

Problems of development and institutional reformation of the power-supply complex of Russia

In this article the problems of the current state of the power-supply complex of Russia and efforts for their decision by the basic institutional changes, their purposeful directivity, the difficulties for their realization and expected consequences are analyzed.

Russia, the energy supply, the electric-power industry, problems of development, institutional transformations.



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The urgent problems. In Russia the most important problem of the present state in the power-supply systems is *the lowering of production potential* – i.e. the great wear of capital stocks and the growing deficiency of working capacities. Such situation is connected with the lack of stimuli and the shortage of investments for renewal of capital stocks for many years. Long period of standing idle in the technical re-equipment led to *the technological lagging of power engineering renewal*: many home power technologies are not ready for introduction in full measure or they yield the foreign working analogues; the potential of specialized designing and building infrastructure and machine-building base has been reduced.

Very complicated conditions for functioning and development of the power-supply systems are made by *an intensive inflation dynamics*. High rates of rise in fuel prices and inflation bring down the efficiency of operation and investment activity in the sphere of power-supply to the limiting values, and it puts obstacles to its development. Disparity between the gas prices in the world and in Russia misrepresents the market proportions of the comparative economic effectiveness of power technolo-

gies for benefit of the gas ones and it leads to non-competitiveness of other technologies. Such situation is aimed to improve by means of intensive increase in domestic gas prices (the decrees by the Government of the Russian Federation №333 of May, 28, 2007 and №851 of December, 10, 2007), it's obvious that it will be followed by both the considerable rise in the prices of energy produced in our country and high rates of inflation.

All above-named problems are obstacles to the development of power-supply systems, and if there is no reliable and effective power-producing infrastructure it's impossible to carry out the transition to an innovation way of the economic development in Russia, that was planned by the Government RF [1]. So the compulsory and inseparable parts of the long-term economic development of our country are an institutional reform and technological modernization of the Russian power-supply system: “the rapid development of electric power infrastructure, overcoming the future shortage in generating and network capacities, technological renewal of the power complex and forming a new system of institutions at the liberalized power market...” [1].

Below we consider some key trends of the institutional development in the power supply sphere, their purposes, problems of realization and expected consequences.

The main institutional innovations. The most important transformation is *creating of the competitive electric power market*. The result of reorganization of the Russian joint-stock company RAO "UES of Russia" (finished in 2008) is a new structure of the branch which has a great de-monopolized sector (electric power production and sale, maintenance and service) and transformation of property rights: the assets of heat generation are redistributed for benefit of private property, and the state has the predominant part of the assets of networks and governing systems.

At the present time the electric power companies function and interact under the conditions of two-sector market – administered and uncontrolled price formation with increasing the portion of the latter step-by-step. The liberalization of the wholesale prices of power is to be finished in 2011 [2].

Some innovation methods of tariff regulation are introduced in the monopolized sector of power supply (power transmission and distribution, operation and control running, non-competitive generation, centralized heat supply). These *methods are to strengthen* the stimulating mechanisms of price formation by giving the power companies the possibility to get some additional income as a result of optimization of their work. It is planned to change the tariff regulation from the strict concordance of all expenses to the methods of tariff indexation and income rate setting.

Since 2008 the power rates at the wholesale market under the regulated contracts are determined by the method of tariff indexation. Further with slowing down the rate of inflation it will be possible to use this method in the regulated segments of the retail markets more widely. It's supposed that the network companies will go over to the price formation based on the method of economically grounded return on the invested (in operation) capital. According to this

method the tariff is determined by the way of evaluating the regulatory base of the capital and fixing some permitted rate of profit for this base.

The investment resources of the sector are formed at the expense of its tariff receipts (amortized deduction, part of profit) and payment for the technological connection. To make this source stronger some *new approaches in the investment provision of the branch development* are introduced.

In 2008 in the second half-year we started up the power capacity market providing for competitive selection of the supplied electric power and gradual liberalization at the same pace as the sale of electric power.

As for putting some new generating capacities into operation (out of account in the balance-sheet for 2007), there will not be tariff regulation. Their power will be sold at the competitive wholesale market, where the price level must provide the investors with some proper recoupment of their investments. There is a mechanism of providing with the investments in order to solve the most serious problems in the generation i.e. to stave off the deficiency of power capacity. According to this mechanism the repayment of the investments will be realized owing to some special payment for services which are connected with forming a prospective technological reserve, the payment is included in the tariffs of system operator.

For the subjects of government regulation in power engineering (those who keep their monopoly at the wholesale and retail markets of electric and heat power), the investment component will be still included in the approved tariffs in accordance with the volumes of capital investments in the development programs and projects, which are agreed. And the efficiency of investment activity will be increased thanks to the gradual transition to the incentive pricing in the regulated sector which is connected with power transmission and distribution by the method of economically grounded return on capital.

The important source of investments is still the public funds. The state is the biggest

owner of assets in the field of nuclear and water power engineering, electrical supply network and dispatch control. The target sector structure planned to stand such grounds, and as a consequence to keep the direct participation of the state in the running the great property complex and in the financial provision for its development.

There are different forms of government participation in the power engineering development financing [3]: the budgetary investments into the power companies' authorized capital (redemption of additional issue of shares); re-investing of the profits from the sale of government holdings of share belonging to the generating companies; carrying out the federal target programs; co-financing some large investment projects in the form of state and private partnership. Budgetary funds will be spent in general on some investment programs of Rosenergoatom and the Federal network company.

Some additional measures for financial support of the investment process are the following: giving some tax concessions, using the rapid amortization and fast revaluation of capital stocks, building up an inviting credit line and favorable custom conditions for the import of equipment etc.

In the course of re-organization it was supposed to get a great deal of money for the sector development by selling the assets of RAO "UES of Russia" and additional issue of power companies' shares. In general the privatization of the assets of RAO was directed to some strategic investors who take upon themselves the duties concerning the fulfillment of the sectional investment program. According to the information presented by the Institute of Complex Strategic Searches (<http://www.icss.ac.ru>), there are three major groups of strategic investors: Russian fuel providers, industrial companies and large international power holding companies. Some of the strategists' targets are clear.

The interests of the fuel companies are connected with the fuel market inspection and with getting some additional rent as a result of the

integration with energy business (Gasprom, Siberian Coal Energy Company (SCEC), Lukoil).

As for the industrial companies they are interested in the objects of generation because of the efficiency of their own production needs (large metallurgical companies and other energy-intensive customers). In the field of core activity some additional generating assets are bought by the companies to control of the electric and heat power markets in the regions (IES-holding Company (Integrated Energy Systems). Taking part in the power market in Russia the international power holding companies extend the sphere of their influence and make their export and import relations more optimum.

All above-mentioned changes in the institutional system are aimed as a whole at making the selective market, strengthening the key factors of self-organization in the sector and distributing the load between the official and private capitals for sector functioning and development. The presumable results are to be the following: increasing the commercial efficiency in the power-supply sphere, making the process of modernization more active and stable dynamics of the sector development. But when conducting the reforms there are always some difficulties and consequences, the latter cannot be appraised only in a positive way. The most important of them are under our consideration.

The problems and consequences of the institutional reform

1. *Considerable increase in power tariffs.* Besides the increase in prices of gas and other fuel, the results of the reforms in the electric power engineering will also promote the considerable increase in power tariffs. In the conditions of uncontrolled price formation under the weak competitive restrictions it's better to raise the production operation profitability by means of increasing in prices as maximum as possible instead of expenses reduction. At present the increase in prices is restrained by the existence and domination of the regulated sector of the market.

In the process of so large-scale re-organization of the sector the increase in tariffs is connected also with the increase in organization and management expenses for some corporative procedures in the course of reforming and for administrative and management superstructure in all separate kinds of activity. The processes of making and functioning of some commercial market infrastructure will increase the transaction expenditures in the field of power-supply for trade system administration, intermediary services and control units.

It should be expected that the tariffs will increase at the cost of considerable investment component that must provide with refund and return on the capital investments for the production capacities development. As an example we consider the refund of the investment needs in the field of electric power engineering (about 900 milliards of rubles every year [4]) under the condition of their minimum income (for example, 11%). In this case for 12 years the average tariff all over the country (1,200 rubles/MW per hour in 2008) must increase 2.2 times at the minimum in comparable prices only at the expense of the investment component.

According to the forecasts by the Department of Economic Development of the RF [5], next two years the increase in electric power tariffs will be 126 and 122%, and these rates exceed the trends of the previous five years greatly (about 113% year-on-year rate of increase). The negative consequences of the increase in power tariffs for economy are well-known. They are general inflation of expenses and drop in competitiveness of domestic manufacture. In our opinion, if the gas price in 2011 increases 2.2 times the power supply from the gas sources will be more expensive by 160 – 170% against the level of the year of 2008, and taking into account the investment component – by 190%. Then with the lasting increase in oil prices – 1.5 times for three years, the general inflation caused by the power engineering can be 140%.

2. *Processing limits of the competitive market development.* The necessary conditions for the competitive relations development in the power

engineering are available free generating and network capacities and priority of economic criteria when choosing providers. But from the objective point of view there are some processing limits of the price selection when loading the capacities.

First, the power objects are compound technical systems, they must work under the operative-dispatch control for which the processing limits for system and safety are primary. In particular, the processing limits of the competitive selection are pointed by the fact that the load of generating facilities must be in the first place according to the rules of the wholesale market [2, p.82].

Secondly, the limitations concerning the available facilities are connected with the peculiarities of the power system's spatial configuration and the limits of power transmission lines' capacity, which form some independent objects: "free power interchange areas", "trapped" power facilities, regions with power in short supply and isolated power systems.

In the third place, the possibilities to organize some real competitive relations at the retail power markets are limited very much. The re-organization couldn't change the dominating (or exclusive) position of some territorial generating companies at the markets in some regions because of the network restrictions on the power interchanges and the conditions of district heating cogeneration. Most power objects of regional and local significance are co-generation stations with technologically interconnected process of electric and heat power production. The heat demands will keep running all heat-extraction capacities even the ineffective ones, and their heat power will be purchased. The competitive selection can't be put into practice in the isolated regional power systems and in the areas with power in short supply.

On the whole the market rather reflects the cost estimation pattern of the power system work than determines it. Some competitive conditions arise only in the certain territorial areas of the power market where there are pow-

erful electrical supply network connections. Such conditions are concerned with either the provision of semi-peak and peak loads or the departure from the planned volumes of consumption when forming some operative and prospective technological reserves of the power system. In other respects the electric power market which is setting up now, is rather marginal than “competitive”, – in the generation the mechanism of uncontrolled price formation is limited by the maximum tariffs of the closing providers in the certain territorial areas of the wholesale market. In the process of liberalization the equilibrium prices will approach to these tariffs.

3. *Regional peculiarities of the wholesale and retail markets.* The electric power system in Russia is dissimilar in the territorial view. The diversity in the technological structure of the Russian electric power engineering led to the multiply difference of the tariffs in the regions [6]. The expensive power hinders the new productions development in many regions in the North and East of the country. It's obvious that the organization of the competitive wholesale power market is directed to solve the problems of the principal backbone power engineering which is more successful in comparison with the regional and municipal power engineering. It's difficult to forecast the influence of the reforming in the sector over the situation relating to the modernization of energetic economy of regional significance because of the peculiarities of the local energetic and economic conditions. Undoubtedly, the development of main lines will help to smooth over the difference in the power prices in the regions, but only to inconsiderable degree. We need in large-scale modernization of the power capacities in the regions where the power-supply system is retarded and too expensive for both the consumers and the state. Such power systems should be provided with some additional preferences for the power economy development. For the present the re-organization of the electric power companies in the regions hasn't changed the situation connected with the investment supply

much. On the contrary, we see some decrease of the possibilities to concentrate their own means for the technological renewal of capital stocks.

4. *Complication of the mechanisms controlling of the power engineering development.* The improvement of the development of power engineering as a technologically indivisible complex demands a system approach – i.e. mutually agreed plans for the fuel supply development, generating capacities and network infrastructure. The activity-based re-organization destroyed the typical sectoral hierarchy and changed the possibilities for the state control and running in the functional subsystems of power engineering. An economical independent activity and market self-organization were offered instead of the departmental subordination. But it can't settle the questions connected with realizing the common development concept as it is demanded by the technology.

The forecasting and planning functions concerning the electric power system development at the federal and regional levels are still under the competence of the state authorities. But if at the federal level there are some running mechanisms and financial resources, on the level of regions there are no opportunities to plan and to put into practice the measures for the energetic objects development.

The organization reform has changed the system of the power supply organizations' responsibility to the consumers. Early the departmental integration of all links of power supply secured their corporative responsibility and co-ordination of doing the duties. Now independent power sellers are responsible for power supply availability, quality and safety to the consumers. They don't take part in the process of production and can't influence over the functioning and development of the productive facilities in the generation and the networks.

5. *Problems on activation of the investment process.* The increase in power prices and their further liberalization are not enough for the activation of the investment process. It's unclear whether the uncontrolled price for-

mation in power engineering will promote the considerable growth of efficiency of investment programs because their income can be leveled much by high inflation caused by the rise in power prices. The features of the reproduction in power engineering are high capital-output ratio, high manufacturability and long periods of time for the realization of the projects. They limit the circle of potential investors and the possibility to attract loan capital.

For the private power companies currently working at the market the conditions for system shortage of capacities are optimum: they have a guaranteed load, profits and they are not interested in the increase of new capacities. The expected growth of income and stable position of the power companies at the market give reasons for the private owners to take part in the investment process. These motives will be getting more active for a long time as far as the competitive relations will be establishing. Being an infrastructural complex of vital importance for the economy, power engineering and its development can't be guarded by only market self-organization, that's why some additional directing and supporting mechanisms of government running (obligations for the delivery of facility and fulfillment of the investment programs) and its direct participation in the investment process are set in motion.

The total volume of investments for fulfilling the plans of the General scheme on the development of the electric power till 2020 [7] is 20.7 billion rubles by predictive prices, or 11.8 billion rubles by the prices in the year of 2005 [4]. It is planned to cover 42% of these needs at the expense of the power companies' means and 58% of them – by attracting some external resources (selling the assets of RAO, additional issue, the budgetary means and credits) [4]. The investments into the nuclear and water power engineering development till 2020 are supposed to be 5.1 billion rubles by current prices, heat generation – 6.5; networks of the Common National Energetic System – 4.9; distribution networks – 4.2 billion rubles. The figures show that the areas of responsibil-

ity concerning the financial provision of the investment programs are distributed between the state and private business approximately in equal parts.

The scenarios for the national power engineering development (they were planned by the General scheme) look large-scale, but high-flying and unreal against the background of the present level of estimating the production assets and annual volume of commodity output. In 2007 a total book value of power engineering's capital stocks in Russia was (according to our calculations based on the data by Rosstat) about 3 billion rubles, and the receipts from the sale of power was about 1.3 billion rubles. In such situation it's practicable to use the power companies' own means as investments no more than 0.3 billion rubles – less than 30% of the annual requirements of the investment programs by the prices in the year of 2007, all the rest must be provided by the external resources – in general by additional shares issue and also by the credits and the budgetary means for the target programs. It's necessary to have a high income to attract foreign investments, and it is realizable under uncontrolled price formation. The sale of the government portion in the capital of the generating and power service companies must have brought in about 1 – 1.5 billion rubles, but the most part of them was reinvested into the purchase of control network assets holdings.

On the whole, the renewal of the sector is still a matter of prices and income from the work in the sphere of power engineering. Regardless of the investment sources, their repayment and income must be provided by the receipts, and therefore, will be paid by the consumers of electric and heat power. The fulfillment of the planned large-scale program concerning the renewal of power engineering in Russia will lead inevitably to the increase in power prices several times. The consumers should be ready for such situation – they should plan and take measures which are able to level the expected considerable growth of expenses for their power supply.

On summing up the present analysis of the reforms in the institutional system of the power-supply complex in Russia, it should be noted that every above-named problems is important and urgent and deserves to be a subject of thorough scientific research. The power-supply complex in Russia is changing into the new quality which is suitable for a new economy. Such changes are destabilization of all energetic and economic connections,

search for their new equilibrium condition and balanced correlation of value of power and other resources and goods. The process is expected to be long and painful, but the negative consequences can be reduced when paying close attention to the mentioned problems, to the adjustment and precise tuning up of the mechanisms of government running and regulating the work in the sphere of power supply.

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* In the article we used the statutory and legal documents of the Russian Federation given by the Legal Information Distribution Network "ConsultantPlus".