



Renewable Energy in Russia's Future

by Toby T. Gati

Toby T. Gati is Senior International Advisor, Akin Gump Strauss Hauer & Feld LLP. She served as Special Assistant to the U.S. President and Senior Director for Russia, Ukraine and the Eurasian States at the National Security Council and Assistant Secretary of State for Intelligence and Research. The author gratefully acknowledges the very helpful contribution of Dmitry Ivanov, Special Assistant, Akin Gump Strauss Hauer & Feld LLP, in the preparation of this article.

President Dmitri Medvedev has begun to outline what could become a serious Russian initiative to address the environmental impact of profligate energy use and to encourage greater energy efficiency. In a decree signed by the President on June 4, the government was instructed to submit draft legislation to the Duma by October 1, 2008 which would provide incentives for introducing environmentally friendly and energy efficient technologies. The order also calls for allocating funds in the 2009-2011 federal budget for renewable energy and providing subsidies for specific projects. These steps may indicate that the elements of a broader domestic energy policy extending beyond the oil and gas sector are now being put in place. All this is occurring at the same time that Russia is making clear its intention to play a larger role in the international effort to address climate change and global warming.

Russia's new policy direction – and particularly its nascent interest in alternative energy – is important because Russia is such a large energy exporter (number one in natural gas and number two in oil), and is now the third largest emitter of CO₂ from fossil fuel (behind China and the United States). It is also significant because President Medvedev has coupled his complaints about the wastefulness of Russian industry and the lack of environmentally sound technologies with the need to improve Russia's international competitiveness and develop technologies key to the success of his "innovation strategy." Over time, a more diversified energy policy could also open up avenues for entrepreneurial businesses in Russia as well as partnerships with some of the fastest growing energy sectors in the United States and Europe.

Russia has abundant oil, gas and coal productive capacity backed up by enormous reserves, but it also has the potential to be a giant in the area of renewable energy. Existing renewable

technologies for harnessing wind and solar power are available to augment current energy supplies and could serve isolated populations currently off the electricity grid, while biomass from numerous forests and croplands around the country, numerous watersheds in the eastern part of the country, tidal potential in the White Sea and the Sea of Okhotsk, and geothermal fields in the North Caucasus and in the Kamchatka Peninsula could be developed to supplement current energy sources.

Yet in Russia in 2005, renewable energy sources accounted for about 3.5 percent of the country's total primary energy supply (TPES), while globally renewable energy is the fastest growing energy source today – some 13.5 percent of global energy supply. (If hydro is excluded, renewable energy sources account today for only 1.2 percent of Russia's TPES, and by 2010 might account for about 1.9 percent.)

Russia's huge hydrocarbon (oil and gas) resources, low domestic energy prices, weak economic incentives, and the lack of a requisite legal structure to develop a renewable energy sector are some of the reasons Russia has lagged behind in the development of a renewable energy sector. At present, Russia does not fall within the top 25 countries making investment in renewable energy attractive and increasing the use of renewables – even though some others in the top 25 are also energy rich (i.e. Norway and Australia). Both in domestic debate and in international fora, Russia's potential is rarely discussed.

Why has interest in renewables lagged? The low level of state support, a focus on other priorities – such as the urgent need to upgrade existing infrastructure – and an almost complete lack of public debate and understanding of the role renewables could play are all important factors. With an economy based on abundant reserves of oil and gas, not only is very little state budget money allocated for the development of renewables, but there are few incentives to invest in alternative sources of energy. The current focus of economic policy is on investment in the “national priority” projects, state corporations, and in major strategic sectors. Companies may be hesitant to risk millions of dollars in sectors or industries that the state appears to find less attractive and they will want to wait for a more favorable political and legal environment before undertaking costly projects. The well-trodden path of innovation in the West – small startups with innovative ideas that then become mainstream – is not easy to transfer to any sector of the Russian economy.

RUSSIAN INCENTIVES TO DEVELOP RENEWABLE ENERGY

The incentives that could drive the development of renewable energy in Russia are not as clear as they are for the U.S. – which is trying to become less dependent on Middle Eastern oil – or for Europe – which is trying to reduce reliance on Russian gas amidst recent concerns about supply disruptions. Russia, as both a major energy producer and exporter, has few incentives to develop renewable energy sources. Given the difficulty of raising domestic energy prices in Russia and a possible shortfall in gas and oil production, expanded use of renewable energy sources at home

could save some expensive hydrocarbons. Using renewables could over time free more oil and gas for export, but probably not enough to make much of a difference.

A stimulus for growth in this sector globally has been growing concerns over pollution levels and global warming. At present, public consciousness in Russia on this issue remains lower than in the West. However, given Russia's close proximity to the glaciers melting at the North Pole, as well as the extensive permafrost covered regions of Siberia and the Far East, the impact of climate change is likely to be great. Recent articles have highlighted the threat from global warming to the environment, to small native populations and to animal life in the Far East, as well as future dislocations caused by melting of the permafrost. But given the immediate social and economic problems facing the Russian government, encouraging the use of renewables and energy-efficient technologies to solve long-term problems does not rank high. Renewables may have economic and environmental benefits, but they are no panacea for tackling more acute problems, such as energy inefficiency.

POTENTIAL MARKET FOR RUSSIA'S RENEWABLE ENERGY PRODUCTION

In 2003, some 10 million people not connected to the Russian electricity grid relied on costly delivery of fossil fuels to remote areas. In Russia's largest entity, the Republic of Sakha, for example, fuel and transportation accounted for around 75 percent of the cost of all municipal services in 2006. The annual cost only of transporting fuel to the republic was estimated at 1.2 billion rubles (over \$50 million) in 2007. These costs give a rough indication of the potential market for renewable energy systems in Russian regions like Sakha if greater investments were made, for example, in off-grid electricity systems based on wind power.

The majority of the wind energy potential is found in Russia's far northern and eastern territories. Wind energy can be exploited in Russia's North West (i.e. Kaliningrad Region, Republic of Karelia, and Arkhangelsk Region), the North Caucasus (i.e. the Krasnodar Territory, the Rostov Region, Republic of Dagestan, Republic of Kalmykia, and the Astrakhan Region), Siberia (i.e. the Tyumen Region and the Novosibirsk Region,) and the Far East (i.e. the Magadan Region, the Khabarovsk Territory, and the Sakhalin Region). Some international cooperation on wind energy projects has already begun. For example, Denmark helped Russia with the construction of a wind power station in the Kaliningrad Region in 2002; Norway's Troms Kraft in 2005 announced plans to build a wind power station on the Solovetsky Island in the White Sea; the Czech Republic's Falcon Capital plans to build a wind farm in Kalmykia by 2010; Spain's Iberdrola Renovables is planning a wind farm in the Krasnodar Territory by 2011; and the Dutch company Windlife Energy has plans to build a wind park in Murmansk Region. Russian HydroOGK is also engaged in several wind power projects. For example, the company plans to increase wind power capacity in Kalmykia from 1 megawatt in 2007 to 9 megawatts by 2010. The company has announced a pilot investment program running to 2010 and sees opportunities for domestic manufacturers of wind energy equipment.

Russia's biomass resources include waste from forest industry, agriculture, and other sources (municipal solid waste and sewage waste). These resources can be used for the production of biogas, butanol, ethanol, and other bio-fuel products. For example, driven by domestic demand and export opportunities, the number of producers of wood briquettes, pellets, and woodchips in Russia's North-West is estimated to have increased 10 times in the last five years. Finland's Wartsila Corporation has already delivered a number of bio-energy boiler units for heat production to wood processing companies in Russia, including a significant order for the Irkutsk Region.

Russia's agriculture industry has shown some interest in supporting bio-fuel projects, many of which are supported by regional authorities. In 2007, the Russian government announced plans to invest 4.6 billion rubles (about \$181 million) between 2008 and 2012 for increasing rapeseed production to boost bio-diesel supply. In March 2008, then Prime Minister Victor Zubkov announced that a new government program would provide financial support for the construction of 30 new bio-fuel plants, as well as for upgrading existing facilities. If implemented, this could eventually increase bio-ethanol production in Russia to 2 million tons per year. Construction plans for bio-ethanol production plants have been announced in various regions.

At present, these projects are often oriented toward export because Russia's current excise tax policy makes it more profitable to export bio-fuel products than to sell them domestically. According to estimates, the production cost of bio-ethanol in Russia for transportation purposes is in the range of 25-35 cents per liter, but an excise tax of 26 rubles (about \$1.10) per liter of bio-ethanol is added to the cost, making production of fuel ethanol cost prohibitive for domestic use. Thus, Russia's emerging bio-fuel sector is primarily driven by the European Union's growing demand for bio-ethanol, rapeseed-based bio-diesel, and wood fuel, rather than by domestic market conditions. Moreover, the country does not yet have a unified standard for bio-diesel production. The Russian National Bio-fuel Association organized its second international forum on fuel bio-ethanol in April 2007 and a third one in April 2008.

Solar potential is greatest in Southwest Russia, near the Black Sea and the Caspian Sea, and in Southern Siberia, i.e. in the Altai Republic. In 2006, former President Mikhail Gorbachev called upon the leaders of the G8 to create a \$50 billion Global Solar Fund over 10 years to promote solar energy projects. No action appears to have been taken to establish this fund. Nevertheless, private initiatives to promote solar energy projects are moving ahead. For example, the U.S.-based company Solar Night Industries, Inc. has recently established an office in Moscow to further promote solar energy research and technology commercialization. Nitel Solar, Russia's producer of silicon for solar panels, has recently announced plans to list on the London Stock Exchange and expressed interest in promoting the use of solar energy applications.

Russia's substantial geothermal resources are located in seismically active areas on the Kamchatka Peninsula, the Kuril Islands, and in Sakhalin. Two functioning Mutnovsky geothermal power stations in Kamchatka have already significantly increased local electric power supply. In 2006, Iceland's authorities expressed interest in cooperating with Russia to build more geothermal plants on Russian territory. In 2007, the top three countries generating

electricity from geothermal energy were United States, Japan, and Iceland. Russia was not even in the top ten.

Russia is using about 20 percent of its economically viable hydropower resources, with the extent of use varying from 48 percent in the European part of Russia, to 25 percent in Siberia, to three percent in the Far East. (For comparison, the United States, Canada, several countries in Western Europe, and Japan are using from 50 to 90 percent of their resources.) Most of Russia's hydropower potential is in Central and Eastern Siberia and the Far East. Russia ranks second after Brazil in terms of the level of annual river runoff in the world. HydroOGK has an ambitious plan to invest around \$65 billion for renewable energy projects and plans to double its installed capacity of electricity production by 2020. HydroOGK has plans to build up to 20 mini-hydro power plants in the North Caucasus by 2010.

Anticipating the adoption of renewable energy laws, Russian and foreign investors are now beginning to explore investment opportunities for hydropower. For example, Japan's Mitsui and Norway's Statkraft are considering proposals to build a number of hydropower plants in the North Caucasus. In addition, the federal government is ready to financially assist HydroOGK with construction of the Mezen Bay tidal power station on the White Sea, which would supplement the existing Tugurskaya tidal power station on the Sea of Okhotsk and the Kislogubskaya tidal power station on the Barents Sea.

Several Russian investment companies, including Mikhail Prokhorov's Onexim Group, are seeking to implement hydrogen-fuel projects. Interros and Norilsk Nickel have invested in the U.S.-based Plug Power Inc. in 2006 to further promote hydrogen and fuel cell technologies. The National Innovation Company "New Energy Projects," founded in 2005 and headed by Boris Kuzyk, promotes the development of hydrogen technologies in Russia, some of which can enhance solar or wind-powered generators. The company's programs emphasize the importance of developing a renewable energy sector in Russia. Looking further ahead, Russian Minister of Industry and Energy Victor Khristenko in the spring of 2007 announced plans to use hydrogen-fueled buses at the 2014 Olympic Games in Sochi. Holland's European Technology and Investment Research Center (ETIRC) is going to provide Sochi with conversion technologies for gasoline and diesel oil buses to be powered by hydrogen. ETIRC also has plans for hydrogen fuel projects in the Irkutsk Region, whose administration signed an investment agreement with the Dutch company in October 2007 to launch coal-to-fuel projects in the near future.

WHAT IS TO BE DONE?

A favorable environment for the renewable energy market would include four elements: a clear articulation of national goals by Russia's political leadership; passage of new legislation providing a more solid legal framework, as well as subsidies and other incentives for investing in renewable energy; greater public interest and support at home; and partnerships between domestic industry and international companies to kick-start a viable market.

In general, growth in demand for renewable energy is highest in countries that have made renewable energy development one of the focal points of national energy policy. Including renewable energy in national energy policy is an important first step toward increasing the attractiveness of investment. So is establishing quantifiable renewable energy targets that set a minimum percentage of energy supply in a given country or region. Market players view such goals as encouraging signals that investment in renewable energy is welcome and will be rewarded. For example, Renova is interested in participating in Russian wind and solar projects, but is waiting for the introduction of state subsidies for electricity generation from renewable sources.

In Russia, political signals matter greatly, but, increasingly, so do economic ones. If the focus of political leadership continues to be on gas and oil production and if the state budget continues to rely heavily on tax revenues from these industries, there will be few incentives to innovate and develop new resources on a significant scale. In the future, however, as domestic gas prices increase and the cost of renewable energy technologies falls, the percentage share of renewables should grow. In addition, as international companies began investing in renewables, it is likely that more innovative Russian companies will follow. Some Russian companies are now taking the first steps of investing in Western technology firms. In 2006, Interros and Norilsk Nickel acquired a 35- percent stake in New York-based Plug Power Inc. In 2007, Renova announced plans for wind, solar, and bio-energy projects in the Italian market and this year increased its stake to 39 percent in the Swiss technology company Oerlikon, a producer of equipment for manufacturing solar cells. In early 2008, a subsidiary of the Russian independent gas producer ITERA announced plans to invest in construction of two bio-fuel plants in the U.S., as well as in similar projects in Russia and the CIS.

Russian companies may now also attract foreign investment for joint renewable energy projects in order to generate emission reduction credits for subsequent sale on international markets. A government commission under the auspices of the Economic Development and Trade Ministry began accepting applications and reviewing Joint Implementation (JI) projects in March 2008. In all likelihood, Russian companies will not take full advantage of the JI mechanism under the Kyoto Protocol to raise additional funding for domestic energy efficiency projects if the approval and issuance processes are too complicated and administratively burdensome. So, too, the pace of technology transfers depends in part on the emergence of favorable market conditions in Russia.

LEGISLATIVE INITIATIVES

A number of attempts to pass legislation aimed at developing Russia's renewable energy sector have already been made. A draft bill on "State Policy for the Use of Non-Traditional, Renewable Energy Sources," introduced to the State Duma in April 1998 and passed by the parliament in November 1999, was vetoed by President Boris Yeltsin. The Putin Administration, preoccupied with other issues, did not reintroduce the bill and it was removed from further consideration in October 2003.

In January 2005, another draft bill, On Alternative Motor Fuels, was introduced in the Duma, but in September 2007, it was put on hold by the government, which said that the bill lacked clarity and needed additional work. The bill included the provision of federal subsidies for alternative fuels projects in Russia's regions, and called for the establishment of public-private partnerships for undertaking large-scale investments in bio-fuels for transportation.

Last spring, the Federation Council, supported by the Agriculture Ministry, announced that a draft bill concerning Bases of the Development of Bio-Energy in the Russian Federation would be submitted to the State Duma in the near future. The draft bill would lower the excise tax on fuel ethanol and offer tax breaks for oil refineries to blend gasoline and diesel with ethanol.

In late November 2007, former President Vladimir Putin instructed Agriculture Minister Alexei Gordeyev to create "conditions for business to produce bio-fuel." Some business leaders have gone further, suggesting that the use of bio-ethanol and bio-diesel as additives to motor fuels be mandated and Russia's tax and customs legislation changed. However, despite the country's 20 million hectares of unused arable land, critics have cited concerns about the impact of grain-based bio-fuel production on Russian grain market prices, as well as growing competition in the West among producers of bio-fuel, as reasons to go slow.

The Industry and Energy Ministry has repeatedly spoken of the need to expand the use of renewable energy sources. Working with RAO UES, the ministry prepared a draft law, On Supporting Renewable Energy Use, in early 2006. Late last year, a new federal law on reforming RAO UES was passed, which could pave the way for federal subsidies to utilities that use renewable energy sources to generate electricity.

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In the West, high energy prices have stimulated global innovation in the development of solar, fuel cell, tidal, geothermal, wind, biomass, and other technologies. Lacking similar economic incentives to reduce dependence on fossil fuels, and with little funding for pilot projects or investments in renewables, the development of a robust renewable energy industry in Russia has been slow.

It now appears that more attention is being given to the potential for renewables and clean energy technologies. Former President Vladimir Putin said at a January 2008 meeting of the Security Council that "Russia now has the financial and economic opportunities to promote the use of clean technology." This speech on Russia's ecological security was followed by then First Deputy Prime Minister Dmitry Medvedev's call for Russia "to move quickly to gain a foothold" in the market for clean and renewable energy technologies.

Whether this happens will depend on creation of the conditions – political, economic and legal – for the development of the country's renewable energy potential and then applying Russia's considerable scientific and technological resources to accomplishing the task.

