Russian Renewable Energy Market: Design and Implementation of National Policy

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I. Introduction

Joining the Kyoto Protocol of the United Nations Framework Convention on Climate Change (UNCCC) marked the beginning of a new era for the Russian renewable energy industry. Reduction of greenhouse gases, increased prices of fossil fuels and liberalization of Russia's power market are the primary factors for the promotion of renewable energy. One of the aims of the Federal Target Programme Energy Efficient Economy for 2002-2005 with an outlook to 2010, is to diversify the Russian energy economy. Government support and promotion of renewable energy use can increase the diversity of energy supplies and make renewables competitive with the diminishing fossil fuel resources over the long run. Introducing "green" energy into the market can help to overcome the country's dependence on the "oil needle", provide electricity in the rural remote areas, and create new employment opportunities. Renewable energy production causes virtually no emissions during the generation process, while fossil fuels create environmental pollution and emissions of carbon dioxide that "carry a number of health and environmental costs which are not found on the consumer electricity bills, but are paid by the society in the form of increased health costs, respiratory problems, pollution of the environment, climate change related cost."[1] According to the European Union Commission's ExternE Research Project, in Denmark alone, those external health costs were estimated to add up to €85-170 billion in 2001.[2] Denmark's use of clean wind energy resulted in saving the Danish economy some of these unnecessary health care costs, saving the global atmosphere from about 5.2 million tonnes of CO_2 and the national industry some 2.3 million tonnes of coal worth more than €100 million.[3]

The benefits of creating competitive renewable energy market are clear. However, in Russia, problems with the overall commercial use of renewable energy remain unresolved. Among them is limited consumer awareness of the environmental and social benefits of "clean" energy, high cost of renewable energy technologies, and unclear investment prospects. The main barrier prohibiting renewable energy technologies from entering the market is the absence of a national comprehensive policy to promote renewables. The policy should include the enactment of federal law on renewable energy; and implementation procedures, such as tax incentives for the "green" energy producers and price reductions for renewables to compete broadly with the least costly fossil-fuel alternatives.

This article outlines the current situation of the Russian renewable energy market and advocates for the promotion of renewables by means of federal regulation and financial support. The combination of Russia's rich renewable power resources and availability of contemporary renewable energy technologies suggests that investment in renewable energy in Russia could generate large economic benefits.[4] The second part of the article describes the necessity of the federal law on renewables. Part three classifies the sources of renewable energy and describes Russia's potential for the development of this industry. Part four analyses the experience of European countries in designing national policies to create renewable energy markets, and part five advocates for the adoption of a national policy on renewable energy generation and outlines the measures to promote renewables in Russia.

[1] Mattias Akselsson, *The World's Leader in Wind Power,* Scandinavika, (Sept. 2004), http://www.scandinavica.com/culture/nature/wind.htm.

[2] *Id.*

[3] *Id.*

[4] *See* International Energy Agency Report, Renewables in Russia: from Opportunity to Reality, http://www.iea.org/Textbase/nppdf/free/2003/RenewRussian.pdf [hereinafter IEA Report].

Regulation of Russian Power Industry and Renewables

In recent years, the Russian power industry has undergone radical changes. Following world trends, Russia began restructuring and deregulating the power market. The goals of the reform are the demonopolization of the current energy producers, increasing economic efficiency of power plants, and attracting investments.[5] On October 22, 2004, the State Duma ratified the Kyoto Protocol.[6] In March of 2005, the government adopted the National Action Plan ("the Plan") on Kyoto Protocol implementation and established the Interministerial Commission on Kyoto Protocol implementation in May of 2005.[7] According to the Plan, the share of renewable power sources out of the total volume of production of primary energy should be increased by 2-3 times by 2008. However, no implementation mechanism has yet been developed.

Currently, there is no federal legislation regulating the renewable energy market. The only federal legislative act that names renewable energy, Russia's Federal Law on Energy Saving,[8] treats renewable energy generation as a part of the energy saving strategy and does not provide any regulatory mechanism for its commercial large scale production. In 1998, the Federal Sobranie held a legislative hearing on the development of alternative energy.[9] In 1999, the Federal Duma adopted the Draft Law on Renewable Energy, however, President Yeltsin vetoed the act.[10] In 2001, the Duma created the Committee on Natural Resources and Nature Use, to prepare a draft program of state support and the subsidy of large scale production and use of renewable energy.[11] The group under the coordination of A.S. Belyakov reviewed the proposed drafts of the renewable energy law and amendments to the existing Law on Energy Saving. The group also prepared a plan regarding government support of the use of non-traditional sources of renewable energy, and reviewed the possibility of changes and additions in the federal tax code if the law on renewable energy were enacted. The group also developed proposals regarding renewable energy use for the Federal Target Programme Energy Efficient Economy for 2002-2005 with an outlook to 2010.

Definition and Classification of Renewable Energy

Renewable energy generally refers to energy obtained from sources that are essentially inexhaustible, unlike, for example, fossil fuels such as oil, coal and natural gas, of which there is a finite supply.[12] Renewable energy is almost exclusively used to produce electricity, and it does not produce pollutants when used to generate energy. Renewable sources of energy include wood, waste, geothermal, wind, photovoltaic, and solar thermal energy, but excludes nuclear energy sources. However, the definition of renewable energy may vary in different countries and even in different regions in Russia. Some of them exclude hydroelectricity, for example. Russia's Federal Law on Energy Saving defines renewable energy sources as "solar energy, wind, earth thermo energy, natural hydro movement and nature heat production."[13]

A. Wind Energy

Commercial production of wind electricity became a reality in Europe in the mid-1990's. In Denmark, for example, wind power alone supplies 20 percent of total Danish electricity consumption. The 5,536 gigawatts (GWh) produced by clean-energy wind turbines in 2003 covered the electricity demand of 1.4 million Danish homes.[14] The output of electricity produced from the moving air is dependent on many factors.[15] The most important in production of wind generated electricity is the wind speed and the size of the turbines. The correlation between the size of a specific turbine and the wind speed measurement of its lo-

[5] *See* RAO UES of Russia ("During the restructuring period sector structure changes as well: separation of natural monopoly functions (power transmission, dispatching) from potentially competitive ones (production and supply, repair works and services); new structures responsible for separate activity types are being created instead of former vertically integrated companies which exercised all the above mentioned functions."), http://www.rao-ees.elektra.ru/ru/reforming/reason/show.cgi?suppositions.htm.

[6] Kyoto Protocol to the United Nations Framework Convention on Climate Change, full text available at http://unfccc.int/resource/docs/convkp/ kpeng.html (last visited Feb. 5, 2006).

[7] *See* UNFCCC Country Profile – Russian Federation, http://unfccc.int/files/parties_and_observers/parties/annex_i/country_profiles/application/pdf/c-brief-ext_russia_a4_28_jan_2005.pdf.

[8] Russia's Federal Law on Energy Saving # 28-FZ (April 3, 1996).

[9] See Ecology Journal – Baikal Waive, no. 32-33 (2004), http://www.baikalwave.eu.org/Volna/32-33/volnamag32-33-energy4.htm.

[10] *Id.*

[11] Federalnoe Sobranie of Russian Federation, State Duma Committee on Natural Resources and Nature Use, Report on the Operation of the Committee on Natural Resources and Nature Use During the Period of functioning of State Duma of Federalnoe Sobranie of Russian Federation III (2000-2003), http://www.duma.gov.ru/search/kmpage/80200027/apparat/otchet2003.htm.

[12] *See* Natsource – Environmental Services, http://www.natsource.com/markets/index.asp?s=104

[13] Energy Saving Law §1.

[14] Akselsson, supra note 1.

[15] Environmental Change Institute, University of Oxford, Windpower and the UK Wind Resource, http://www.eci.ox.ac.uk/renewables/UKWind-Report.pdf ("As the wind blows air across the blades of a turbine, aerodynamic forces are generated which cause the turbine to rotate; by connecting the blades of the wind turbine to an electricity generator, the energy forcing the blades to rotate is converted into electricity, which is then fed into the electricity network.")

cation can then be converted into wind power output.[16]

Russia has tremendous wind energy potential. According to the Russian Wind Atlas, there are numerous areas where the annual mean wind speed exceeds 6.0 meters per second (m/s).[17]

The highest wind speeds are found along the coasts of the Barents and Kara seas, the Bering Sea and the Sea of Okhotsk. Other areas with relatively high wind speed (5-6 m/s) include the coasts of the East-Siberian, Chukchi and Laptev seas to the north and the Japan Sea to the east. Slightly lower wind speeds (3.5-5 m/s) are found on the coasts of the Black, Azov and Caspian seas in the south and on the White Sea in the north-west. Good resources are also found in the low and middle Volga regions, the Urals, the steppe areas of West Siberia, and around the Baikal Lake.[18]

In 2002, in Kaliningrad Region, the Yantarenergo Energy Company completed the first commercial wind power station in Russia with a total power output of 5.1 megawatts.[19] The company is also planning to build an off-shore wind power station, which will have a power output of 50 megawatts.[20] It will consist of 25 wind turbines, which will be erected 500 meters from the shore on the Baltic shelf near the village of Primorsk.[21] Wind energy can be exploited in industrial cities where the fossil fuel supply is insufficient, including Astrakhan, Volgograd, Novosibirsk, Rostov and Krasnodar.[22] In the Northern remote regions wind energy can be used as the primary energy source for small isolated consumers.

B. Solar

The production of solar energy depends largely on solar radiation, which in turn, varies based on latitude, strongest at the equator and weakest at the poles. The solar radiation levels in Russia vary considerably. In the Northern regions, it drops to 810 kWh/m^2 per year, while in the Southern regions it is more than 1400 kWh/m^2.[23] In addition, seasonal changes influence the variations: at 55 degrees latitude, solar radiation is 1.69 kWh/m^2 per day in January and 11.41 kWh/m^2 per day in July.[24] Russia's estimated gross solar energy potential is 2,300,000 million tons of coal equivalent (mtce).[25]

Solar energy potential is greatest in the south-west (North Caucuses, the Black and Caspian Sea regions) and in Southern Siberia and the Far East. Regions with good solar resources include: Kalmykia, Stavropol, Rostov, Krasnodar, Volgograd, Astrakhan and other regions in the south-west, and Altay, Maritime, Chita, Buryatia and other regions in the south-east. In some parts of Western and Eastern Siberia and in the Far East, the annual solar radiation is 1300 kW/m^2, exceeding levels in the Southern regions of Russia. For example, incoming solar energy reaches 1340 kWh/m^2 in Irkutsk (52 degrees latitude), and 1290 kWh/m^2 in Yakutia-Sakha (62 degrees latitude).[26]

C. Biomass Energy

The term biomass refers to non-fossil organic materials produced by photosynthesis and having intrinsic chemical energy content.[27] It includes all water- and land-based vegetation and trees, and all waste, such as municipal bio-solids (sewage) and animal wastes, forestry and agricultural residues. Some classifications include municipal solid waste and certain types of industrial waste as renewable energy sources, and classifies them together with biomass.[28]

Russia is the world's largest producer of biomass (15 billion tons of biomass every year – equivalent on an energy basis to 8 billion tce).[29] The biomass resources available for energy production include: up to 800 million tons of wood, 250 million tons of agricultural wastes, 70 million tons of wood wastes (from forestry and pulp and paper industries), up to 60 million tons of municipal solid wastes, and 10 million tons of sewage wastes. The potential of these resources is 100 mtce of biogas (120 billion m^3) and between 30 and 40 mtce of ethanol per year. In Murmansk, Arkhangelsk, Karelia, Vologda, Komi, Pskov, Novgorod and Saint Petersburg, the residues from sawmills and the pulp and paper industry could

[16] Environmental Change Institute, University of Oxford, Windpower and the UK Wind Resource, http://www.eci.ox.ac.uk/renewables/UKWindReport.pdf ("The rated capacity of a wind turbine represents the maximum power (watts) that each individual wind turbine can produce under suitable wind conditions. Power is generally presented as kilowatts (kW, or 1,000 watts) or megawatts (MW, or one million watts). The energy produced by a wind turbine is equal to the power output multiplied by time – for example, wind turbine operating at a power output of 100kw for five hours will produce 500kWh of energy.").

[17] *See* STARKOV, LANDBERG, BEZROUKIKH &. BORISENKO, *RUSSIAN WIND ATLAS* (2000) (Wind speeds are based on 8 observations (every 3 hours) at 332 meteorological stations in Russia over 10 years.).

[18] IEA Report, supra note 4.

19 *See* Russia's Largest Wind Power Station Completed in Kaliningrad Region, http://english.pravda.ru/region/2002/07/23/33035.html.

[20] *Id.*

[21] *Id.*

[22] *See* IEA Report, supra note 4.

[23] *See* Sergey Karabanov, *The Prospects for Photovoltaic Development in Russia* (2001).

[24] *Id.*

[25] Yanovsky & Bezroukikh, T*he Role of Renewable Sources of Energy in Power Strategy of Russia* (1999).

[26] IEA Report, supra note 4.

[27] *Id.*

[28] Donald L. Klass, *Biomass for Renewable Energy and Fuels,* in ENCYCLOPEDIA OF ENERGY, (2004), http://www.bera1.org/cyclopediaofEnergy.pdf.

[29] IEA Report, supra note 4.

supply as much as 45 to 50 TWh/y.[30] The Leningrad Oblast Forest Committee estimates that the total annual production of wood waste in Leningrad Oblast is 250,000 m^3 (12% of annual wood processing), of which one third to one half remains unused.[31] Karelia, Vologda, Komi and Arkhangelsk each produce 2.5 to 7.5 million m^3 of wood waste annually.[32]

D. Geothermal

Geothermal energy is available for commercial large-scale use in areas where the earth's natural heat flow is close enough to the surface to extract steam or hot water. The former Soviet Union began exploration of geothermal resources in 1957. The first bore holes were drilled on the Pauzhetsk thermal field in Kamchatka. The seismically active Kamchatka peninsular and the Kuril Islands contain the largest geothermal resources; Kamchatka has 127 volcanoes, 22 of which are active; the Kuril Islands have 100 volcanoes, 21 of which are active.[33] Kamchatka has some 150 thermal spring groups and 11 high-temperature hydrothermal systems.[34] In 2002, the first phase of the 200-MW Mutnovskaya geothermal power plant on the Kamchatka Peninsula was put into service.[35] The European Bank for Reconstruction and Development (EBRD) provided approximately $100 million in financing for the project.

There are a number of other areas in Russia with substantial geothermal resources, including the Northern Caucasus, Dagestan, the Central Regions, the West Siberian plate, lake Baikal, Krasnoiarsk Region, Chukotka, and Sakhalin. It is estimated that the economic potential of resources of hot waters and steam-water fluids could be 115 mtce per year and geothermal energy could produce 16.9 billion kWh, or almost 2% of Russian electricity production.[36]

E. Hydropower

With over two million rivers and countless lakes, Russia has the second highest level of mean annual river runoff in the world, second only to Brazil.[37] Hydropower is the only renewable energy asset competitively utilized in the Russian power industry. Of the country's 205.6 gigawatts (GW) of installed power-generating capacity hydropower accounts for 44.7 GW, or 21.7% of the total.[38] Russian hydropower plants generated 173.5 billion kilowatt-hours (Bkwh) of electricity in 2001, accounting for 20.5% of Russia's total power output (846.5 Bkwh) for the year.[39]

Hydropower plants capture the energy of falling water to generate electricity.[40] The bulk of the stream flow is concentrated in the eastern part of the country.[41]

The average runoff varies considerably across the country. Over the Northern Caucasus the runoff exceeds 2000 mm, in the North Urals, in the Altai and in the mountains of Eastern Siberia it is close to 1000 mm. According to the World Commission on Dams, Russia's hydropower potential is 2,900 billion kWh per year, of which 83% is from large and medium-sized rivers. The technical potential is estimated to be 2,030 billion kWh per year.[42]

There are 11 hydropower stations with more than 1,000 megawatts (MW) of capacity each, including the 6,400-MW Sayano-Shushenskaya facility in the Krasnoyarsk Region, the country's largest power plant.[43] Russia's Unified Energy Systems (UES) is building a number of mega-hydropower projects in the Far East as well, including the 3,000-MW Boguchansk in Krasnoyarsk and the 2,000-MW Bureya hydropower plant.[44]

Foreign National Policies for the Promotion of Renewable Energy

Most renewable energy options (with the exception of hydropower and massive windfarms) are not yet competitive in today's global market. Like Russia, industrialized countries have the same incentives to promote the penetration of renewable

[30] Dmitriev & Gunnar Boye Olesen, *Biomass and Wind Power Opportunities in Russia* (2001), http://accord.cis.lead.org/cooperation/energy-engl/8.htm.

[31] IEA Report, supra note 4.

[32] *Id.*

[33] *Id. See* also Battocletti, *Geothermal Resources in Russia 18* (2000), http://www.bl-a.com/ECB/PDF%20Files/Geo%20Res%20Russia_2000.pdf.

[34] IEA Report, supra note 4.

[35] Energy Information Administration, Official Energy Statistics from U.S. Government, Russia Environmental Issues (May 2004), http://www.eia.doe.gov/emeu/cabs/russenv.html [hereinafter Russia Environmental Issues].

[36] IEA Report, supra note 4.

[37] IEA Report, supra note 4. See also Koronkevitch, Water Resources of Russia, http://www.iiasa.ac.at/Research/FOR/russia_cd/hydro_des.htm.

[38] Russia Environmental Issues, supra note 35.

[39] *Id.*

[40] *See* Wisconsin Valley Improvement Company, http://www.wvic.com/hydro-works.htm ("A turbine converts the kinetic energy of falling water into mechanical energy. Then a generator converts the mechanical energy from the turbine into electrical energy…. The amount of electricity a hydropower plant produces depends on two factors: the size of the dam: how far the water falls; and the amount of water falling. More water falling through the turbine will produce more power. The amount of water available depends on the amount of water flowing down the river. Bigger rivers have more flowing water and can produce more energy. Power is also "directly proportional" to river flow. A river with twice the amount of flowing water as another river can produce twice as much energy.")

[41] IEA Report, supra note 4.

[42] *Id.*

[43] Russia Environmental Issues, supra note 35.

[44] *Id.*

energy technology into the national industries. The European Union's target is to double the share of renewable sources by 2010. China recently adopted a federal law on renewable energy (effective January 1, 2006), with the goal of raising the country's renewable energy consumption to 10 percent of the total by 2020, as opposed to only 3 percent in 2003.[45]

A. United Kingdom

In the early nineties the British electricity industry was privatized. The purpose of privatization was to attract private investment in the industry. By late-1990's, it became clear that non-fossil fuel production was extremely unattractive to the private sector. To resolve this situation the Non-Fossil Fuel Obligation was introduced in April of 2002.[46] The Obligation is a statutory requirement for the Public Electricity Suppliers to buy specified amounts of renewable energy according to orders set by the government.[47] The government established a competitive tendering process for the producers of specified types of green energy. The first step of the process is an announcement of the new non-fossil fuel order, and an invitation to renewable energy developers to submit their bids. The Ministry establishes a deadline for the receipt of bids and issues detailed instructions to the bidders. The submitted bids must include the price calculations, energy technology, environmental impact, electrical connection details, and local authority planning application. The bids are ranked in order of price and furthermore filtered by the so-called "will secure" test.[48] This test determines whether the project is viable in light of the technology risks, conflict with the planning guidelines, environmental concerns and power generation capacity. The Purchase Agreements are awarded for up to 15 years and are index-linked to protect them against inflation.

The cost of purchasing renewable energy is spread among electricity consumers. It is estimated that by 2010, the Obligation will create a strong and growing renewable energy demand – worth over one billion British pounds and save around 2.5 million tones of annual carbon emissions.[49] At the same time, as a result of higher purchasing prices of green energy, the yearly electricity cost to British consumers would increase by around 0.5 percent.[50] Overall the policy has been quite successful in reducing the price of renewable power. The competitive bidding procedure provides incentives for upgrading technology to achieve cost efficiency.

B. Germany

Like Austria, Belgium, Denmark, Greece, Italy, Spain and Portugal, Germany uses a system of fixed feed-in tariffs to promote the use of renewable electricity.[51] In general, the German system operates in a similar manner to the British bidding scheme. The main difference is that the purchase prices are guaranteed by government regulation instead of competitive tenders. Both systems place the purchase obligation on network companies or systems operators, and establish a legally guaranteed fixed amount of electricity produced from renewables and fed onto the grid. Germany, however, in addition to the amount of electricity also regulates the price. Germany was one of the first European countries to enact federal legislation promoting renewable energy. The Electricity Feed Law was adopted in December of 1990, and came into effect on January 1, 1991.[52] The law was updated in April of 1998, when the German electricity market was opened to all customers. The act regulates "the purchasing of electricity generated in the territory of the Federal Republic of Germany from specified renewable sources (hydropower, wind and solar energy, sewage and landfill gas as well as biomass)."[53] The implementation program included guaranteed lower interest rates for construction projects. Within the first year following the amendment, over 1,000 new wind turbines with an overall generation capacity of approximately 800 MW were set up reaching the total capacity of 3,000 MW at the end of the year.

C. Netherlands

A different type of regulation governing the renewable electricity supply industry, a system of tradable green certificates, is active in the Netherlands. Its main goal is to stimulate demand instead of supply of renewable electricity. In 1998, the Dutch government implemented European Union directive no. 69/92 by

[45] Renewable Energy Access – China Passes Renewable Energy Law, http://renewableenergyaccess.com/rea/news/story?id=23531 (Unofficial English translation available for download).

[46] *See* Renewables Obligation Order 2002, 2002 Stat. R. & O. 914, http://www.dti.gov.uk/energy/renewables/publications/pdfs/obligatio n 2002.pdf. Renewables Obligation (Amendment) Order 2004, 2004 Stat. R. & O. 924, http://www.legislation.hmso.gov.uk/si/si2004/20040924.htm#note3.

[47] *See* How to Improve the Framework and Design of National Policies for the Promotion of Renewable Electricity, Research Project sponsored by the European Commission in the Framework of the Non Nuclear Energy Programme (1999), http://climate.zew.de/haupt/dp.php.

[48] *Id.*

[49] *See* Giovanna Golini, Tradable Green Certificate Systems In The E.U, 26 Energy L. J. 111, 122 (2005).

[50] *Id.*

[51] *See* How to Improve the Framework and Design of National Policies for the Promotion of Renewable Electricity, supra note 47.

[52] Act on Feeding Renewable Energies into the Grid of 7 December 1990, http://www.solarnet.org/juice/Wind/feedlawDE.htm.

[53] Act on Feeding Renewable Energies into the Grid § 1.

enacting the Electricity Act, which established a certificate system for green electricity. The certificates "are tradable financial assets issued to producers of certified 'green' electricity on the basis of the units of 'clean' energy generated."[54] At the same time the government placed a purchase quote obligation on producers, suppliers and consumers to purchase a number of certificates matching a certain quota of their production, distribution, or consumption of "conventional" energy. The advantage of this system is that renewable electricity is sold and traded on the normal market; "[t]he 'greenness' however is incorporated in the green certificate,"[55] which means that a market participant can buy the certificate instead of buying renewable energy. Another benefit of the system is that the accounting and monitoring of production levels are relatively easy. Each certificate represents a receipt for the specific amount of "green" power. The System Operators report the data to the Green Label Registrar, EnegieNed. Unlike the feed-in tariff system, the government does not establish the price for the renewable energy or the green certificates. The price depends solely on the market conditions of supply and demand. Higher demand will result in increased prices and lead to incentives to produce "green" electricity. Moreover, the market will also determine which renewable plants are less expensive to build, where they should be built, and at what price.

Proposals for Russia

In developing the Russian national policy on renewable energy, the following steps should be taken: First, the federal law on renewable energy must be promulgated. In drafting the act, the most important aspect is crafting the definition of renewable energy. The most controversial issue is whether it should include waste and hydropower. Some states exclude waste incineration from the definition of renewable energy processes based on the argument that this is simply the "transforming of one sort of pollution into another." Power generation from wood, municipal and industrial waste creates as much air pollution as coal, if not more. Appropriate studies should be undertaken to determine what types of the waste energy and technologies of energy generation qualify for legal protection. Another suggestion is to make distinctions based on whether the fractions being burned are biodegradable or non-biodegradable.

The status of hydropower remains open. On one side, the Russian hydro industry is highly competitive in today's market. The cost of hydroelectricity production is relatively inexpensive. On the other side, the majority of Russian hydro resources are not yet fully utilized and their construction requires substantial investment. Therefore, to encourage the construction of new hydropower plants, the industry needs government protection. Another question is what technology should be prioritized. Some technologies are less mature and more expensive, and therefore do not provide the same benefit as others. Here, the British experience in determining the market competitiveness and financial viability might be helpful. At the same time there is a risk of underdevelopment of the technologies that might become more effective over a longer time period, such as biogas and photovoltaic installations.

The next step is to create a national implementation policy. To turn the renewable energy system into an area of business activity for market players a stable regulatory framework is needed.[56] The British bidding system is consistent with the need to achieve economic efficiency, since it introduces an element of competition between generators, which in turn, reduces the prices of renewable power. However, importing the policy to the Russian economy seems problematic for several reasons. First, the bidding procedure requires expensive bid preparations from private contractors. To prepare a successful bid the project has to be approved by the local planning authorities and supported by a detailed environmental impact assessment and with the appropriate technical specifications. All of that requires financial investment and solid research, while the independent green energy developers simply do not exist in today's monopolized Russian energy market. Furthermore, the British system suffers from poor conversion of contracts into projects, and from "the stop-go nature of market development."[57] In 1998, in the United Kingdom, of the more than 3.2 GW of Non-Fossil Fuel Obligation contract offers made to developers, only 246 schemes (31%) have been built, representing only 634 MW (19%) of capacity.[58]

[54] Giovanna Golini, supra note 49.

[55] How to Improve the Framework and Design of National Policies for the Promotion of Renewable Electricity, supra note 47.

[56] *Id.*

[57] *Id.*

[58] *Id* (However, "the NFFO [Non-Fossil Fuel Obligation] has certainly been successful in reducing the price of renewable power. This can be seen as a measure of the economic efficiency of the instrument.").

The Dutch system seems to be more ambitious and has proved to be quite successful. Since its inception, many new projects have been undertaken and revenues generated.[59] It is a clear market system for the individual actors who can produce renewable energy, obtain certificates, and find buyers, conventional energy operators and suppliers. The problem in trying to implement this policy in Russia however, is once again related to the government's monopolization of the Russian energy sector and absence of free independent energy producers.

The German policy, with its fixed tariff regulatory systems and government determined purchase price seems to be closer to the administratively regulated Russian energy market.[60] The problem with that system is the difficulty in determining the amount of subsidy needed to stimulate the supply of all renewable technologies and the absence of explicit targets in the German system. There is no competition among investors in renewable sources of power plants and the mechanism does not ensure that renewable electricity is generated and sold at the least social cost possible.

Despite the different approaches in the national policies to promote renewable energy, every system has something to offer in developing the regulatory framework for Russia. All systems have existed for several years and have proved to be successful. In addition to designing the regulatory mechanism, the implementation of the policy must be promulgated. It is important to provide financial support for the promotion of renewable energy technologies. Consumers need to have access to loans to finance the installation of technologies, such as photovoltaics, solar water and space heating. It is important to develop and include standards and specifications for those technologies in the local building codes.

To encourage large scale renewable energy production government grants and tax reductions must be established. For example, in Latvia and Lithuania, instead of tax reductions for "green" producers, the government imposes "environmental taxes" on polluting fuels. Taxing pollutants raises the price of emissions-intensive goods and lowers profits for fossil-fuel use, providing incentives for the market participants to produce "clean" energy. The principle of "polluter pays" has also been implemented in other European country's taxation policies. In Russia, the strategy, however, might not find much support among the Russian legislators due to the strong mining industry lobby in the Parliament.

Conclusion

Though Russia as a nation is an energy exporter, most Russian regions produce less energy than they need. For the last two years even Moscow, the capital of the Russian Federation, has been facing frequent disruptions in electricity supply. The unusually cold winter spells of 2005 and 2006 caused major disruptions in power in most of the European cities of Russia. Transportation costs dramatically increase the total cost of fuel. Given the long distances between regions, some remote territories, such as Kamchatka, Republic of Tyva and Republic of Altai, where fossil fuels have to be imported over thousands of kilometers, spend more than half of their annual budgets on fuel.[61] Renewable energy could become a solution and a competitive alternative to the diminishing fossil fuels in the long run. According to scientific research, [62] Russia has all the necessary potential of wind, solar, biomass, hydro and thermal power resources to successfully develop a "green power" industry. To create a competitive renewable energy market new comprehensive national policies must be promulgated, including the adoption of the federal law on renewables, tax incentives for the green energy producers, financial support through attractive loans, grants and government purchasing policies. □

[59] *Id.*

[60] *Id* ("The EFL [German Electricity Feed Law] is not conform to the idea of a liberalised power market. In the first place, it does not even create a separate competitive market for renewable sources of energy. In the second place, the purchase obligation on network companies is an infringement of the system, as under the EFL it is his job to supply and sell the green electricity to consumers and not the job of the generator or supplier.").

[61] *Id. See* also Bezrukikh, Non-Traditional Renewable Energy Sources, Analytical Report, Russian Ministry of Fuel and Energy, http://www.minprom.gov.ru/activity/electro.

[62] *See* IEA Report, supra note 4.