IJEEP

INTERNATIONAL JOURNAL OF ENERGY ECONOMICS AND POLICY

EJ EconJournals ISSN: 2146-4553

International Journal of Energy Economics and Policy

ISSN: 2146-4553

available at http: www.econjournals.com

International Journal of Energy Economics and Policy, 2018, 8(1), 122-127.

EJ EconJournals

Formation of the Price Mechanism for Energy Resources in Russia and the Countries of the European Union

Olga Ergunova[1], Vladislav Lizunkov[2], Viktor Blaginin[3], Ekaterina Politsinskaya[4], Olga I. Shaykina[5]*

[1]Department of Foreign Economic Activity, Ural State Economic University, Yekaterinburg, Russian Federation, [2]Yurga Institute of Technology of National Research Tomsk Polytechnic University, Yurga, Russian Federation, [3]Department of Regional, Municipal Economy, Ural State Economic University, Yekaterinburg, Russian Federation, [4]Yurga Institute of Technology of National Research Tomsk Polytechnic University, Yurga, Russian Federation, [5]National Research Tomsk Polytechnic University, Tomsk, Russian Federation. *Email: nikol_2507@mail.ru

ABSTRACT

The current research focuses on the solution to the challenge of finding balance in different energy resources pricing trends. Our research shows that increase in gas price leads to corresponding growth in electricity cost, but the effect of replacement has not occurred yet. The burden on population is growing as cross-subsidization is gradually being canceled in order to increase the production competitiveness. It has been found out that households in Russia pay less nowadays than in the USSR, less than Europeans for gasoline, electricity and diesel at present. If we bring the cost of electricity in proportion to the corresponding level of the Soviet time, it will cost about 0.1825 € per kWh, which quite corresponds to European prices and newly confirms the validity of the author’s calculations. Two theoretically possible directions for the development of Russian energy system based on innovations in energy consumption and production have been defined.

Keywords: European Union, Energetics, Price, Energy Supplies, Competitiveness of Production, Direction of Development
JEL Classifications: C62, N70, O13, P48

1. INTRODUCTION

At all times energy sector has determined the development of not only economics but mankind as a whole thus contributing to the fundamentals of so-called energy security. The quality and quantity of the consumed energy resources defined labor efficiency (productivity) as well as areas and rate of core productions development. At the same time there is a “use of resources rule” in the economic theory: Profits are maximized by continually added resources until the marginal revenue product is equal to the marginal revenue cost: MRP = MRC.

The “use of resources rule” leads to demand of a firm for each resource. The change of resource price leads to both substitution effect when a firm substitutes expensive resources for cheaper ones and output effect when a firm increases output of the product if the price of the resource goes down or reduces output when the price of the resource goes up. Market uses price mechanism to inform about demand change for each economic resource. Price dynamics is closely connected to elasticity of the resource demand at a certain price. This elasticity characterizes change of demand for the resource if its price changes.

Energy sector is one of the most significant and at the same time one of the most difficult spheres of Russia-European Union (EU) relations. The EU needs hydrocarbons supply, and Russia needs revenues from energy resources sale (EU buys more than 50% of Russian oil exports and more than 60% of Russian natural gas exports). This has a serious impact on the traditional alignment of forces in their economic relations. As a rule, the EU gets superior in the economic relations with Russia, trying to impose its own level playing field both through bilateral documents and in multilateral forums. Although the EU made similar attempts in the energy sector, its efforts remained rather restrained. The reaction of the Russian Federation was extremely tough.

At the same time, Governments of European countries attach great importance to the development of alternative energy technologies. In 1997, the EU, in the White Paper on Renewable Energy Sources, set the goal to double the use of renewable energy sources from 6% (the 2000 level) to 12% by 2010. Three main sectors where an increase in the share of renewable energy use will make it possible to significant change the current situation were determined as follows: Power supply; buildings heat and cold supply; production of biofuels.

These three sectors contribute greatly to sustainability, reliability and competitiveness of the energy supply. But industrial base, demands, growth barriers and legislative base required for each sector differ drastically. Considering these principles, it would be curious to analyze the dynamics of the price for the main energy carrier in the Russian Federation, namely, gas and identify changes in the energy sector which might take place if gas price and net costs change in the Russian Federation and European market.

2. LITERATURE REVIEW

In the world economic literature, the theoretical framework for analyzing the problems of regulating national energy sectors and world energy markets is rather extensive, as they represent the basic infrastructure sector of the world economy. This is due to the fact that the problems of regulation encompass such areas as industrial organization theory, public sector economics, economic regulation theory and natural monopolies theory which can be attributed to the above-mentioned economic regulation theory as well as a number of other theories and disciplines.

The monographs of A. Koch, M. Atton, J. Vickers, M. Crew, P. Kleindorfer, S. Brown and D. Sibley and others are devoted to theoretical analysis of regulatory problems and related issues.

As already noted, it is possible to identify 2 different approaches in the state policy aimed at increasing economic welfare. On the one hand, we define development and implementation of measures for competition development and antimonopoly policy, which we have considered above, and, on the other hand regulation can be pointed out. The main approach is applied to those areas of production activities where competition is potentially effective, while additional approach is applicable to the areas where the market turns out to be ineffective (natural monopolies, negative externalities, contradictions between short-term commercial interests of the business and long-term strategic plans for social and economic development, etc.).

In as early as the 1960s, American economists H. Averch and L. Johnson_ftn1 discovered the effect that was later on called Averch–Johnson effect. The essence of the effect is that at a given rate of return, regulated companies tend to expand the volume of their profits by artificial capital accumulation, namely, the denominator in the rate of return formula. The K/L ratio is overstated by the regulated company, and its output can be implemented at a lower cost - using less capital and more effort. So, H. Averch and L. Johnson came to the following conclusion: Rate of return regulation leads to inefficient operation of the company and does not necessarily lead to an increase in output and a drop in price (Averch and Johnson, 1962). The ineffectiveness of regulating the capital rate of return was also described by R. Greenwald (Greenwald, 1980), M. Brennan, E. Schwartz and other researchers (Brennan and Schwartz, 1982).

Modern ideas of natural monopolies and economic regulatory institutions allow the introduction of one or another type of competition to ensure the effective operation of the naturally allocated monopoly sector. The forms of competition, used as regulators of natural monopolies, go beyond the generally accepted typology (Korolkova, 2000).

The theory includes the following types of market environments compatible with natural monopoly and forcing it to operate in socially desirable regimes:

- The model of contestable market, which was proposed by W. Baumol, J. Panzar and R. Willing,
- Competition for the market model as referred to natural monopoly was formulated in the late 1960s and early 1970s by H. Demsetz (Demsetz, 1968), J. Stigler (Stgler, 1971), and R. Posner (Posner, 1974);
- Yardstick competition model. The essence of this concept is that regulators auction off a monopoly franchise (Gas Deregulat on Report, 2006). Public-private partnerships are often created as a result of this form of competition (Electricity Deregulat on Report, 2006).

3. METHODS

In the world economy, the method of price caps has started to be used since the second half of the 80s when the privatization of a number of natural monopoly firms took place in England. Price cap regulation was first proposed by S. Littlechild to control the prices of British Telecom, the company that was privatized in 1984. As a result, in the 80's the practice of price caps started to gain recognition in the United States. Later on, price cap regulation was used in other countries as well.

The main principle of the price cap approach is to set an upper boundary of the price that the regulated company can charge. The firm is allowed to set a price less or equal to the cap and to retain all of the resulting profits. As far as the restriction imposed on the firm is not tied to its costs and is not dependent on them, so the price cap serves as a mechanism that generates incentives to reduce costs. This model presupposes quite a long period between the reviews of the price caps. The duration of this period is clearly fixed in advance (usually the lag is 4–5 years). In a multi-commodity situation, the object of regulation is the company's total revenue divided by its cumulative output. The firm is allowed to change prices for products with the only condition that the average income does not exceed the established limit. This simplifies the calculation procedure, since it is not necessary to calculate the actual costs for the production of each type of product (Jiménez-Preciado et al., 2017).

The price cap is calculated on the basis of a pre-established exogenous correction for the firm. Frequently, such a correction is the consumer price index RP minus the performance factor - X, expressed as a percentage:

$P_{t+1}=P_r(RP-X)$

Here P_t - is the base price for the previous period of time (month, year), P_{t+1} is the price for the next period of time. This mechanism is called RP-X regulation. The value of X is determined on the basis of quantitative estimates of such factors as long-term demand, amount of capital investment, amount of profit from other (unregulated) activities, probability of cost reduction and productivity growth, as well as need for investment.

The main advantage of the price cap model is that it is less prone to cost inefficiency and a tendency to overestimate the capital intensity than rate of return regulation model. Producers are guaranteed to maintain the benefits of improving efficiency within the period between X reviews. Natural monopoly gets incentives to increase production efficiency. In addition, the regulation procedure becomes much simpler and cheaper: The costs of collecting and analyzing information on the financial and economic activities of the regulated enterprise are significantly reduced.

Despite obvious advantages, the RP-X regulation has its own flaws (Shepherd, 1999), including, in particular: (1) Regulating authorities are often unable to determine accurately the value, (2) regulated firms tend to reduce the quality of products (quality control is necessary), (3) failure to respect a normal investment schedule (investments are made only at the beginning of the regulatory period).

4. DATA AND ESTIMATION TECHNIQUES

According to official data, gas will provide the largest increase in electricity production in the 20-year term (Scheme and Program for the development of the Unified Energy System of Russia for 2013–2019 approved by the Ministry of Energy order on July 19, 2013).

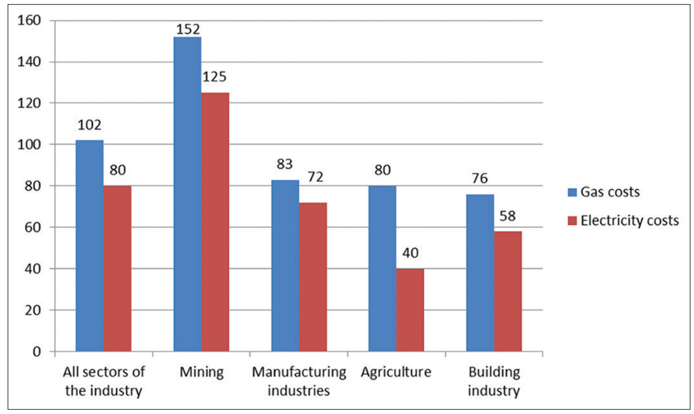
According to Gazprom, the average cost of gas production in the second quarter of 2016 was 1224 rubles per 1000 cubic meters (an increase of 81% as compared to the prices in the 2nd quarter of 2015), in the third quarter of 2015 was 802 rubles per 1000 cubic meters ($27.63), which is 38% higher than the average level of 2014–581 rubles ($19.14). The cost price in US dollars increased by 44%. The cost price of oil production is also steadily increasing, ranging from $15 to $25 per barrel (transportation costs included) for the third quarter of 2016.

Huge increase in cost price in 2015-2016 was caused by 272 rubles MET rise - from 237 to 509 rubles per 1000 m^3 of gas and an increase in production costs.

Undoubtedly, high domestic price for oil and gas affects the growth of costs in Russia, thus reducing the competitiveness of production (Chart 1).

Gas price increase leads to corresponding growth in electricity cost, but at the same time the effect of replacement which is

Chart 1: Growth of gas and electricity costs in Russia, 2011-2015, %



expected according to theoretical postulates, has not occurred yet. This may partly be due to government regulation of the industry implying relatively low tariffs for the population, which is possible by virtue of cross-subsidization at the expense of production works.

5. EMPIRICAL RESULTS

We have calculated how this state policy affects the electricity prices growth for the population (Table 1).

Data for 2012 and price growth calculations are made by the author in November-December 2012. The average salary is given according to Rosstat data for March 2012.

The Table shows that electricity price has grown 75 times compared to the Soviet period. For instance, diesel fuel has risen in price 429 times, wages have increased by 182 times. Only vodka price has risen less than electricity price. So, electricity costs are almost the same as accessible alcoholic beverages.

As it follows from the above data, there is an actual decrease in electricity tariffs, compared to the tariffs in the USSR. Moreover, the regulated tariffs for electricity that existed in the USSR did not contain an investment component.

At the same time, the burden on population is growing and will grow in future as cross-subsidization is gradually being canceled in order to increase the production competitiveness. The increase in electricity prices is caused by the need to invest in the generation and development of the grid economy until domestic prices for consumers, other than the population, come around the European level with a discount of 10–15%. According to the Ministry of Economic Development, this period will last until 2017–2018.

In addition, the commissioning of new capacities until 2018 as well as large-scale investments in the power grid facilities will affect the increase in electricity prices. As a result, the electricity prices will undergo quite a high growth - about 11% until 2016, and by 8–8.5% annually in 2017–2018.

It turned out that households in Russia pay less nowadays than in the USSR, less than Europeans for gasoline, electricity and even diesel at present. It is understandable that prices for gas are at the same level as in Europe (Karacaer-Ulusoy and Kapusuzoglu, 2017).

If we now bring the cost of electricity in proportion to the corresponding level of the Soviet time (Table 2), it will cost about 7.3 rubles per kilowatt-hour, which corresponds to 0.1825 €/kWh, which corresponds to European prices and newly confirms the validity of the author's calculations.

So, it is quite possible that tariffs will grow both for households and for both small and large business. If the practice of cross subsidization is maintained and the cost of electricity for both the population and business grows at the same rate, then the tariff for the population will sooner or later reach 4 rubles. But small business by then will have to pay 8 rubles per kilowatt, which will be one of the highest electricity tariffs in the world.

6. CONCLUDING REMARKS

Such prospects make it logical to replace the energy resource - i.e., building their own generation facilities for consumers-households and for businesses. This approach is becoming more and more economically justified than centralized energy supply in the Russian Federation. And this trend will intensify due to the significant decrease in the cost parameters of generation (Table 3).

Theoretically, it is possible and logical to switch to other types of fuel (Kapitonov, 2012a) - for example, to cheaper coal, as Russia

Table 1: Prices for some products according to statistical data and price lists (1970, 1985 and 2012)

Name of product	Price of goods, ruble			Price growth 1970-2012
	1970	1985	10.2012	
Electricity, kWh	0.04rub.	0,04rub.	3,00rub.	75,0
Diesel fuel, l	0.07rub.	0.11rub.	30.09rub.	429.9
Gasoline AI-92. L	0.15rub.	0.17rub.	28.86rub.	192.4
Bakery, kg	0.23rub.	0.27rub.	32.00rub.	139.1
Sausage products, kg	2.22rub.	2.69rub.	330.00rub.	148.6
Potatoes, kg	0.13rub.	0.15rub.	15.00rub.	115.4
Zhigulevskoe beer, L	0.47rub.	0.51rub.	50.00rub.	106.4
Vodka, 0.5 L	2.87rub.	4.12rub.	150.00rub.	52.3
Copper wire, kg	1.81rub.	1.81rub.	409.00rub.	226.0
Average salary	145.00rub.	190.00rub.	26 440.00rub.	182.3

Source: Data for 1970-1985 - Energy and Industry of Russia, No. 22 (162) November 2010: Front page: Electricity, vodka and beer cost the same in Russia

Table 2: Cost of gasoline, diesel, electricity and gas in the EU and in Russia, 2012

Countries	Gasoline, 95, € (10.12.2012)	Diesel, € (10.12.2012)	Electricity, € per 1 kW/h up to 3500 kW/year (01.05.2012)	Gas, € per 1 m3, consumption up to 1400 m3 (±25%)
Austria	1.392	1.390	0.1988	0.0702
Belgium	1.656	1.501	0.2134	0.0574
Bulgaria	1.248	1.268	0.0829	0.0428
Czech Republic	1.501	1.465	0.2850	0.0541
Denmark	1.584	1.460	0.1480	0.1146
Estonia	1.264	1.334	0.2982	0.0414
Finland	1.603	1.529	0.0989	N/D
France	1.650	1.481	0.1566	0.0583
Germany	1.597	1.460	0.1412	0.0574
Greece	1.683	1.433	0.2541	N/D
Hungary	1.421	1.494	0.1265	0.0568
Ireland	1.584	1.554	0.1708	0.0506
Italy	1.758	1.700	0.1920	0.0700
Latvia	1.337	1.337	0.2031	0.0394
Lithuania	1.392	1.309	0.1187	0.0433
Luxembourg	1.330	1.234	0.1200	0.0516
Malta	1.520	1.400	0.1707	N/D
Netherlands	1.811	1.511	0.1695	0.0727
Poland	1.346	1.365	0.2208	0.0466
Portugal	1.754	1.517	0.1488	0.0609
Romania	1.218	1.235	0.1689	0.0285
Slovakia	1.515	1.441	0.1095	0.0465
Slovenia	1.484	1.402	0.1677	0.0670
Spain	1.374	1.354	0.1447	0.0525
Sweden	1.661	1.679	0.1959	0.1226
England	1.645	1.744	0.2098	0.0419
Russia	0,7215	0,75225	0,075	0,09555

Source: EU-25 data: European Energy Agency/European Energy Portal http://www.energy.eu/, In Russia: RBC-Rosstat http://quote.rbc.ru/news/macro/2012/11/23/33826363.html, Federal Tariff Service data, http://www.fstrf.ru/tariffs/analit_info, Calculations of the author, made at a rate of 40 rubles per 1 Euro. EU: European Union

Table 3: Existing and prospective cost benchmarks in the field of renewable energy in the world, average values

Indicators	Capital investments, $/kW		Cost of production, $ cent/kWh	
	2005	2030	2005	2030
Biomass	1000–2500	950–1900	3.1–10.3	3.0–9.6
Geothermal power engineering	1700–5700	1500–5000	3.3–9.7	3.0–8.7
Traditional hydropower engineering	1500–5500	1500–5500	3.4–11.7	3.4–11.5
Small hydropower engineering	2500	2200	5.6	5.2
Solar photoenergetics	3750–3850	1400–1500	17.8–54.2	7.0–32.5
Solar thermal power engineering	2000–2300	1700–1900	10.5–23.0	8.7–19.0
Tidal energy	2900	2200	12.2	9.4
Ground wind energy	900–1100	800–900	4.2–22.1	3.6–20.8
Marine wind power	1500–2500	1500–1900	6.6–21.7	6.2–18.4
NPP	1500–1800	-	3.0–5.0	-
Coal fired hydroelectric power station	1000–1200	1000–1250	2.2–5.9	3.5–4.0
Gas fired hydroelectric power station	450–600	400–500	3.0–3.5	3.5–4.5

Source: International Energy Agency (IEA), 2010

Table 4: Projects of capacities in Europe, planned for commissioning in 2012-2022

Year	Planned (GWt)					Authorized for construction (GWt)					Under construction (GWt)				
	Gas	Coal	RES	RESIDUAL	ATOM	Gas	Coal	RES	RESIDUAL	ATOM	Gas	Coal	RES	RESIDUAL	ATOM
2012	4	2	12	1	-	-	-	2	-	-	6	0,5	9	2,5	0,2
2013	2	0.5	12	0.2	-	-	-	8	-	-	2	10	2.5	0.5	0.2
2014	7	2	14	0.4	-	2	-	0.5	0.2	-	0.5	2	0.5	0.1	0.1
2015	5	1.8	12	1	-	1	-	0.5	0.1	-	0.5	2	0.5	0.5	-
2016	7	32	4	0.8	0.2	1	0.5	-	0.1	-	0.5	0.5	-	-	-
2017	2	1	3	1	0.3	-	1	-	0.1	-	-	-	-	-	-
2018	3	1	3.2	1.5	0.1	-	-	-	-	-	-	1	-	-	-
2019-2022	0.2	14	14	2.5	0.2	-	-	-	-	-	-	-	0.2	-	-

Source: Enerdata, 2012

has significant coal deposits. These two theoretically possible directions for the development of the national energy system of the Russian Federation are indirectly confirmed by data on commissioned capacities in the EU, where there is a gradual transition of the EU countries mainly to alternative energy sources and to some extent to coal (Table 4).

This transition is logical, as large energy-consuming industries need powerful power production plants and for this purpose new, more environmentally friendly and economical coal-fired power plants with introduced innovations in combustion and cleaning process are being introduced. It is possible to deliver coal from many regions; its deposits are also present in the EU itself. As for private households and enterprises that do not consume much energy, it is possible to switch to alternative energy (Kapitonov, 2012b). This concept is confirmed by the theoretical transition of the developed countries to the so-called 6th technological order.

Russia has already missed the fifth technological order, but if it does not realize the necessity of the new transition now, it will irretrievably fail to gain high profits from energy supplies today, the money which could be directed to the advanced modernization of the economy to enter the sixth order tomorrow (Kapitonov, 2012c).

We can see the ongoing transformation of the global energy security system into a local-regional system based on innovations in energy consumption and production. Both general theoretical postulates and practical steps taken by countries confirm this fact. The new system is maximally self-sufficient, based on energy saving, energy efficiency, applies innovative technologies for energy production, transportation and combustion of fuel; uses renewable energy sources in order to develop and conserve significant amounts of natural resources for future generations.

The new regional-oriented energy security system leaves aside the mutual dependence of the supplier and consumer in the context of global energy security, focusing primarily on local-regional aspects of energy efficiency and energy security.

7. ACKNOWLEDGMENTS

The research is carried out at Tomsk Polytechnic University within the framework of Tomsk Polytechnic University Competitiveness Enhancement Program grant.

REFERENCES

Averch, H., Johnson, L. (1962), Behaviour of the firm under regulatory constraint. American Economic Review, 52, 1052-1069.

Brennan, M., Schwartz, E. (1982), Concistent regulatory policy under uncertainty. The Bell Journal of Economics, 13, 506-521.

Demsetz, H. (1968), Why regulate utilities? Journal of Law and Economies, 11, 55-66.

Electricity Regulation Report. (2006), Global-2006: Energy Market Research Reports: UK, London. Available from: http://www.energy-market-research.info/Free_Energy_Market_Research_Reports.shtml. pdf. [Last retrieved on 2017 Oct].

Enerdata. (2012), Available from: http://www.dhi.nic.in/writereaddata/Content/indian_mission_plan_2012-2022.pdf. [Last accessed on

2017 Jul].

Gas Regulation Report. (2006), Global-2006: Energy Market Research Reports: UK, London. Available from: http://www.energy-market-research.info/Free_Energy_Market_Research_Reports.shtml.pdf. [Last retrieved on 2017 Oct].

Greenwald, R. (1980), Admissible rate bases, fair rates of return and the structure of régulation. Finance, 35, 359-368.

International Energy Agency (IEA). (2010), World Energy Outlook. Available from: http://www.worldenergyoutlook.org/media/weo2010.pdf. [Last accessed on 2017 Jun].

Jiménez-Preciado, A.L., Cruz-Aké, S., Venegas-Martínez, F. (2017), Persistency of price patterns in the international oil industry, 2001-2016. International Journal of Energy Economics and Policy, 7(1), 9-18.

Kapitonov, I.A. (2012a), Economics and safety of innovation-oriented energy sources introduction in Russia and abroad. International Economics, 4, 74-85.

Kapitonov, I.A. (2012b), Ecological and economic problems and prospects for the transition to the sixth technological order in the world and in Russia. Bulletin of Economic Integration, 1, 86-91.

Kapitonov, I.A. (2012c), Innovation-oriented energy basis for the formation of national competitiveness in the conditions of the world transition to the sixth technological order. Bulletin of Economic Integration, 2, 58-62.

Karacaer-Ulusoy, M., Kapusuzoglu, A. (2017), The dynamics of financial and macroeconomic determinants in natural gas and crude oil markets: Evidence from organization for Economic Cooperation and Development/Gulf Cooperation Council/organization of the Petroleum Exporting Countries. International Journal of Energy Economics and Policy, 7(3), 167-187.

Korolkova, E.I. (2000), Natural monopoly: Regulation and competition. Lecture 3. Power engineering: Regulation and competition. Economic Journal of the Higher School of Economics, 4, 528-551.

Posner, R. (1974), Theories of economic régulation. The Bell Journal of Economics, 5, 335-358.

Scheme and Program for the Development of the Unified Energy System of Russia for 2013-2019 Approved by Order of the Ministry of Energy on July 19, 2013, 319.

Shepherd, W.C. (1999), The Economics of Industrial Organization. Illinois: Waveland Press.

Stgler, G. (1971), The theory of economic régulation. The Bell Journal of Economics, 2, 3-21.