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Integration of the Russian energy system with the energy systems of the key group of Eastern, Southern and Western Asian countries through the formation of the Global Asian energy ring

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Abstract

The modern day threats and challenges (from economic crisis up to strengthening of terrorists groups) make it necessary to form and to develop the Asian energy system project of the 21st century through the collective energy security of the Eastern, Southern and Western Asia, including the Middle East and India as the Global Asian energy ring. It is Russia, which has accumulated the experience of the USSR in the creation, operation and development of large-scale power systems (UES of the USSR – RAO UES of Russia), that is suitable for leading this international project. Thus, the concept of the formation of the energy ring should be based on the strategic role of Russia as a key energy partner and the main guarantor of collective energy security of the system by supplying key Russian fuel and energy resources, and by its assistance in the construction of infrastructure, energy management systems, etc.

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Keywords: *Asian energy ring, collective energy security, energy supply, energy investments, energy infrastructure, intellectual energy supply, energy system, energy market*

Introduction: the GOELRO plan¹ for Asia and the Middle East

The current political and economic situation makes it possible to shift the vector of Russia's political and economic activity to Eastern, Southern and Western Asia. The Asian vector of development of exports of systemically linked Russian fuel and energy resources and energy transport services is the most promising one when it is integrated into the system of international energy businesses [1]. Within this framework, it is possible to establish a long-term basis for multibillion-dollar economic cooperation with the export of not only Russian fuel and energy resources, but also energy equipment, components, and energy management systems technologies [2]. That is, those relatively few sectors of possible exports, where Russia can still be in demand, taking into account economic and political realities and the current Asia's effective demand.

Russia's strategic objective: the creation of the Asian energy system of the 21st century based on Russian energy supplies and technologies

Given the lag in the field of energy infrastructure of most Asian countries with the developed countries, the proposal is tantamount to the establishment of the Asian energy system of the 21st century.

The technological, economic and organizational basis for maintaining the format of collective energy security in Eastern, Southern and Western Asia, taking into account the large territories, complex political interests of the participants, different levels of development of domestic energy infrastructure and resources for its development, presuppose reliance on successful experience in the creation, operation and development of large-scale power systems. In fact, the only example of a successful project of such a mega-system is the experience of the UES of the USSR and the transnational electric power grid "Mir" (Russian: Peace) of the Comecon [3].

¹ GOELRO plan – the acronym that stands for the large scale Soviet plan for the electrification of the RSFSR after the October Revolution of 1917 for national economic recovery and development.

On the basis of the Soviet and Russian experience in the creation, operation and development of large-scale power systems, it is possible and advisable to form a Global Asian energy ring. A unified energy regulation system and resource- and financial coordination mechanisms within the Global Asian energy ring can provide a basis for ensuring political and economic competitiveness of a group of key countries in Eastern, Southern and Western Asia in complex economic, political and military conditions.

Most importantly, the natural role of Russia as the guarantor of collective energy security is the basis for sustainable energy supply within the group of key countries of Eastern, Southern and Western Asia [4].

Options for creating the Asian energy ring

Increasing energy needs, as well as risks and threats [of technical, economic, organizational, military, terrorist, and other nature] form the task of creating a system of integrated coordination of transportation and supply of Russian and transit fuel and energy resources within the group of key countries of Eastern, Southern and Western Asia with the development of the relevant fuel and energy infrastructure as a metasystem within the framework of the Asian energy ring.

The mechanism for organizing energy supplies within the Asian energy ring, if implemented, will serve as a system's "framework" for developing conditions and procedures for coordination within the cross-border energy unification of supply and turnover of Russian and transit electricity for ensuring the exact amount of fuel and energy resources concerted on cost, routes and commodity nomenclature agreed upon by the key countries of Eastern, Southern and Western Asia, by territories (industries and sectors of economy) and by economic entities (agents) [5].

We can suggest three possible options for such energy ring

The first option is the "small" Asian energy ring (AER)

Earlier in the late 1990s, the idea to unite the energy systems of Russia, South Korea, China and Japan was proposed by RAO "UES of Russia" (the list of participants also included Mongolia and North Korea), but was postponed due to lack of interest.

The discussion of the initiative began in 2011, when Japan faced energy shortage due to the shutdown of nuclear reactors after the accident at the Fukushima Daiichi NPP. The super-ring will allow countries to balance load schedules (both daily and seasonal), to exchange free electricity flows, to cover peak loads, to carry out international redundancy in case of natural or technological disasters.

In March 2017, Russian power company PAO Rosseti, Japanese Softbank, the State Grid Corporation of China and South Korea's KEPCO have signed in Beijing the Memorandum of Understanding of joint promotion of an interconnection electric power grid covering the North-East Asia. The project involves the supply of electricity from Russia to Japan in the amount of up to 2 GW at the initial stage. The power of the system could be 5 GW [6].

The formation of the Asian energy ring – the unification of energy systems of Russia, South Korea, China and Japan – according to the Ministry for the development of Russian Far East is estimated to cost 30 billion dollars (Fig. 1).



Fig. 1. The «small» Asian energy ring [7].

The second option – the «broad» Asian energy ring

The proposal is to unify the “small” Asian energy ring with Unified Power System of Central Asia (UPS CA) [8], CASA-1000 [9] (Kyrgyzstan – Tajikistan – Afghanistan – Pakistan) and Turkish Power grids. Russian company JSC “Atomenergoproekt” began the construction of a Turkish nuclear power plant Akkuyu in 2010, the first four units of which are expected to start operation in 2020. For security reasons, it is suggested not to construct energy bridges through Afghanistan and Pakistan, rather to carry out the commissioning of transmission lines from different countries to maintain the stability of the energy supply to the consumer cluster, if possible, taking into account the likely terrorist acts and other emergencies on the power grids. Due to good Russian relations with above-mentioned participants, Russia has an opportunity to successfully implement the project of such scale (Fig. 2).



Fig. 2. The «Broad» Asian energy ring [10].

The third option – the Global Asian energy ring

The main proposal is to expand the “broad” Asian energy ring within the group of energy clusters of Eastern, Southern and Western Asia into a unified super power grid – the Global Asian energy ring (Fig. 3).



Fig. 3. The Global Asian energy ring [10].

Russia has experience in the formation of such energy metasystem.

UES of the USSR was the basis of the functioning of the “Mir” international electric power grid: in 1960 – the unification of power systems of East Germany, Poland, Czechoslovakia and Hungary. In 1962 – unified power systems of the USSR, Hungary and Poland. In 1963 – Romania had joined the group, in 1965 – Bulgaria. From 1963 the Central Dispatch Office (CDO) of the “Mir” power grid started to operate in Prague [11]. The economic impact of parallel operation of power systems [in the framework of the “Mir” international power system] was formed as a result of mutual assistance in the case of emergency, reduction of the required generating capacity in each country due to the discrepancy between the load maxima of national power systems located in different time zones,

and reduction of the total load redundancy of the grid. In 1972, the effect of combining the load schedules of national power systems during the annual maximum period was more than 1 GW. That year, unscheduled supplies of electricity to interested power systems as a part of mutual assistance amounted to about 850 million kW×h [12].

The strategy of forming a new energy architecture for the integration of the energy systems of Russia and the group of countries of Eastern, Southern and Western Asia within the framework of the Global Asian Energy Ring is considered by us as a policy for the formation of a transboundary energy unification within a single energy space [more precisely, energy-economic] [13].

Within the framework of the energy ring, it is proposed to build mechanisms for both trade in electric power and other fuel and energy resources used for energy generation, and coordination of various technological, economic, information and other aspects between the countries that ensure synchronization of the processes of energy supply to consumers in various territorial zones of national economies of Eastern, Southern and Western Asia [14].

Clustering of a new quasi-integrated Asian power system

Taking into account the significant probability of cascade shutdowns during military or terrorist attacks on power facilities in a number of countries involved in the work of the Global Asian energy ring with a large situational component of the uncertainty of the consequences, the authors propose to rely on the controlled fragmentation of the entire quasi-integrated Asian power system within a technologically and organizationally structured energy clusters, with the subsequent restoration of the system integrity of energy supply to consumers and transit transportation of fuel and energy resources, primarily electricity (Fig. 4).

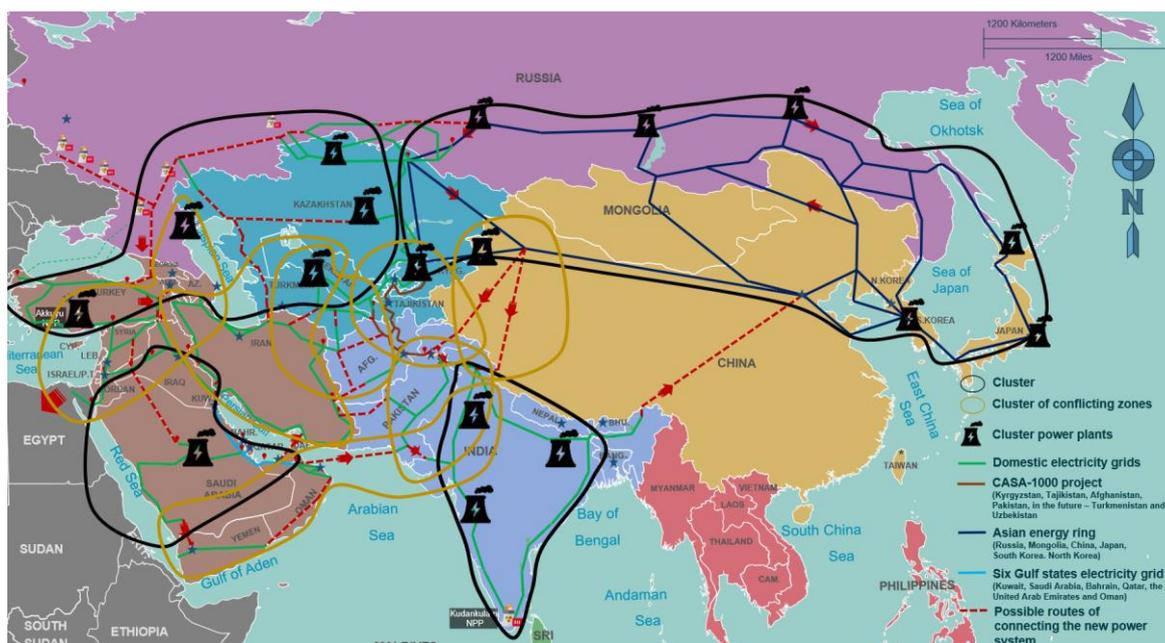


Fig. 4. Clustering scheme of a new quasi-integrated Asian power system.

To “bundle” energy consumers and energy networks within clusters, it is necessary to divide a quasi-integrated Asian energy system in such a way that each energy segment is presented as a kind of one aggregated energy consumer, strongly or loosely dependent to other energy clusters using a model of self-organization and decay of functional neural network structures.

As a measure of protecting the parties from malfunctions in the operation of the quasi-integrated Asian energy system and from possible use of a system by some countries as a tool of pressure to advance their interests, it is assumed that:

- The energy ring will consist of self-sufficient small energy rings, which in the certain conditions will be able to work independently in case of failure in any part of the Global energy ring.
- At the intersection of the clusters (in the nodes of power grids) power plants should be placed (in most cases, nuclear power plants, as they are able to adjust energy output in a short period

of time), which, in addition to maintaining the power supply under normal conditions, will be able to support the power supply of the neighboring cluster in the case of disconnection of some power grids.

- Nuclear power plants should not be located at the intersection of conflict (military, etc.) zones of possible hostilities.

- If two countries are politically or otherwise in conflict, they should be part of two different energy clusters.

- The more successful a country is, the more it can be responsible for the energy supply of its cluster, which will include other less developed countries.

- The Global Asian energy ring project should take into account the economic and technological specificities of the countries involved, both in the current period and in perspective up to 2050.

- The concept of forming the energy ring should be based on the strategic role of Russia as a key energy partner and the main guarantor of collective energy security by supplying key Russian and transit fuel and energy resources, and by its assistance in the construction of infrastructure, energy management systems, nuclear power plants, etc.

Strategic advantages of the project

The expansion of the distribution area of Russian fuel and energy resources, primarily electricity, to the countries of Eastern, Southern and Western Asia (including the Middle East) offers the following advantages for Russia:

- Electricity for export is a highly processed product (processed in Russia, not abroad), with a higher-value-added than oil, gas or coal, that is, it will be monetized in Russia, and not in foreign subsidiaries and affiliates companies, often located in offshore zones;

- The possibility of using for the export of surpluses of electricity available at hydro- and nuclear power generation facilities, primarily in Siberia, especially at night (up to 30%);

- Opportunity for increasing hydro-generating facilities that are available in abundance in the country;

- Additional economic, political and other benefits for the country;

- Russian technologies, somewhat outdated, but relatively simple and reliable for the management of the processes of generation, transmission, distribution and consumption of electricity are most suitable for Asian- and especially Middle Eastern countries that in their majority, somewhat lagging behind in the development of technologies and personnel from developed and new industrial countries;

- Russian equipment, components, including raw materials-intensive wires, cables, etc., can be in demand in most Asian countries and from the standpoint of energy consumers of these countries are not inferior to similar Chinese, Korean and other products;

- Russia can supplement the export of electricity with the export of a package of fuel and energy resources (oil, natural gas, coal) used to generate electricity. That is, to provide comprehensive energy supplies with the possibility of replacing one type of resource with another;

- This project can be developed in cooperation with China with the division of the supply areas of equipment, components, including wires, cables, supports, cement, etc. And with the involvement of Chinese investments by the countries-buyers of Russian fuel and energy resources and energy transportation services;

- Many regional countries are fairly unresponsive to the US and the EU influence, that is, will not abandon the project with Russia's participation after learning about the negative opinion of the US or the EU;

- Due to the fact that population growth and energy consumption in most of these countries is expected to steadily grow in the foreseeable, the entry of Russia into the regional markets of energy resources, energy transportation, energy equipment will provide Russia with a stable annual supply (conditionally standing orders), and guaranteed additional orders in the future;

- The use of various financial and economic models (for example, similar to the model "build–own–operate" in the construction of Akkuyu NPP in Turkey) in the formation of modern power systems by Russian companies in these countries will expand the opportunities for their introduction in the most profitable foreign commodity and financial flows;
- The construction of nuclear power plants at the intersection of power clusters in power grid nodes (without which it will be difficult to maintain the stability of energy supply), will expand the package of orders of Russian atomic energy corporation Rosatom and the Russian influence in this strategic world energy sector;
- Other member States of the EAEU may be involved in the implementation of the project, which will create a cumulative synergetic effect with the strengthening of the economic foundations of the Union;
- When estimating the supply of Russian fuel and energy resources and equipment between Asia and Russia, the ruble, the national currencies of regional countries, swaps, currency pairs, etc. can be used, which will entail the appreciation of the Russian currency;
- The package of Asian orders to Russian industrial companies in the implementation of the project will not only strengthen the economic situation of these companies (industries) in the Russian economy, but also allow their modernization for future long-term programs in the execution of orders.

Conclusions

The project of forming the Global Asian energy ring through the unification of Russian energy systems and key countries of Eastern, Southern and Western Asia allows solving many Russian problems and, first of all, overcoming crisis in the group of basic sectors of the Russian economy. At the same time, the Russian economic and political influence will return, and in some places even expand the opportunities for role and importance of Russia in comparison with the positions of the USSR in this sphere and in this unstable, and yet, promising part of the world.

References

1. Ageev A., Gromov A. Energetism concept and its use for economic and energy strateging. //Energy Strategy. 2014. № 5. pp. 12-20 (in Russian).
2. Tukenov A.A. Integration of electricity markets in Europe: stages, mechanisms and achieved progress. Moscow: Publishing house IKAR, 2013. p. 272 (In Russian).
3. Tsvetkov V.A., Bortalevich S.I., Loginov E.L. Strategic approaches to the development of energy infrastructure in Russia in terms of integration of national energy grids and energy markets. Moscow: IPR RAS, 2014. p. 511 (In Russian).
4. Loginov E.L., Shkuta A.A. The draft of the Asian Energy Ring: The formation of the energy metasystem in East Asia by uniting energy systems of Russia, China, South Korea and Japan // National Interests: Priorities and Security. 2017. Iss. 13. № 7 (352). pp. 1353-1362. (In Russian).
5. Abramov V.L., Berlin S.I., Loginov E.L., Shkouta A.A., Sorokin D.D. Russia's economic interests in the realization of perspective infrastructure projects in energetics in East Asia. //Finance: Theory and Practice, 2017, Iss. 21. № 5., pp. 82-89. (In Russian).
6. Komrakov A. Asian energy ring went to the 18th round [e-source] URL: http://www.ng.ru/economics/2016-09-05/4_energy.html (In Russian). (Retrieved 01.07.2018)
7. Business Guide "Electricity Industry 4.0". Application № 33 as of 17.10.2016. p. 3. (In Russian).
8. Shamsiev Kh.A. The Issues of Technical Regulations in UPS CA. [e-source] URL: <https://www.carecprogram.org/uploads/The-Issues-of-Technical-Regulations-in-UPS-CA-ru.pdf> (In Russian). (Retrieved 01.07.2018)
9. CASA-1000 Project. [e-source] URL: <http://www.casa-1000.org/indexr.php>
10. Abdul Asrar R. «Cooperation development between Russia and countries of Southern and Western Asia // Graduation thesis / Supervisor: Doctor of Sci (Econ.) Loginov Evgeny Leonidovich / the Financial University under the Government of the Russian Federation – 2018.

Интеграция энергосистемы России и энергосистем группы ключевых стран Восточной, Южной и Западной Азии путем формирования Глобального азиатского энергетического кольца

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Аннотация

Угрозы и вызовы современного этапа (от экономического кризиса до террористических атак) делают необходимым формирование и развитие проекта создания азиатской энергосистемы XXI века в формате коллективной энергобезопасности Восточной, Южной и Западной Азии, включая Ближний Восток и Индию - Глобального азиатского энергетического кольца. Именно Россия, сконцентрировавшая опыт СССР по созданию, эксплуатации и развитию сверхбольших энергосистем (ЕЭС СССР – ЕЭС России) является подходящим модератором этого международного проекта. Концепция формирования энергетического кольца должна основываться на стратегической роли России как ключевого энергопартнера и основного гаранта коллективной энергетической безопасности путем поставки пакета ключевых российских и транзитных топливно-энергетических ресурсов, помощи в строительстве инфраструктуры, систем управления энергообеспечением и пр.

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Ключевые слова: *Азиатское энергокольцо, коллективная энергобезопасность, поставки, инвестиции, энергетическая инфраструктура, интеллектуальная энергетика, энергосистема, энергорынок*

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