness from the main roads complicate the creation and operation of the energy infrastructure. Energy capacities in remote settlements are often not connected to the regional energy systems (and even less — to the Unified Energy System of Russia). In fact, remote consumers are often dependent on local generation facilities and have no possibility to receive electricity from other areas by means of transmission lines. At the same time, the main source of energy for such consumers is expensive imported diesel fuel. As a result, tariffs for electricity and heat in the Arctic are high. The use of local NRES can help to reduce energy prices and increase energy security of remote consumers. In [4, Witt M. de, Stefánsson H., Valfells A., Larsen J.N., p. 154], it is noted that the share of renewable energy among all energy sources in the Arctic is somewhat higher compared to other territories, but in order to increase their use significantly, more cost-competitive technologies are needed.

Social factors are related to the importance of energy supply for ensuring normal life conditions in the harsh cold climate, as well as protecting the rights of indigenous peoples of the North, Siberia and the Far East when implementing industrial energy projects in their areas of residence. In recent years, more and more attention has been paid to the social aspects of economic devel-

opment, and the development of the fuel and energy complex has not become an exception. In [5, Sidortsov R.], a review of articles by professional researchers in the field of social sciences, devoted to energy development in the Arctic, is made. The author of this paper notes that, despite the diversity of views, modern researchers agree that the Arctic is more than just a storehouse of energy resources. Some of them emphasize the importance of the social responsibility of fuel and energy companies and point out that even after the implementation of hydrocarbon projects, the Arctic will remain home to many people. Others call attention to the energy efficiency and energy saving solutions that have been developed over the years of Arctic exploration. The researchers also criticise the perception of the Arctic as a zone of confrontation and argue that local, regional, national and international cooperation is possible and necessary in this macro-region.

Technological factors of energy supply imply increased requirements for energy generation and transmission technologies used in the Arctic climate. Low temperatures, high temperature fluctuations throughout the year, strong winds, high humidity can have an adverse effect on equipment performance and must be taken into account when designing power supply options. Another technological factor is the low efficiency of small power plants, which are characterised by high specific fuel consumption for energy production. In the future, with the expansion of NRES use, new, more efficient technologies and energy equipment should come to the Arctic regions: wind power plants, solar power plants, tidal power plants, generators based on biomass or biogas may also appear in some areas. [6, Lombardi P., Sokolnikova T., Suslov K., Voropai N., Styczynski Z.A., pp. 532–533]. It should be mentioned that non-traditional renewable energy resources can be used not only for electricity, but also for heat supply [7, Bezhan A.V.].

Environmental factors determine the requirements for energy technologies and equipment, which should not cause irreparable harm to the Arctic nature, which is sensitive to anthropogenic impact. In this regard, it is important to note that the enterprises of the fuel and energy complex are sources of pollutant emissions into the air and water bodies, and contribute to thermal pollution. The environment may be harmed by economic activities related to geological exploration and extraction of fuel energy resources, drilling works, construction of oil, gas and product pipelines, hydrocarbon storages and other facilities, etc.

Legal factors imply the legal framework within which activities related to energy supply are carried out. At the level of the RF subject, it is necessary to take into account the legal documents adopted at the federal level, and the legislation of the RF subject itself, developed, adopted and implemented within the framework of its authorities.

The study of energy supply factors is carried out on the example of four subjects of the Russian Federation: the Murmansk Oblast, the Nenets Autonomous Okrug, the Yamalo-Nenets Autonomous Okrug, the Chukotka Autonomous Okrug (AO). The choice of these regions is explained by the following:

- the territories of these regions are fully attributed to the Arctic zone by the Decree of the President of the Russian Federation of May 2, 2014 No. 296. Since the state admin-

istration is implemented within the administrative-territorial boundaries, this makes it possible to analyze regional state programs as a tool for developing energy supply in the regions. In addition, information on programs for socio-economic development and the development of individual sectors of the economy is more accessible in relation to the RF subject as a whole, and not to its individual districts;

- the selected regions, having common features for the Russian Arctic (cold climate, peripherality, etc.), have differences and, in general, sufficiently represent the diversity of conditions for socio-economic development in the Arctic. Thus, the Murmansk Oblast is a settled region with a developed industry and large power plants. The Nenets Autonomous Okrug is characterized by a decentralized energy supply in most of the territory; hydrocarbon production is carried out in the region. In the Yamalo-Nenets Autonomous Okrug, there are zones of centralized and decentralized power supply, the basis of the region's economy is oil and gas production. The basis of the economy of the Chukotka Autonomous Okrug is the mining industry, the region has a technologically isolated energy system, but there is also decentralized energy.

In [1, Gasnikova A.A.], the structure, tasks, functions and full powers of the state executive authorities of the four Arctic regions in the sphere of energy supply were analyzed. This analysis showed that state regulation of energy supply in one way or another takes into account all the factors under consideration, although there is a different concentration of functions or powers assigned to the authorities in the regions. "The activities of all executive authorities are related to legal and economic factors in one way or another, directly or indirectly. The activities of relevant ministries, departments, directorates or committees established in different federal entities are linked to energy supply factors according to their areas of responsibility. At the same time, there are differences in the structure of authorities in the regions, which are explained by the specifics of different territories" [1, Gasnikova A.A., p. 141].

Further work involves the study of regional policy aimed at the regulation and development of energy supply in the Arctic regions. This article describes the results of the stage of the work aimed at analyzing the regional state programs as a tool to ensure the reliability of energy supply and its development in the subjects of the Russian Arctic.

The tasks aimed at achieving this goal include:

- clarification of the essence of regional state programs;
- review of the main state programs of the considered subjects of the Russian Federation, aimed at the development of the energy sector;
- comparison of the content of state programs of the considered AZRF subjects with the factors of energy supply.

Research methods and information base

The Arctic subjects of the Russian Federation are considered from a systemic viewpoint, they are presented as socio-economic systems, which are at the same time subsystems of the macrosystem — AZRF. Having some common goals and partially similar characteristics, the Arctic subjects solve specific tasks, the content of which is related to the specifics of the territories of the regions. An important research method is the content analysis of scientific literature, legal documents of the federal and regional levels, and other information on the subject of research from open sources. Particular attention is paid to the content analysis of state programs of the constituent entities of the Russian Federation aimed at socio-economic development, analysis of the structure of these programs, the content of their subprograms and envisaged activities. Information is interpreted using the tabular presentation method, which allows you to present data compactly and systematically, facilitates their comparison and identification of relationships. The study uses the method of logical analysis and the method of comparison.

The information base for the study includes scientific periodicals on the topic of research, legal acts of the Russian Federation and the Arctic regions of the Russian Federation. The source of the texts of the state programs of the RF constituent entities was the official Internet portal of the electronic fund of legal and regulatory and technical documentation of the Consortium “Kodeks” (<https://docs.cntd.ru>).

Results

The Arctic is a complex territory to manage, with many interests of various entities, intertwined in the Arctic regions — enterprises, organizations, population (including indigenous peoples of the North, Siberia and the Far East), the state (the Russian Federation and the constituent entities of the Russian Federation). Taking into account the geopolitical significance of the Arctic, the vastness and diversity of its territory, the difficulties of its development and habitation, Russian scientists substantiated the position of the dominance of state interests in the development and implementation of the development policy of the Russian Arctic [8, Leksin V.N., p. 75].

State interests are reflected in the documents that make up the legal framework for the development of the Russian Arctic. The most significant of these documents include: “Fundamentals of the state policy of the Russian Federation in the Arctic for the period up to 2035” (approved by Decree of the President of the Russian Federation of March 5, 2020 No. 164) ¹, “Strategy for the development of the Arctic zone of the Russian Federation and ensuring national security for the period up to 2035” (approved by Decree of the President of the Russian Federation of October 26, 2020 No. 645) ²; The State Program of the Russian Federation “Socio-economic development of the Arctic zone of the Russian Federation” (approved by Decree of the Government of the Russian

¹ GARANT.RU portal. URL: <https://www.garant.ru/products/ipo/prime/doc/73606526> (accessed 17 February 2021).

² GARANT.RU portal. URL: <https://www.garant.ru/products/ipo/prime/doc/74710556> (accessed 17 February 2021).

Federation of March 30, 2021 No. 484)³. “Fundamentals...” and “Strategy...” determine the general directions of the development of the Russian Arctic, although the “Strategy...” is a more detailed document, which includes criteria for the effectiveness of public policy, key measures to improve the system of state management of socio-economic development. The main legal source that determines the state policy in the Russian Arctic is the state programs of the Russian Federation [9, Mankulova Zh.A., p. 130].

According to the Federal Law No. 172-FZ dated June 28, 2014 “On strategic planning in the Russian Federation”, state programs contain a set of measures interconnected in terms of time, performers and resources aimed at solving certain tasks. According to researchers, the role of state planning and forecasting is currently strengthening [10, Maltseva A.A., Klyushnikova E.V., p. 5, 9; 11, Vlasyuk L.I., p. 108, 110–111; 12, Shvedov D.L., pp. 22–25, 28–29]. The chronology of the development of program tools used at the federal level is given in [13, Kalinin A.M.], which notes that since 1995 up to the present time, “the methodological support of state policy has gone from insufficiently formalized target programs to system of state programs developed according to the established form” [13, Kalinin A.M., p. 44]. State programs of the constituent entities are developed on the basis of documents of the federal level, taking into account the specifics of the regions. According to [14, Vopilovskiy S.S., p. 23], regional state programs are to some extent subprograms of federal projects, thus acting as conductors of program-targeted state administration. State programs aimed at the development of energy supply specify measures in the area under consideration, taking into account industry regulatory and technical requirements for the reliability of power equipment, energy security and efficiency, the admissibility of impact on the environment and human health.

Most of the state programs of the Arctic subjects of the Russian Federation analyzed in the course of the study are designed for a period starting in 2014–2015 and finishing in 2022–2024. Tables 1–4 present information on the state programs of the four Arctic regions of the Russian Federation, including the correlation of the program activities with energy supply factors.

It should be noted that the study considered only those regional state programs that are aimed at maintaining or developing energy supply to consumers. According to the same principle, tables 1–4 include selective information about subprograms, as well as the main events aimed at their implementation or individual regional measures. It should also be noted that state programs may be revised and extended. Thus, the state program of the Yamalo-Nenets Autonomous Okrug “Energy efficiency and energy development, providing high-quality housing and communal services to the population for 2014–2020”, approved in 2013, revised and its updated version will be implemented in 2014–2024.

³ Electronic fund of normative-technical and normative-legal information of the Consortium “Kodeks”. URL: <https://docs.cntd.ru/document/603154509> (accessed 17 February 2021).

Table 1

State programs of Murmansk Oblast and energy supply factors⁴

State programs and their components (subprograms, program measures – selectively, in brief from)	Energy supply factors
Economic potential (implementation period: 2021-2025)	
Subprogram 1. Providing conditions for raising investments, development and modernization of the industrial complex, increasing the competitiveness of production (activities)	
Supporting investment activities. Providing conditions for the implementation of investment projects by residents of the Russian Arctic and the territory of advanced socio-economic development "Capital of the Arctic".	L, Econ
Subprogram 5. Assurance of the state program implementation	
Ensuring the implementation of government functions of strategic planning, tax regulation, and supporting social sphere	L, Econ, S
Ensuring the tariff regulation in the Murmansk oblast	Econ, S
Comfortable housing and urban environment (implementation period: 2021-2025)	
Subprogram 4. Ensuring the sustainability of the fuel and energy complex and improving energy efficiency in the Murmansk region	
Modernization of heat and electric power supply facilities. Subsidies to resource-supplying organizations. Ensuring the stable functioning and improving the energy efficiency of facilities and life support systems in municipal districts. Ensuring the implementation of government functions in the sphere of energy, energy saving and energy efficiency, housing and communal services	T, Econ, S, L
Environmental protection and reproduction of natural resources (implementation period: 2014-2020)	
Subprogram 1. Ensuring environmental safety	
Atmospheric air monitoring	Env
Subprogram 3. Protection and rational use of water resources	
Prevention of pollution and contamination of water bodies	Env
Subprogram 4. Assurance of the state program implementation	
Implementation of the government functions in the sphere of environmental protection and restoration of natural resources	L
Subprogram 5. Elimination of accumulated environmental damage	
Elimination of nuclear and radiation hazardous facilities	Env

Table 2

State programs of Nenets Autonomous Okrug and energy supply factors

State programs and their components (subprograms, program measures – selectively, in brief from)	Energy supply factors
Modernization of housing and communal services of Nenets Autonomous Okrug (implementation period: 2015-2025)	
Selected activity 7. Implementation of a centralized system of accounting for consumers of housing and communal services, pricing of housing and communal services and the formation of unified payment documents	L, Econ
Subprogram 1. Modernization of communal infrastructure facilities	
Preparation of communal infrastructure facilities for operation in the autumn-winter period	Econ, S, T
Subprogram 2. Ensuring the availability of communal services	
Public support for organizations of the housing and communal complex providing communal resources, taking into account the maximum indices of changes in the amount of citizens' payment for utilities	Econ, S
Subprogram 6. Development of the energy complex Nenets Autonomous Okrug (2018-2022)	

⁴ In this and the following tables abbreviations are used to denote energy supply factors: natural resource factors — NR, economic factors — Econ, social factors — S, technological factors — T, environmental factors — Env, legal factors — L.

Construction and reconstruction of heat and electric energy power supply facilities	Econ, T
Improving the safety of the energy system of the Nenets Autonomous Okrug	T, Econ
Providing affordable and comfortable housing and public services for citizens living in Nenets Autonomous Okrug (implementation period: 2014-2035)	
Particular measure 7. Implementation of the public policy in the sphere of construction, housing and communal services, energy industry and transport	L
Environmental protection, reproduction and use of natural resources (implementation period: 2015-2024)	
Particular measure "Expenses for the maintenance of state bodies and ensuring their functions"	L
Subprogram 1. Environmental protection and ensuring environmental safety of Nenets Autonomous Okrug	
Elimination of objects of accumulated environmental damage	Env
Subprogram 3. Protection and use of water bodies	
Ensuring the environmental safety of water bodies	Env
Preservation and development of the Indigenous Minorities of the North in the Nenets Autonomous Okrug (implementation period: 2014-2022)	
Subprogram 2. Saving and protection of primordial living environment of the low-numbered indigenous peoples of the North in Nenets Autonomous Okrug	
Ensuring the implementation of the reindeer herders' and raw-hide tent keepers' right for purchasing firewood for heating nomadic housing at preferential prices	S

Table 3

State programs of Yamalo-Nenets Autonomous Okrug and energy supply factors

State programs and their components (subprograms, program measures – selectively, in brief from)	Energy supply factors
Energy efficiency and energy development, providing high-quality housing and communal services to the population for 2014-2024	
Subprogram 1. Energy saving and improving energy efficiency	
Determining requirements for organizations programs in the sphere of energy saving and improving the energy efficiency. The exercise of regional powers in the sphere of jurisdiction	L, Econ, T
Subprogram 2. Development of energy industry and housing and communal services	
Development of a scheme and program for the long-term development of the electric power industry. Public support for energy sector, gas supply and housing and communal services. Public regulation and control of prices (tariffs) in the fuel and energy sector and the communal complex	L, Econ, T, S
Economic development and innovative economy for 2014-2024	
Subprogram 1. Development and operation of an integrated system of strategic planning of socio-economic development	
Development of regional strategic documents. Monitoring and control of socio-economic development targets	L, Econ, S
Subprogram 3. Development of small and medium-sized businesses	
Public support for entrepreneurship (including supporting improving the energy efficiency of production, partial compensation of the energy resources cost)	Econ
Development of the mineral resource base (implementation period: 2014-2024)	
Subprogram 1. Geological study of subsurface resources and geoinformation support of natural resources management	
Works on geological study of subsurface resources (including monitoring of the proven hydrocarbon reserves; government grants for research on the topic "Development of a unified geological model of the structure and oil-and-gas potential of the southern part of the Kara Sea")	Econ, NR
Subprogram 2. Licensing and monitoring of subsurface resources use and the activities of fuel and energy companies	
Management of natural and subsurface use	Econ
Subprogram 3. Assurance of the state program implementation	
Governance and management in the sphere of designated functions	L
Social support of citizens and labor protection (implementation period: 2014-2022)	

Subprogram 1. Development of social support measures for certain categories of citizens	
Support measures (including payment for housing and communal services)	S
Environmental protection (implementation period: 2014-2024)	
Subprogram 1. Maintaining an ecological balance and a favorable environment	
Environmental protection and environmental safety (including environmental monitoring, establishing specially protected natural reservation)	Env, S
Subprogram 2. Implementation of the public policy in the sphere environmental protection, atmospheric air, management of production and consumption wastes, as well as organizing and convening public environmental impact assessment at the regional level	
Consideration of plans for the prevention and elimination of accidental oil and oil products spill. Ecological monitoring and environmental impact assessment	Env, L

Table 4

State programs of Chukotka Autonomous Okrug and energy supply factors

State programs and their components (subprograms, program measures – selectively, in brief from)	Energy supply factors
Energy sector development of the Chukotka Autonomous Okrug (implementation period: 2016-2024)	
Subprogram. Energy saving and energy efficiency improvement	
Development and implementation of energy saving projects	T, Econ
Subprogram. Development and modernization of the electric power industry	
Construction, reconstruction and design and survey work (including development of design and survey documentation, commissioning of generating reserve capacities, refurbishment and reconstruction of power transmission lines and transformer substations)	T, Econ
Public support of energy supply organizations (including compensation of economically justified expenditures for the guaranteeing supplier in certain cases)	Econ, S
Development of industrial infrastructure (including construction of power transmission lines)	T, Econ
Subprogram. Development of the gas industry	
Public support of gas supply organizations (including construction of gas distribution pipelines, increasing the capacity of the automatic gas distribution station)	Econ, T, Env
Subprogram. Development of the coal industry	
Public support of the coal industry companies (including coal mining)	Econ, NR, T
Development of housing and communal services and the water management complex of the Chukotka Autonomous Okrug (implementation period: 2016-2024)	
Subprogram. Public support for housing and communal services	
Subsidies to housing and communal companies for upgrading and equipping their facilities	Econ, S, T
Subsidies to resource-supplying companies for partial compensation of the costs related to the provision of communal resources (services) to the population	Econ, S
Subprogram. Providing conditions for the development of the communal complex	
Energy saving measures	T, Econ
Construction, reconstruction and thorough repairs of engineering infrastructure facilities	T
Subprogram. Implementation of measures for the development of communal infrastructure	
Development of infrastructure providing uninterrupted supply of heat and electric energy to residents of city of Bilibino and city of Pevek	T, S
Environmental protection and ensuring rational use of natural resources in Chukotka Autonomous Okrug (implementation period: 2015-2024)	
Subprogram. Prevention of negative impact on the environment and elimination of the consequences of such impact	
Prevention of negative impact on the environment and elimination of environmental damage associated with economic activities	Env

Discussion

Each of the AZRF subjects under consideration has its own set of regional state programs. The structure of the state program presents the program passport, information about the program, followed by data on subprograms (passports of state programs, information about subprograms), data on targets, program activities, etc. in tabular form, by subprograms. Sometimes the order of presentation is different — for example, the state programs of the Chukotka Autonomous Okrug first present the program passport, then the subprogram passports, the program data, target indicators, etc., and the subprograms are not numbered. The state programs of the Nenets Autonomous Okrug, in addition to the presence of subprograms, are characterised by the inclusion of selected activities, and sometimes their number exceeds the number of subprograms. However, these differences are not an obstacle to comparing the state programs of various subjects of the Russian Federation.

The tasks of energy supply development are distributed unevenly in the subjects' state programs. Some regions have developed large programs with a developed structure of subprograms, while others have adopted programs aimed at solving a narrower range of tasks. For example, Yamalo-Nenets Autonomous Okrug has developed a regional program with energy efficiency in its title, but in Murmansk Oblast and Chukotka Autonomous Okrug, energy efficiency issues are included in subprograms of larger programs.

Examination of the content of state programs reveals some similar areas and measures for the development of energy supply in the regions. Thus, the regions pay attention to the development of energy infrastructure, energy efficiency, quality of housing and communal services, environmental pollution by energy enterprises. They provide support for energy enterprises, for example, in the form of subsidies to compensate for lost income due to state regulation of prices (tariffs), in some cases — subsidies to recover part of the costs of capital repair of utility infrastructure systems, to organize energy supply to the population, sometimes budgetary investments in capital construction projects are provided. State programs in the field of environmental protection include reduction of the negative impact of energy enterprises' activities on the natural environment; such programs are included in the consideration.

When comparing the list and content of the state programs of the regions, differences can be identified.

For example, the Murmansk Oblast does not have an active state program focused on energy development in the region at the time of writing this paper. However, significant attention to these issues is paid in one of the subprograms of the regional state program "Comfortable housing and urban environment". It should be noted that the earlier state program of the Murmansk Oblast (2014–2020) "Providing a comfortable living environment for the population of the region" initially did not contain materials of significant interest for the study. However, later it was supplemented by the subprogram "Ensuring the sustainable operation of the fuel and energy complex of the Murmansk Oblast and increasing energy efficiency". A subprogram with the same name is

present in the current regional state program “Comfortable housing and urban environment”. It should be noted that the state programs of other RF subjects, aimed at providing the population with comfortable housing, pay more attention to housing construction and development of housing and communal services, the inclusion of subprograms, aimed at the development of the fuel and energy sector, is atypical.

The state program of the Murmansk Oblast “Environmental protection and reproduction of natural resources” includes a subprogram aimed at the protection of water resources. In this regard, it is worth noting that the lake and river system of the Oblast is favourable for the development of hydropower — the natural regime of most large lakes and rivers is regulated by six cascades of hydroelectric power stations. The subprogram “Liquidation of accumulated environmental damage” of the specified state program should also be mentioned. The reason for special attention to this subprogram was the concentration of nuclear power facilities in the territory of the Murmansk Oblast, which appeared over a long (more than 40 years) period of operation of the military and icebreaking nuclear fleets of the USSR and Russia.

In the Nenets Autonomous Okrug, a state program has been developed aimed at modernizing the housing and communal services. This is a large program that includes a complex of separate measures and subprograms. It covers a wide range of issues, including modernization of communal infrastructure, ensuring the availability of utilities and the safety of the housing stock, development of a waste management system, etc. Its subprogram, aimed at developing the energy complex of the region, is of interest for research. For comparison, in other regions, measures for the development of housing and communal services are usually provided for in the subprograms of larger programs. Perhaps more attention to the modernization of housing and communal services and consideration of the development of the energy complex at the nested level of the state program is due to the fact that decentralized energy supply to consumers prevails on the territory of the Nenets Autonomous Okrug (with the exception of the urban district of Naryan-Mar), and oil and gas enterprises in the region use their own power plants.

In the Nenets Autonomous Okrug, such specific features of the Arctic regions as the residence of representatives of indigenous minorities leading a traditional way of life are evident. The energy supply for this category of the population has specific features, such as the use of firewood for heating nomadic housing. The manifestation of this specificity is reflected in the state program “Preservation and development of the Indigenous Minorities of the North in the Nenets Autonomous Okrug”.

In the Yamalo-Nenets Autonomous Okrug, the regional state program “Energy efficiency and energy development, providing high-quality housing and communal services for the population for 2014–2024” is dedicated to various aspects of the development of energy supply. In addition, energy supply issues are also discussed in other state programs of the Okrug. In recent years, there has been an active industrial development of the territory of the Yamalo-Nenets Autonomous Okrug, associated with the extraction of oil and gas condensate. This specificity is reflected

in the state program of the Okrug “Development of the mineral resource base”. Its subprogram 1 “Geological study of subsurface resources and geoinformation support of natural resources management” is aimed at strengthening the raw material base for the production of local building materials, filling the fund of geological information. At the same time, the text of the program notes that common minerals (sand, sand-gravel mixtures, peat) are required in large quantities for the implementation of large investment projects for the development of hydrocarbon deposits on the Yamal Peninsula, the construction of the Bovanenkovo-Ukhta gas pipeline, the main oil pipeline, the building of the plant for the liquefaction of natural gas. Subprogram 1 also provides for monitoring the state and use of the mineral resource base of the region, industries of the fuel and energy complex, which will provide information allowing the Government of the Yamalo-Nenets Autonomous Okrug to interact with oil and gas companies and federal authorities in resolving issues related to natural resource regulation.

The state program “Environmental protection of the Yamalo-Nenets Autonomous Okrug for 2014–2024” notes that the intensification of industrial development associated with the extraction of oil and gas condensate leads to the appearance of additional anthropogenic loads, and sometimes this happens on territories of traditional economic activity of the indigenous peoples of the North. Additional anthropogenic pressures require extra measures to protect the natural environment and preserve the traditional way of life of indigenous peoples. An acute problem of the Autonomous Okrug is the intensive negative impact of associated petroleum gas (APG) emissions. In order to solve this problem, actions of both oil producers and state authorities are needed.

The state program “Energy sector development of the Chukotka Autonomous Okrug” covers a wide range of issues, including energy saving, modernization of the electric power industry, development of the gas and coal industries. A separate state program of the region is devoted to the development of housing and communal and water management complexes — probably because these complexes are close to the consumer (unlike fuel and energy enterprises). The state program “Development of housing and communal services and the water management complex of the Chukotka Autonomous Okrug” is aimed at improving the reliability and efficiency of the region’s communal infrastructure, providing the population with high-quality affordable communal services, and ensuring uninterrupted heat and power supply. This program provides for curbing the growth of utility bills, replacing the retired capacities of the Bilibino NPP with the capacities of a new generation facility; modernization of public infrastructure.

The factors of energy supply considered in the study are taken into account to a greater or lesser extent in regional state programs. In most cases, state programs, their subprograms and activities can be compared with several groups of factors, as shown in Tables 1–4.

Natural resource factors at the regional level can be taken into account to a limited extent. This group of factors is associated with activities aimed at studying the natural resource potential that can be realized for the purposes of energy supply. This is relevant for regions where hydrocarbon deposits are being developed. Thus, in the Yamalo-Nenets Autonomous Okrug, a state

program “Development of the mineral resource base” has been introduced, which involves the geological study of the subsoil and the licensing of subsoil use activities. The implementation of program measures should ensure the improvement of mineral resources, primarily energy security of Russia and the region and, in general, give a positive socio-economic effect. However, the actual organization of large-scale hydrocarbon production is one of the tasks that are solved at the highest level. In the Chukotka Autonomous Okrug, the subprograms “Development of the gas industry” and “Development of the coal industry” can be noted, which provide for state support for enterprises in the relevant sectors.

Economic factors are reflected in state programs aimed at the economic development of the region, increasing its economic potential, and creating a favorable investment climate. One means of doing this is to increase the availability of energy infrastructure. It may be noted that more attention to economic development is paid in the programs of the Murmansk Oblast (which has a relatively diversified economy) and the Yamalo-Nenets Autonomous Okrug (which has an active industrial development).

Social factors are connected with state regulation of prices (tariffs) in the energy sector, control of housing and communal services quality — these issues are addressed in the state programs of all regions. The conservation of land and the protection of the traditional way of life of the indigenous peoples of the North are the tasks of the state, and this is also reflected in the state programs of the Arctic regions. One of the programs of the Nenets Autonomous Okrug provides for such a specific measure as providing reindeer herders and raw-hide tent keepers with firewood for heating nomadic housing at a reduced price. In regions where industrial development is taking place, the interests of the indigenous population are to be taken into account in the creation of industrial facilities.

Technological factors at the regional level are manifested through the implementation of measures to simplify the technological connection of consumers to the energy infrastructure, construction, modernization and reconstruction of energy facilities, as well as measures to develop energy saving and to improve energy efficiency.

Environmental factors are reflected in programs aimed at protecting the environment — such programs have been developed in all regions. Researchers point out the high sensitivity of Arctic ecosystems to changes. As noted in [4, Witt M. de, Stefánsson H., Valfells A., Larsen J.N., p. 144], climate change has a significant impact on the Arctic environment, with temperatures rising two to three times faster than anywhere else on the planet. Although climatic features have an impact on the demand for energy resources and the operation of power equipment, it is more correct to consider climate change issues among environmental rather than natural resource factors of energy supply. Natural resource factors imply the possibilities and limitations of organizing energy supply, while the environmental factors primarily mean the environmental impact of the energy sector enterprises. No objectives related to global climate change impacts are set at the level of constituent entities of the Russian Federation. Such tasks are set at the national, interstate

and global levels, and individual regions can serve as conductors of the tasks set above. It is important that there is a need to preserve and ensure the protection of the natural environment of the Arctic in each RF subject. The analyzed state programs provide for measures to protect the environment of the regions (in particular, the prevention of excess emissions of pollutants by energy enterprises), taking into account the specifics of the regions. Regional peculiarities are reflected in the specification of tasks and the list of program measures. For example, the state program in Murmansk Oblast specifically mentions the need to eliminate radiation hazardous facilities. In the Yamalo-Nenets Autonomous Okrug, plans for prevention and elimination of oil and petroleum product spills are being developed.

The legal factors of energy supply are related to the fact that the state programs of the constituent entities of the Russian Federation are conductors and instruments for implementing energy policy. Each state program contains a subprogram and measures aimed at the implementation of state functions in the area of its action.

Conclusion

State programs of the constituent entities of the Russian Federation are an instrument of regional policy. Each state program has goals, objectives and provides for a set of measures to solve the set tasks. The study analyzes the content of state programs of four Arctic regions of the Russian Federation (Murmansk Oblast, Nenets, Yamalo-Nenets and Chukotka Autonomous okrugs), which are directly or indirectly aimed at developing energy supply to consumers. Each of the considered regions has its own set of state programs. Their structure does not differ much (the differences are usually related to the order of presentation of the content of the program, the presence or absence of selected activities along with subprograms).

The tasks of energy supply development are distributed unevenly in the state programs of the constituent entities of Russia, the measures have different details. However, each region provides support for the development of energy infrastructure (including those related to general economic development), measures to save energy and improve energy efficiency, provide consumers with high-quality housing and communal services, reduce the negative impact of energy enterprises on the environment. Lists and details of state programs and activities, level of attention to any issues of energy supply can be explained by the peculiarities of the regions. For example, the presence of significant reserves of hydrocarbon resources, the widespread use of hydro-power resources, and the residence of the indigenous peoples of the North in the region are among such features.

Various factors of energy supply are taken into account to a greater or lesser extent in regional state programs. The prevailing factors are economic and legal. As an instrument of regional energy policy, the state programs of the RF subjects act as legal factors. Economic factors can be correlated with most state programs, since each state program is aimed at solving problems in any sector of the economy or social sphere, or at creating conditions for favorable socio-economic de-

velopment of the region as a whole. Social factors are reflected in measures aimed at protecting the interests of the population, primarily through the regulation of prices (tariffs) in the energy sector, as well as measures to protect the interests of the indigenous peoples of the North in the implementation of projects for the development of energy resources on their territories.

Technological and environmental factors in regional state programs are manifested, as a rule, through the inclusion of measures that implement the requirements of the legislation in the relevant areas. Regional state programs aimed at environmental protection may, if necessary, pay attention to the solution of specific problems (a typical example: plans for the prevention and elimination of oil spills in the Yamal-Nenets Autonomous Okrug where large-scale hydrocarbon extraction operations are being carried out). Natural resource factors may be taken into account on the regional level to a limited extent, and this group of factors may be compared with activities aimed at studying the potential of local energy resources, which can be used for energy supply to consumers in the regions.

The results outlined in the article may be useful to researchers of the regional economy and energy, as well as employees of public authorities in the Arctic regions of Russia. Despite the fact that all state programs of the RF subjects are developed in accordance with the requirements defined at the federal level, the programs vary somewhat in different regions. The review of regional state programs, on the one hand, shows the general directions for supporting the development of energy supply in the Russian Arctic, on the other hand, allows to see that different regions have their own tasks in the field of energy supply development and own approaches of their solution. The latter is manifested in the choice and specification of measures provided for by regional state programs. The study of the system of state programs and activities aimed at the development of energy supply makes it possible to assess the comprehensiveness of energy supply issues and the best practices in addressing these issues in the regions. Thus, the results presented in the article can be used to develop new state programs, or amend the current ones.

References

1. Gasnikova A.A. Uchet razlichnykh faktorov v regulirovanii energoobespecheniya v arkticheskikh regionakh [Different Factors in the Regulation of Energy Supply in the Arctic Regions]. *Sever i rynek: formirovanie ekonomicheskogo poryadka*, 2020, no. 3 (69), pp. 131–143. DOI: 10.37614/2220-802X.2.2020.69.009
2. Popel' O.S. Perspektivnye tekhnologii maloy i vozobnovlyаемoy energetiki dlya osvoeniya i razvitiya Arkticheskoy zony Rossiyskoy Federatsii [Perspective Technologies of the Small-Scale and Renewable Power Generation for Reclaiming and Developing of the Arctic Zone of Russian Federation]. *Gosudarstvennyy audit. Pravo. Ekonomika*. [State Audit. Law. Economy], 2017, no. 1, pp. 44–52.
3. Bogoyavlensky V.I. Sovershenstvovanie gosudarstvennoy politiki i razvitie strategii osvoeniya resursov uglevodorodov v rossiyskoy Arktike [Improvement of State Policy and Development of a Strategy Fordeveloping Hydrocarbon Resources in the Russian Arctic]. *Nauchnye trudy Vol'nogo ekonomicheskogo obshchestva Rossii* [Scientific Works of the Free Economic Society of Russia], 2020, vol. 224, no. 4, pp. 59–85. DOI: 10.38197/2072-2060-2020-224-4-59-85
4. Witt M. de, Stefánsson H., Valfells A., Larsen J.N. Energy Resources and Electricity Generation in Arctic Areas. *Renewable Energy*, 2021, vol. 169, pp. 144–156. DOI: 10.1016/j.renene.2021.01.025

5. Sidortsov R. A Perfect Moment during Imperfect Times: Arctic Energy Research in a Low-Carbon Era. *Energy Research & Social Science*, 2016, vol. 16, pp. 1–7. DOI: 10.1016/j.erss.2016.03.023
6. Lombardi P., Sokolnikova T., Suslov K., Voropai N., Styczynski Z.A. Isolated Power System in Russia: A Chance for Renewable Energies? *Renewable Energy*, 2016, vol. 90, pp. 532–541. DOI: 10.1016/j.renene.2016.01.016
7. Bezhan A.V. Povyshenie effektivnosti sistem teplosnabzheniya za schet vnedreniya vetroenergeticheskikh ustanovok [Performance Improvement of Heat Supply Systems through the Implementation of Wind Power Plants]. *Energetika. Izvestiya vysshikh uchebnykh zavedeniy i energeticheskikh obyedineniy SNG* [Energetika. Proceedings of CIS Higher Education Institutions and Power Engineering Associations], 2020, vol. 63, no. 3, pp. 285–296. DOI: 10.21122/1029-7448-2020-63-3-285-296
8. Leksin V.N., Porfiryev B.N. Razvitie rossiyskoy Arktiki kak predmet gosudarstvennogo upravleniya: novye otsenki i resheniya [Russian Arctic: The Logic and Paradoxes of Changes]. *Kontury global'nykh transformatsiy: politika, ekonomika, pravo* [Outlines of Global Transformations: Politics, Economics, Law], 2019, vol. 12, no. 5, pp. 69–85. DOI: 10.23932/2542-0240-2019-12-5-69-85
9. Mankulova Zh.A. Gosudarstvennaya podderzhka promyshlennogo osvoeniya Arktiki: chego ozhidat' predpriyatiyam i zhitelyam regiona? [State Support for Industrial Development of the Arctic: What to Expect For Enterprises and Residents of the Region?]. *Nauchnyy vestnik Arktiki* [Scientific Bulletin of the Arctic], 2019, no. 6, pp. 127–136.
10. Maltseva A.A., Klushnikova E.V. Planirovanie nauchno-tehnologicheskogo razvitiya v gosudarstvennykh programmakh regionov Rossiyskoy Federatsii [Planning the Scientific-Technological Development in Government Programs for Russian Regions]. *Vestnik Povolzhskogo gosudarstvennogo tekhnologicheskogo universiteta. Ser.: Ekonomika i upravlenie* [Vestnik of Volga State University of Technology. Ser.: Economy and Management], 2018, no. 3 (39), pp. 5–21. DOI: 10.15350/2306-2800.2018.3.5
11. Vlasyuk L.I. Regional'naya proektsiya sistemy strategicheskogo planirovaniya i prognozirovaniya v Rossiyskoy Federatsii [Strategic Planning and Forecasting System in the Russian Federation: A Regional Projection]. *Ekonomika promyshlennosti* [Russian Journal of Industrial Economics], 2017, vol. 10, no. 2, pp. 107–113. DOI: 10.17073/2072-1633-2017-2-107-113
12. Shvedov D.L. Vvedenie i ispol'zovanie gosudarstvennykh programm pri realizatsii strategiy sotsial'no-ekonomicheskogo razvitiya regiona [Introduction and Use of State Programs in the Implementation of Strategies for the Socio-Economic Development of the Region]. *Ekonomika i upravlenie narodnym khozyaystvom (Sankt-Peterburg)* [The National Economy and Management (Saint Petersburg)], 2020, no. 13(15), pp. 21–29.
13. Kalinin A.M. Evolyutsiya instrumentov gosudarstvennoy podderzhki promyshlennosti v Rossiyskoy Federatsii: ot federal'nykh tselevykh programm k gosudarstvennoy programme [Evolution of Instruments of State Support of Industry in the Russian Federation: From Federal Target Programs to the State Program]. *Problemy prognozirovaniya* [Studies on Russian Economic Development], 2018, vol. 29, no. 1, pp. 28–34.
14. Vopilovsky S.S. Programmno-tselevoy podkhod — vektor gosudarstvennogo upravleniya RKhK Arktiki [Software and Target Approach Vector of the Governance of the Arctic RKhK]. *Vestnik Moskovskogo Gumanitarno-ekonomicheskogo instituta* [Herald of Moscow Humanitarian Economic University], 2019, no. 4, pp. 20–30.

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