

Why Energy Efficiency is Vitally Important for Russia

By Laura Solanko*

Introduction

The severity of the global financial crisis in Russia underlined the dependency of the Russian economy on the smooth functioning of global markets for raw materials and on the global financial markets. Despite the desire to stress sovereignty and stability in Russian economic parlance, the federal budget is largely based on export tax revenues. On the other hand, the domestic financial system does not meet the investment needs of large Russian corporations. Therefore, the world's largest producer of oil and natural gas is inherently open and dependent on the global economy. The future challenge is how to manage this dependency and to secure energy exports given only slowly increasing domestic production volumes. A key ingredient in any successful strategy has to include increasing the efficiency of domestic energy use in Russia.

Energy-dependent Economy

Much of the world's most important hydrocarbon resources are concentrated in a fairly small area stretching from the Middle East and Caspian region to Russian Siberia. Russia alone accounts for a quarter of the world's natural gas reserves while the next largest resource owners (Iran, Qatar and Saudi Arabia) together account for almost a third of the world reserves. Consequently, the world's largest natural gas producer country, Russia, alone accounts for 20% of the world's natural gas production. Global oil reserves are slightly less concentrated geographically but nevertheless three countries (Saudi Arabia, Iran and Iraq) account for 40% of total proven reserves. Russia's oil reserves are estimated at 80 billion barrels or slightly less than 10% of global proven reserves. Currently Russia - on a par with Saudi Arabia - is the world's largest crude oil producer. This means that Russia's crude oil reserves are likely to be depleted long before Saudi Arabia's.

As opposed to many other major oil and gas producers such as Qatar, Norway and Saudi Arabia, Russia is a large country, with a population of 142 million and a high level of domestic energy consumption. In per capita terms, Russia's hydrocarbon reserves are not huge. Proven crude oil reserves are the case in point; Russia's oil reserves per capita are only 1% of the corresponding figure for Saudi Arabia. (See Table 1) Therefore, Russia cannot live on energy resources alone.

Russia exports around 70% of its crude oil and 30% of its natural gas production. These two items, combined with oil products, comprise 70% of the value of Russia's exports. Moreover, the rest of Russia's export goods are generally energy-intensive, low-value-added products of the metals, petrochemical and forestry industries. The share of machinery in Russia's exports is less than 6%.

Since the export price of natural gas depends on the world market price of crude oil, the total value of Russia's exports fluctuates widely, in line with fluctuations in the international prices of raw materials. The main driver of the 45% decline in the value of exports in the first half of 2009 was clearly the drop in oil prices. In volume terms, Russia's oil exports increased modestly, and gas exports were cut by "only" 30% compared to the first half of 2008.

Not only is Russia's external balance dependent on oil and gas exports; the country's budget balance is also critically dependent on proceeds from fees from natural resources extraction and from export taxes on crude oil. According to the Russian Ministry of Finance, almost 50% of federal government revenues derive from the energy sectors (mainly oil and gas). This indicates that at least a quarter of the enlarged government (federal, regional and local budgets plus major extra-budgetary funds) revenues are dependent on proceeds from the energy sector.

Russia taxes heavily crude oil exports, the tax rate depending on the export price. Therefore increases (decreases) in export prices are almost immediately

Oil: Proven Reserves at end 2007	Thousand million barrels	Share of world total	Reserves/ current Production	Population mils.	Reserves per capita
Saudi Arabia	264,2	21,0%	66,5	4,5	58,7
Iran	138,2	10,9%	86,9	72	1,9
Iraq	115,0	9,1%	47,5	29	4,0
Kuwait	101,5	8,1%	99,6	2,7	37,6
Venezuela	99,4	7,9%	38,7	27	3,7
United Arab Emirates	97,8	7,8%	89,7	4,8	20,4
<i>Russian Federation</i>	<i>80,4</i>	<i>6,3%</i>	<i>21,8</i>	<i>142</i>	<i>0,6</i>
Libya	43,7	3,5%	64,6	6,3	6,9
Kazakhstan	39,8	3,2%	70,0	15,4	2,6

Table 1

Source: BP World Statistical Review 2009, CIA World Factbook

* Laura Solanko, is a Senior Economist with the Bank of Finland, Helsinki, Finland. She may be reached at laura.solanko@bof.fi
See footnotes at end of text.

translated into increases (decreases) in federal budget revenues. This is why a federal budget surplus of 4% of GDP in 2008 could turn into a deficit of 6% this year. Russian oil companies have long claimed that the effective marginal tax rate on oil exports is 90%, which discourages new investments even when the oil price is high.

Any list of large Russian companies includes energy companies and state-owned banks. The largest enterprises are oil and gas giants, which are large by any measure even by global standards. Fortune magazine places Gazprom (22nd) and Lukoil (65th) in its top-100 companies worldwide in the 2009 rankings.¹ An alternative ranking by Forbes includes Gazprom (43rd), Lukoil 8114th) and Rosneft (192nd) in the global top-200.² Oil and gas companies and their subsidiaries are therefore unquestionably the major companies in Russia. Only 19 oil and gas companies made their way into the Expert rating of the top-400 companies in Russia in 2008. Those 19 companies accounted for 33% of the total sales of the 400 rated companies.³ The remaining 381 companies accounted for only two thirds of total sales.

Additionally, these energy majors are often the main customers (and owners) of many service companies, especially in transportation, banking and construction. Therefore, it is not surprising that the energy sector as a whole (including electricity and district heating) comprises a large part of the domestic economy. The draft government Energy Strategy 2030 states that the energy sector currently accounts for a third of Russia's GDP. The figure should not be an over-estimate, as the country's largest company, Gazprom, claims to produce alone some 10% of Russia's GDP.

Inefficient Energy Use

By global standards, Russia trails far behind almost everyone else in energy efficiency. Russia is the world's third largest energy consumer after the U.S. and China. As the structural change towards services has proceeded in Russia both energy consumption per unit of GDP and the absolute levels of CO₂ emissions have declined slightly over the last 15 years. But Russia is still nowhere close to the average levels of industrialized countries. In relation to the size of the economy, as measured by GDP, Russia currently consumes 2.5 times more energy than China and a whopping nine times more than the U.S.

Russia's energy efficiency has increased significantly during the last ten years. In 2000-2007 GDP increased by seven percent while energy consumption grew only by two percent annually. Annual improvement of energy efficiency by five percentage points or more is targeted by the Russian government. And it is surely impressive by any international comparison, but Russia's progress is mostly due to the rapid growth in GDP – not due to efficiency-enhancing investments.

Some of the high energy intensity in Russia's economy is probably dictated by a harsh climate and long distances, but most of it is a legacy from the Soviet economic structure, tilted towards heavy, energy-intensive industries. According to recent government estimates, 45% of Russia's relative energy inefficiency is due to the inherited industrial structure, 35% to outdated technology, and only 20% to other factors, including climate.⁴ If true, this would imply two things. First, Russia can go a long way to improve energy efficiency simply by adopting new technologies already in use elsewhere. And second, if Russia really wishes to approach Western European levels of energy efficiency, large-scale modernization of the Soviet industrial base is needed. That would mean closing down several large plants, with grave implications for local employment and public services. Energy is still considered a social public good in Russia.

The scale of inefficiency in energy use is indeed huge. A recent study (IFC, 2007) estimates that Russia could save up to 300 Mtoe or 45 percent of its total primary energy

consumption by switching to more efficient technologies already commercially available elsewhere in the world. This would equal 15 % of total primary energy consumption in the EU-27.⁵ The largest potential for energy savings in Russia are found in residential buildings as well as in industry and transportation, where current energy consumption could be cut by 40%-50%. Also power generation and heat distribution suffer from low energy efficiency; primary energy use could be reduced by 30% and 20 %, respectively (IFC, 2007). Russian power plants typically have average electric efficiency of about 28%

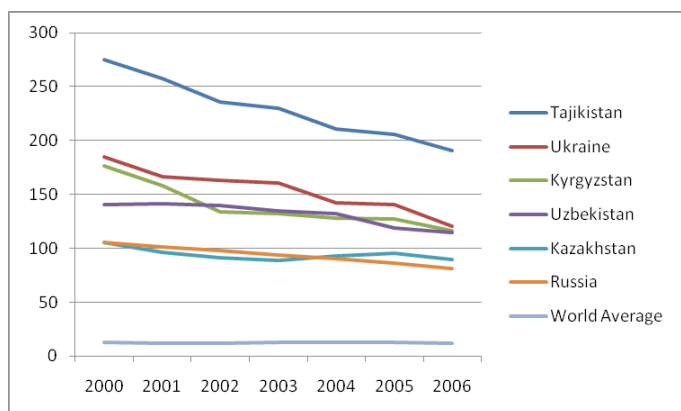


Figure 1: World's Six Most Energy Intensive Economies and World Average. Primary Energy Consumption (Btu) per GDP, 2000-2006.

Source: EIA at <http://www.eia.doe.gov/emeu/international/energyconsumption.html>

Note: GDP is measured using market exchange rates in thousands of (2000) US dollars.

,i.e., 10 percentage points less than in modern Western European plants. Moreover, Russian power plants are equipped with only very basic emission control systems with no control systems for nitrogen or sulphur oxides. (ÅF-Consult, 2009.)

A major obstacle to more rapid improvement in energy efficiency is domestic energy pricing. Domestic prices on gas and electricity need to be increased. In Russia, the price of gas is not determined by the market. Instead the Federal Tariff Service sets fixed wholesale prices at which Gazprom must sell most of its gas.⁶ The tariff for households is significantly lower than the price charged to industrial users. Both prices are, however, considerably lower than export prices. In October 2006, the government approved a plan – since already adjusted - to gradually increase the domestic price of gas so that by the end-2011 the domestic price for industrial users would equal the export price (less export tax and transportation costs). Currently the price difference is remarkable. At the end of 2007, the domestic tariffs should have been raised almost three-fold to attain net-back parity with export prices (Solanko and Sutela, 2009). This would be a very major adjustment burden to the Russian economy, accustomed to very low-priced energy. As long as consumer prices for natural gas and electricity continue to be regulated, incentives for energy efficient investments are weak.

Increasing Energy Efficiency is Vitally Important to Secure Energy Exports

Russia's economy is in many ways unavoidably dependent on energy production and energy exports. This dependence on global energy prices renders the Russian economy vulnerable to external shocks, as witnessed again during the global financial crisis of 2008/2009. Moreover, dependence on export earnings from a few raw materials is often seen to lead to the "resource curse", an equilibrium where the domestic economic institutions (e.g., rule of law, education, courts) remain in a poor condition, which leads to slow economic growth and wide income disparities. This scenario would clearly contradict all attempts to create a "modernized", innovations-based Russian economy – an idea most recently promoted by President Medvedev in his state of the nation speech in November 2009.

Russian policy-makers have a clear vision of the need to reduce Russia's energy dependency. Both the government's medium-term economic policy plan and the Energy Strategy of the Russian Federation till 2030 point to a diminishing role for the energy sector. The Energy Strategy document, often criticized for being overly optimistic and vague on details, strives for an economy in which the energy sector's role is less than 20% of GDP by 2030.⁷ This vision has yet to result in concrete action plans and forceful implementation, which have been in short supply in post-Soviet Russia.

Even in the best of the cases, reducing energy dependency is a long-term goal. It would imply that the non-energy sectors of the economy should grow at faster rates than the energy sector. Increasing global energy prices are likely to make this target extremely difficult to attain. Therefore, at least in the medium term, the Russian economy is likely to remain just as energy-dependent as it is now. Perhaps paradoxically, this means that maintaining energy export capabilities will be a top priority in Russia's economic policy-making.

During the last ten to fifteen years Russian oil and gas industries have relied on the massive investments made in these sectors during the last Soviet decades. With fading production levels at the super-giant fields this is no longer possible. Especially in the gas sector, it is not the sufficiency of resources that would hinder growth in production. They exist in great quantities. The challenge is in deficiency of investment. In the past fifteen years, the Russian gas monopoly Gazprom has made very little new investments in production and transportation. The next generation of Russian gas fields are located further north in the Arctic Sea and in the Yamal peninsula, in extreme physical conditions. In 2006, Gazprom finally decided to start developing the fields on the Yamal Peninsula beginning with the Bovanenkov field. Many experts have warned that Gazprom's plans to commission the giant Yamal field by 2015 are almost impossible to materialize. The challenges are technical, logistical, and project management-related, and none of them is alleviated by the tightness of credit markets following the 2008/2009 financial crisis. Constructing a completely new production site and infrastructure takes years at best. Just building the transportation infrastructure on the marshy peninsula presents a major challenge.⁸

Even the optimistic forecasts of the Energy Strategy 2030 do not see large increases in production volumes in oil and gas over the next 20 years. Therefore, future growth has to be found elsewhere. Securing future export volumes requires curbing growth in domestic energy consumption together with securing the current volumes of energy imports. This is why improving energy efficiency will become increasingly important for Russia.

As stressed above, the potential is clearly huge and, encouragingly, the Energy Strategy 2030 seriously discusses these issues. A new law on energy efficiency was adopted in November 2009, hope-

fully increasing awareness of energy efficiency in the country. Further, continuing price liberalization in wholesale electricity markets and in industrial use of natural gas will slowly force domestic consumers to optimize their energy use. For higher prices to have real influence on end-user behavior, however, both households and corporations need to have hard budget constraints. This will imply a major cultural change. Even though there have been some cases where industrial consumers have been cut off power supply, at the end-2009 cutting off private consumers for unsettled bills was still illegal. Further, energy consumption must be metered properly which sets remarkable technical requirements in especially residential housing. A typical Russian block of houses does not have meters for power, heat or natural gas by apartment. Higher prices alone are not, therefore, enough to enhance energy efficiency. Without adequate institutional and technical environment, dramatic increases in energy prices could simply lead to serious social problems, possibly reflected in increased non-payments.

But much remains to be done. In industries, importing the already existing technologies and know-how from other countries would be the fastest way to achieve real results. Russian industry has been slow in realizing its energy efficiency potential primarily due to sheer ignorance and lack of awareness among senior management (IFC, 2007). A significant hindrance is also lack of long-term funding to finance energy efficiency improvements. IFC estimates that on average, energy efficiency investments would pay back in just four years. But only a third of corporate bank loans in Russia have maturity over one year.

From the Russian perspective, the other important element in securing export capabilities is the securing of sufficient and reliable transport capacity. Besides the standard maintenance and repair, this includes the building of new oil and gas pipelines as well as new export harbors, in order to reduce dependence on sometimes unreliable transit countries. This explains why projects like the gas pipelines Nord Stream and South Stream, and the oil pipelines BPS-2 or TCP-2 are seen as vitally important by the Russian government.

Seen in this light, Nord Stream (planned to run from Russia through the Baltic Sea bed to Germany) is neither simply targeted against Ukraine or the Baltics nor meant to provide the Russian Baltic Fleet a missing *raison d'être*. It can be seen as an unavoidable investment for securing uninterrupted deliveries of natural gas to Russia's major export markets. Deliveries to the EU-27 countries plus Turkey account for two-thirds of Gazprom's total sales revenue. Deliveries to all CIS countries account for only a third of Gazprom's revenues, even though, in volume terms, two-thirds of its sales go to those markets.

Conclusions

Due to its dependence on energy resources Russia is, and will continue to be, dependent on the gyrations of the global economy. During the last ten years the Russian governments have managed the windfall revenues of constantly increasing export prices very prudently, storing large shares of them in sovereign extra-budgetary funds. These funds, did indeed provide a warmly welcomed cushion that insulated public expenditure from the dramatic decline in revenues in 2009. But even the large stabilization funds and extremely low public debt cannot insulate the Russian economy from being an energy-dependent economy vulnerable to a global shock.

High energy dependency is readily acknowledged among the Russian policy-makers. The government's Energy Strategy strives for an economy in which the energy sector's role is less than 20% of GDP and energy efficiency is much improved by 2030. Even in the best of the cases, reducing energy dependency is a long-term goal. The current crisis underlined the fact that even a country that manages one of the world's largest hydrocarbon resources needs global financial markets. This is especially true considering that huge new investments are needed to keep up the current production levels in the future as well as to finance the shorter term investments needed to increase energy efficiency.

Meanwhile, securing sufficient volumes of energy exports is of utmost importance for public finances, external balance and economic growth in Russia. As oil and natural gas production is not projected to increase rapidly in the future, growth in domestic energy consumption can be only very modest. This calls for major improvement in energy efficiency. Russia can, technically, save 45 percent of its primary energy consumption of the 2007 level. To ensure continued economic growth, some of that potential has to be realized fast.

(See footnotes on page 26)