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## Russian Federation

### Bio-Fuels

### Annual

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**Report Highlights:**

As one of the world's leading producers and exporters of oil and gas, interest and demand for biofuel remains limited in Russia. While alternative energy has entered the Russian consciousness, there has been no activity at the federal level regarding biofuels. However, there is growing activity at the regional level. The number of biofuel production facilities has increased, as has production of biofuel raw materials for export (including wooden pellets, rapeseed, and rapeseed oil). The emerging Russian biofuel industry is driven primarily by growing demand for biofuel in Europe. Current production volumes of bio-fuel sources are still small.

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## Executive Summary

Russia has little domestic demand for biofuel, largely due to its abundance of petroleum and natural gas. Alternative energy sources have entered the Russian consciousness, however, and the number of declarations and conferences devoted to the topic rose considerably during 2006 and the first half of 2007. There has been no activity at the federal level regarding biofuel legislation, policy, or technology investment, but several activities have taken place at the regional level. The number of planned biofuel projects has increased, as has the number of local entrepreneurs who have begun or increased their production of biofuel raw materials for export (including wooden pellets, rapeseed, and rapeseed oil). The emerging Russian biofuel industry's export orientation is driven by the growing demand for biofuel in Europe and other nations. Production volume of biofuel sources are still small, and have not yet affected Russia's domestic grain and oilseed prices. Given the relatively high cost of production, transportation, unstable weather conditions, and limited land resources for grain and oilseed production in Russia, however, substantial increases in biofuel production may affect domestic grain markets in the long run.

## Policies Supporting Production and Use of Biofuels

Russia's abundant resources of petroleum and natural gas, as well as subsidized natural gas prices, have removed most incentives for both a more efficient use of fuel, and the development of alternative energy sources. Russia's Gross National Product (GNP) increased 6.7 percent in 2006. Industrial production grew 3.9 percent, agricultural production rose 2.8 percent, and transportation turnover increased 2.2 percent<sup>1</sup>. During the same period, automotive gasoline consumption grew 7.3 percent, and domestic diesel consumption increased 7.2 percent.

International prices for oil and gas remain high. As one of the largest exporters of crude oil and gas, there is little interest in developing a domestic biofuel industry. Little has been accomplished at the national level, although the issue of petroleum and natural gas fuel substitutes was raised at several national conferences and meetings held throughout Russia in the past year. Legislation pertaining to biofuel does not exist, and the renewable energy part of the federal target program "Energy-Efficient Economy"<sup>2</sup> has not been implemented thus far. In December 2006, a group of deputies in the Duma, the lower chamber of Russia's National Assembly, prepared draft legislation that lifts the excise taxes and eases regulation on motor fuel containing less than 10 percent ethyl alcohol. This was intended to make bio-ethanol more economically attractive for alcohol producing plants. The draft legislation is scheduled for consideration by the Duma in the fall of 2007, but given the upcoming national elections, has little chance of becoming law this year.

The mass media, small businesses, and the scientific community are increasingly interested in biofuel production. Interest at the federal level is geared toward providing biofuel for export rather than domestic gains from biofuel use. Current thinking is that the huge expanse of Russian territory and arable lands make Russia well-suited to benefit from the international trade in biofuel rather than direct gains from biofuel use.

No agency or ministry at the federal level has jurisdiction over alternative energy. The use of wood as bio-mass falls, theoretically, under the responsibility of the Ministry of Natural Resources, and to some extent the Ministry of Energy. The production of crops for use in biofuel falls under the jurisdiction of the Ministry of Agriculture. The use of bio-ethanol for fuel falls into a sensitive area, as alcohol production is traditionally dependent on both the

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<sup>1</sup> Source: Federal State Statistical Service. Social-economic condition of Russia, 2006.

<sup>2</sup> GAIN Report RS6031 *Bio-Fuels Annual, 2006*

Ministry of Agriculture and the local administration. While the Ministry of Agriculture could play a substantial role in the development of biofuel policy, it usually limits its activities to lobbying for federal subsidies for agricultural fuel and lubrication. At the end of 2006 and beginning of 2007, however, subsidized agricultural credits were made available for processing of high protein oilseeds for protein feeds and for biofuel<sup>3</sup>. In mid-January, 2007, the Ministry of Agriculture sponsored a meeting devoted to bio-energy development in Russian agriculture. There, they acknowledged that development in the bio-energy sector assists Russian agriculture in the following ways:

- Decrease Russian agricultural exposure to hydro-carbon price fluctuations
- Provide a sustainable, stable supply of energy for farms and rural populations living in decentralized energy zones
- Create additional employment
- Increase the number of potential agricultural exports
- Increase the profitability of Russian agrarian enterprises.

According to the Minister of Agriculture, bio-energy will allow Russia to use its huge resource potential (9 percent of the world's arable lands and 25 percent of the world stocks of wood), and to become a supplier of bio-energy to the world, particularly Europe. At the same time, opponents to biofuel are becoming increasingly vociferous. In some cases, the side effects of biofuel production are positive, such as increased production of protein meal, but opponents are concerned that increased use of agricultural products for biofuel will affect the supply of grain and food-quality products for human consumption.

At the regional level, the situation is somewhat different than at the federal level. Biofuel production and industrial development are supported in many regions of the Russian Federation. Some caution is warranted though; the feasibility of most projects is based on projected European demand for biofuels and could change as technology and demands change. The direct use of biofuel as a substitute for fossil fuels is rarely considered. As for the use of wood bio-mass, some projects are oriented at increase of local energy supply, but the main profits are expected from exports of wood pellets to Europe.

### **Petroleum, Natural Gas and Coal Based Energy Market**

According to the Russian Federal Statistical Service, production of natural fuels in the standard fuel equivalent (petroleum, including gas condensate, natural gas and coal) amounted to 1,792.3 million metric tons (MMT). This represents an increase of 49.4 MMT, or 2.8 percent, over the amount produced in 2005. Petroleum represented 40.9 percent of the total (773.1 MMT), with natural gas providing another 45.1 percent or 808.4 MMT. Coal is of somewhat lesser importance, but still significant at 14 percent (250.9 MMT). Total fuel-energy resources in Russia for 2006 (stocks, production, and imports) were composed of the following: 991.4 billion kWh of electrical energy (an increase of 4 percent from 2005), 703.9 cubic meters of natural gas (up 3 percent over 2005), 512.3 MMT of petroleum, including gas condensate (a 2 percent increase) and 373.6 MMT of coal (a 5 percent increase). Production, domestic consumption and exports of oil, gas and coal are shown in the Table 1.

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<sup>3</sup> GAIN Report RS6055 *Subsidized credit for plant proteins and biofuel production*

**Table 1. Russia: Production, Consumption and Exports of Oil, Gas, and Coal, 2006**

	2006	As a Percent of 2005
Oil, including gas concentrate, mmt		
- production	480.0	102.1
- domestic consumption (processing)	219.6	105.7
- exports	248.4	98.0
Natural Gas, billion M3		
- production	656.3	102.4
- domestic consumption	345.5	104.0
- exports	202.8	97.6
Coal, mmt		
- production	309.2	103.6
- domestic consumption	193.6	99.4
- exports	91.4	114.6

Source: Social-Economic Situation in Russia (Monthly statistics of the Federal Statistical Service), January 2006, January 2007

Domestic consumption is growing along with the production of crude oil. In 2006, crude oil consumption (including gas condensate) absorbed 45.8 percent of production, while in 2005 domestic consumption accounted for 44.2 percent of production and was 42.5 percent in 2004. The story is similar for natural gas. In 2006, 54 percent of production was consumed domestically, up slightly from 53 percent the year before. Coal consumption decreased slightly to 63 percent, down from 65 percent in 2005.

Crude oil exports decreased in 2006. Only 27 petroleum-refining plants make up the heart of the industry and have a total annual capacity of 258 MMT. Oil-gas condensate is processed at Gazprom facilities, which have a total capacity of 7.7 MMT per year. According to official data, processing capacity utilization is increasing from 59 percent in 1995 to more than 80 percent in 2006. These figures, despite improvement, still lag behind the 95-100 percent observed in other developed countries. The average ratio for the depth of petroleum processing in Russian facilities is 71 percent. In most advanced industrial nations, the ratio is between 85-95 percent. Improvements within the Russian industry are aimed at the modernization of these facilities, and increasing the funding for renovation.

The oil and gas based fuel economy of Russia does not consider alternative fuel development a priority. However, some major oil exporters (particularly those who export fuel to the European Union) are interested in meeting the new fuel-quality standards required by 2010. Bio-ethanol additives for automotive use may thus stimulate the Russian oil industry to invest in additional biofuel production.

Table 2 shows the production increase across all major petroleum categories in 2006, along with a corresponding increase in domestic consumption. Automobile gasoline production and consumption increased by 7.4 and 7.1 percent, respectively. Diesel fuel numbers are similar, with production increasing by 7.3 percent and consumption increasing by 7.2 percent. Consumption of bunker oil (mazut) grew faster than production (7.5 percent and 4.9 percent respectively).

**Table 2. Distribution of petroleum products in 2004 - 2006, 1,000 metric tons**

	2004	2005	2006 preliminary
Automobile Gasoline			
Resources	30,713.8	31,996.8	34,267.8
- production	30,505.3	32,011.3	34,368.8
- imports	517.2	8.3	7.4
- change of stocks	+308.7	+22.8	+108.4
Use			
- sales in the domestic market	26,493.3	26,068.5	27,965.6
- - - through gas stations	17,617.7	19,956.7	21,775.4
- exports	4,220.5	5,928.3	6,302.2
Diesel Fuel			
Resources	55,433.7	59,555.1	63,918.2
- production	55,389.1	60,003.3	64,218.4
- imports	1.8	0.5	0.4
- change of stocks	-42.8	+448.7	+300.6
Use			
- sales in the domestic market	25,200.0	25,285.9	27,117.1
- exports	30,233.7	34,269.2	36,801.1
Bunker Oil (Mazut)			
Resources	56,993.6	60,160.2	63,010.5
- production	56,630.6	60,308.2	63,258.0
- imports	16.2	14.7	28.4
- change of stocks	-346.8	+162.7	+275.9
Use			
- sales in the domestic market	20,993.9	18,088.4	19,452.1
- exports	35,999.7	42,071.8	43,558.4

Source: Social-Economic Situation in Russia (Monthly statistics of the Federal Statistical Service), January 2006, January 2007

### Consumption of Fuel and Lubricants in Agriculture and Prospects for Biofuel Use

The supply of gasoline and diesel to agricultural enterprises has decreased every year since the turn of the century (see Table 3). According to official data, supply of automotive gasoline in 2006 was 1.43 MMT, 10 percent less than in 2005, and supply of diesel fuel decreased in 2006 by 8 percent from 2005<sup>4</sup>. Fuel is largely used in spring sowing and in the period of harvesting, and effectiveness of use of fuel depends on many factors such as weather, climate, soil, crops, and management. The data on comparisons of different regions by effectiveness of use of gas and fuel are not available, but very approximate calculations show that regions with improved technologies, favorable climate and better soil (on average), such as Southern Federal District, and Volga Valley Federal District receive higher yields per unit of used gas and diesel fuel. Thus, in 2006, 34 percent of automotive gasoline and 30 percent of diesel fuel were supplied to farms of the southern Federal District, which produced 33 percent of all Russian grain crop and almost 57 percent of the oilseeds harvested in 2006. The Volga Valley Federal District received 18 percent of gasoline and 25

<sup>4</sup> These figures may be slightly lower than actual volumes, as farmers may purchase fuel from different sources and may under-report these purchases. Large agro-industrial companies and holding companies may also understate the exact volumes of fuel that they use for agricultural production. However, price of fuel to agriculture is subsidized from the federal budget and this provides an incentive for accurate reporting of fuel supply.

percent of diesel fuel, and produced almost 27 percent of grain and 19 percent of oilseeds. While the Central Federal District received 19 percent of gas and 19 percent of diesel fuel, and its share in grain production was 17 percent, and 13 percent of oilseeds production. Shares of Siberian Federal District in the automobile gas and diesel fuel supply were 16.8 percent and 16.2 percent respectively, while the share of this district in grain crop was 15.3 percent of grain crop and only 4 percent of oilseeds crop.

Given the regional differences in fuel use, and the general decrease in agricultural fuel stocks, there are several reasons to investigate the use of alternative fuel sources such as biofuel. However, the Ministry of Agriculture's fuel policies concentrate on alleviating farmers' short-term financial difficulties related to rising fuel prices rather than long-term solutions. The Ministry continues to lobby for federal fuel subsidies, and has not yet pushed for investment in alternative fuels, even in regions where this may be more cost-effective.

The Ministry of Agriculture calculates that in 2007, the fuel "needs"<sup>5</sup> of farmers will total 2.33 MMT of automotive gasoline and 5.9 MMT of diesel fuel. Federal diesel subsidies for agriculture amounted to 5.0 billion rubles (US \$192 million dollars). In 2007, subsidies are expected to reach 7.5 billion rubles (US \$290 million dollars). This is in addition to any subsidies that may be provided to farmers at the regional level.

**Table 3. Supply of Automobile Gasoline and Diesel Fuel to Agriculture, 2002 – 2006, 1,000 Metric Tons**

	2002	2003	2004	2005	2006
Automobile Gasoline	1,806.3	1,789.2	1,673.1	1,587.0	1,425.3
Diesel Fuel	4,698.3	4,854.6	4,548.8	4,387.8	4,041.1

Source: Ministry of Agriculture of the Russian Federation. Agro-industrial Complex of Russia, 2005; State Statistical Service. Social-economic Situation in Russia, January 2007

**Table 4. Supply of Petroleum and Petroleum Products to Agricultural Producers by Federal Districts of the Russian Federation, 1,000 Metric Tons**

District	Automobile Gasoline			Diesel Fuel		
	2006	+/- as of 2005	Stocks on January 1, 2007	2006	+/- as of 2005	Stocks on January 1, 2007
Central	279.8	-48.7	11.1	781.1	-77.5	26.5
North-Western	71.9	-6.1	3.3	124.7	-18.2	6.1
Southern	485.5	-49.5	23.0	1,214.8	-41.9	79.0
Volga-Valley	260.8	-44.3	9.7	1,025.2	-154.3	30.0
Ural	64.3	+6.7	3.5	185.5	-1.7	18.2
Siberian	238.9	-21.9	6.7	655.2	-47.1	23.0
Far East	24.1	+2.1	6.8	54.6	-6.0	13.7
TOTAL	1,425.3	-161.7	64.1	4,041.1	-346.7	195.5

Source: Attachment "Petroleum Industry of Russia" to the magazine "MinTop", #3, 2007

<sup>5</sup> "Need" is usually calculated based on the earlier approved norms and ratios of fuel usage, and often does not correlate with the actual demand for fuel. Many of these norms were developed during the Soviet period.

## Biofuel Production Capacities

According to the mass media, for one of the recent biofuel conferences more than 20 Russian biofuel producers have registered. There are no official data on the actual production of biofuel, and most experts concede that most production is likely still in the experimental stage. Biofuel awareness continues to increase, however, and interest in the potential for bio-mass, rapeseed, and bio-diesel is growing, particularly at the regional level.

### Bio-ethanol

Experts believe that Russia has 10 potential bio-ethanol plants, although only one (the Titan company based in Omsk, Siberia) is operating.

High excise taxes on alcohol (23.5 rubles per liter) limits the production of bio-ethanol for domestic use. Bio-ethanol is classified under the general alcohol category, and Russian legislation does not distinguish bio-ethanol from other alcohols intended for beverages. This contrasts sharply with other nations, where bio-ethanol is usually exempt from excise duties. One loophole exists in this legislation: when alcoholic products are exported, the excise duties are returned to the producer. Essentially, bio-ethanol could be produced for foreign markets duty-free without changes in the domestic legislature<sup>6</sup>. The vice-president of the Russian biofuel association Mr. Ablayav gamely notes that any Russian plant that produces an ethyl alcohol (such as vodka) can easily switch their production to bio-ethanol. The cost of production (without the excise taxes) would equal 9-10 rubles per liter since the specialized equipment needed to prepare alcohol for food consumption is not needed. He estimates that this costs is even lower than the cost for vodka production, and conversion would be easy for plants. Other experts are a bit more cautious (and some would say pragmatic); only plants with a capacity of 1.4 billion liters of more can easily switch their production lines. They also expect that the transition will require investment in technology, and that these changes may be quite expensive.

The relatively high cost of grain production and increasing grain prices further constrain bio-ethanol production in Russia. If grain prices continue to increase, using grain as the source of biofuel will not be economically feasible. On the other hand, alternative sources such as sugar beet molasses may be an option.

Industry experts see a market for Russian biofuel in Europe and Japan. Both of these regions have biofuel commodity exchanges, and the markets are relatively developed. The potential size of the market for Russian bio-ethanol is estimated at 800 million liters.

### Current

#### *Omsk oblast*

The Omsk-based group of companies "Titan" is currently building a bio-ethanol plant with a capacity of 150,000 metric tons per year and is designed for grain processing. The Omsk

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<sup>6</sup> Aside from health concerns that bio-ethanol could be illegally consumed as drinking alcohol, the introduction of a special excise regime for bio-ethanol is not likely in the near future for another reason; Russian legislation concerning the production and distribution of ethyl alcohol and alcohol products is undergoing significant changes. The Ministry of Agriculture is trying to concentrate control over the alcohol market at the federal level (GAIN Reports RS5316). Changes that would result in the easing of taxes and control over one segment of production (bio-ethanol for cars) are not expected, although specialists in the alcohol industry note that separating bio-ethanol from food quality ethanol at the plant level is easy.



oblast administration and the Ministry of Agriculture recently signed an agreement supporting this project despite the fact that the market for the plant's products has not been determined. To its credit, the Titan company does have experience in this area. In September 2006, they brought their first bio-ethanol production facility online in Kazakhstan. The "Biokhim" complex has the capacity to fill Kazakhstan's domestic needs, and the remaining product is exported to China.

### **Planned**

In different regions there are plans to increase production of bio-ethanol. Foreign companies, or Russian entrepreneurs with foreign-backing, usually initiate these projects since Europe is the primary market for these products. Below are some planned projects:

#### *Volgograd Oblast*

The Volgograd regional administration submitted a proposal to the Ministry of Energy to construct a bio-ethanol plant in the region, with funding to be provided by the Russian Investment Fund. The project would create a facility capable of transforming 900,000 MT of grain into 300,000 MT of bio-ethanol, and 300,000 MT of distiller's dried grain (dry molasses).

#### *Rostov Oblast*

A bio-ethanol plant is planned in the Rostov oblast within the next two years. It will use corn, sugar beets, and fodder wheat for export-oriented bio-ethanol. The "Bashneft-Yug" company is also planning to build a bio-ethanol plant with a capacity 250,000 metric tons per year on "Azovryba" company's land. Oilseed crushing company "Aston" is also getting in on the act, and plans to build a bio-ethanol plant with an annual capacity of 250,000 MT.

#### *Penza Oblast*

The Israeli company Agrotor, Ltd. has preliminary plans to construct a bio-ethanol plant in Penza. The capacity of the plant has not yet been determined.

#### *Tomsk Oblast*

The existing alcohol plant "Extrasib" plans to expand its product offerings to include 15,000 MT of bio-ethanol annually. The source of the ethanol is unknown.

### **Bio-Diesel**

Commercial-scale production of bio-diesel does not exist in Russia, although some farms are experimenting with vegetable oil fuels. Converting alcohol plants into bio-diesel facilities requires a much more substantial investment than is required for bio-ethanol, as the technological set-up is markedly different. In addition, Russia does not have a unified standard for bio-diesel production, which may stifle development until the regulatory environment is clear.

The domestic food and feed industry have a high demand for grain and oilseeds, keeping prices high. Rapeseed is exported as a raw material for biofuel, especially as the European price for rapeseed is high. Rapeseed-based bio-diesel is the only bio-diesel that operates at low temperatures, and is in special demand in Europe. Soy oil and palm oil-based bio-diesel can be used only in southern Europe where the temperatures are generally warmer.

Despite the technological and financial challenges to bio-diesel production in Russia, foreign and domestic investors are developing rapeseed processing and bio-diesel production plants in Lipetsk, Orel, Voronezh, Tambov, and Kurgan oblasts as well as some oblasts in Siberia. Industry experts point out that none of the projects have yet come to fruition. Most of the projects, even those that receive local administrative support, are oriented toward the export markets of Europe and Japan.

### **Current**

There are no bio-diesel plants in Russia, and commercial production of bio-diesel does not exist.

### **Planned**

#### *Tomsk Oblast*

Tomsk-based company "Prodeks" plans to increase production of vegetable oils to 200,000 MT by 2009, and plans to invest 1.2 billion rubles in the plant. To achieve this volume, they plan to construct a rapeseed processing facility in Kemerovo oblast (at an estimated cost of 350 million rubles), but this is contingent upon the approval of the Kemerovo authorities. Many industry experts think that this project will be profitable only if the company can find external markets for the oil. Prodeks already operates two oil-crushing plants for processing sunflower seeds, rapeseed and soybeans, and sells rapeseed oil to Denmark. They are planning to supply increased amounts of rapeseed oil to other European countries for bio-diesel production. The "Prod Expo" group does not exclude the possibility of creating its own bio-diesel production facilities in an EU country. Experts largely agree that exports are the only way to consume the forecasted rapeseed production. Rapeseed is not used in the food industry in Siberia, and it is traditionally used only for feed and the production of oil varnish.

The Tomsk regional government reported that the area sown to rapeseed is growing. In 2006, the area sown doubled to reach 15,000 hectares. Rapeseed yield is 1.2 to 2.0 MT per hectare, and the authorities estimate potential production at 18,000 to 30,000 MT. Farmers are "strongly advised" by the regional government to increase the area planted to rapeseed, especially as the oblast fears an oversupply in the traditional wheat crop.

#### *Altay Kray*

The Altay kray regional government initiated a new program "Rapeseed - Bio-diesel." Under this program, the first priority is to increase the yield of rapeseed to more than 1.4 MT per hectare. The government also set a target of 10,000 sown to rapeseed in 2007. The local government reasons that if farms allocate arable land to rapeseed, then the farms will eventually be self-sufficient in their fuel needs, and will have protein meal available to further develop the livestock and poultry industry.

#### *Lipetsk Oblast*

Five of Lipetsk's agro-holding companies joined together to construct a rapeseed and bio-diesel production facility. The plant has a capacity of 120,000 MT of rapeseed per year. While the project is potentially profitable given the demand and prices in Europe, a shortage of rapeseed may create a significant constraint. Construction is scheduled to begin in 2007, along with the sowing of more than 20,000 hectares of rapeseed to supply the plant. Plans call for the planting area to be increased to 100,000 hectares to meet the raw material needs of the facility. Initially, the plant is expected to crush 60,000 MT of rapeseed per year, with a

gradual increase to 180,000 MT. The cost of the plant is projected at 10 million Euros. All the bio-diesel produced at this location is intended for export to Europe. There is some criticism of these plans, however, as another processing plant with a capacity of 300,000 MT annually is also scheduled to be built in the oblast, with the intent to produce 100,000 MT of oil. Competition for raw materials may slow the development of both plants, and increase the costs of production. In addition, the rapeseed needs for the facilities are different. Bio-diesel production requires rapeseed with a high erucic acid content, while rapeseed oil used for food consumption needs seed with a much lower acid level.

#### *Tula Oblast*

In Tula, rapeseed oil is directly used in diesel mixtures. In one agricultural enterprise, half of the tractors have been equipped to run on rapeseed oil rather than traditional diesel. The price of rapeseed oil for fuel use is 15 rubles per kilo, roughly equal to the price of diesel. However, any increase in the price of diesel makes rapeseed a more cost-effective option. Scientists from the Research Institute of the Mechanization of Agriculture calculate that the use of rapeseed oil as opposed to diesel will be profitable if rapeseed oil extraction and biofuel processing were vertically integrated into one company. They estimate that a company working in both extraction and processing with a volume greater than 10,000 MT per year could see profits in the range of 50 million rubles (US\$1.96 million).

Processing rapeseed into methyl or ethyl alcohol is a longer and more cost-intensive process, and requires additional inputs. This processing also produces glycerin as a by-product, and a market for this would need to be developed.

#### *Rostov oblast and Krasnodar Kray*

In Rostov-on-Don, the company "Yug Rusi" is planning to invest between 12 and 20 million Euros into a new plant with a capacity of 100,000 MT of fuel per year. They intend to export all of the fuel to Europe, as there is little domestic demand in Russia.

OOO "Rusbio-Diesel," a subsidiary of the Germany company PPM Technologie Gruppe, has commenced production of a bio-diesel plant in Krasnodar kray. This plant will also have a capacity of 100,000 MT of bio-diesel per year, and will require 350,000 MT of rapeseed inputs. Rapeseed will be purchased locally from Krasnodar and Stavropol krays. This plan may be a bit optimistic given that the total production in both regions combined totaled only 101,370 MT in 2006. To meet the demands of this plant alone, rapeseed production would need to triple in 2007. This is unlikely given the competition for land resources in this fertile region. Europe is again the intended market for the bio-diesel.

#### *Belgorod Oblast*

The oilseed crushing and processing company "EFKO" has included plans for a bio-diesel plant (with planned capacity of 120,000 MY annually) in its corporate strategy. Such a plant would likely be located in Belgorod, or another oblast where the company has a production facility such as Voronezh, Rostov or Saratov. The company's management, however, has stated that they are waiting for the "right conditions" before embarking on construction.

### **Import Regimes for Biofuels**

Russia does not import biofuel, therefore import regimes for biofuel and for raw materials used in biofuel production have not been developed. For vegetable oil, which potentially can be used as the raw material for bio-diesel, import duties vary from 5 to 15 percent (please

see GAIN RS7042 *Oilseeds and Products Annual 2007*). Vegetable oils are exported duty-free.

### **Biomass Energy Potential**

Russia has significant biomass potential. According to some estimates, Russia produces 14-15 billion MT of biomass per year (the energy equivalent of 8 billion tons of standard fuel). The majority of the biomass is wood. Timber stocks are estimated at 73 billion cubic meters ( $m^3$ ) while the total volume of logging is estimated at 183 million  $m^3$ , but this amount is still well below the total allowable cut is estimated at 559 million  $m^3$  (see GAIN Report RS7016 *Solid Wood Annual*). According to the Federal Forest Agency at the Ministry of Natural Resources, the annual possible productive consumption of wood biomass is equivalent to 1.6 billion  $m^3$ . Logs available for processing (at sawmills and in the pulp and paper industry) are 350 million  $m^3$  per year, or 22 percent of the total mass. The remaining 1,250 million  $m^3$ , or 78 percent of the total, can be used for biofuel production.

The primary resources for biofuel are waste from wood processing and clear cutting, firewood, stumps, branches, and dead wood. Experts estimate the total wood biomass available for production of energy at 800 million metric tons.

Production of wood pellets made of wood waste has increased, but the domestic market for these pellets is small, and pellets are mainly exported. The number of plants for production of wood pellets and granules in Russia increased from 5 plants in 2003 to 50 plants at the end of 2006. Total production of granules was approximately 100,000 MT in 2006. The cost of production for these granules is 50 Euros/MT. The sale prices for the granules vary, and depend on the region, transportation costs, and other logistical determinants. For comparison, the cost of granules in Europe is between 120 and 150 Euros/MT. There are no export tariffs on wood granules.

Projects in Irkutsk oblast have measured the energy efficiency of wood granules. Four to five  $m^3$  of wood waste produces one MT of granules/pellets. These granules have an efficiency factor of 90 percent and are much more effective than the 30-40 percent obtained from ordinary firewood. The granules are created by taking wood waste (bark, saw-dust, and other waste), milling it in a special miller and then drying the resulting product. A press granulator then pressed the mixture into pellets. Most products are exported to the EU, particularly Sweden, and the production of pellets in Irkutsk and Kachuga (Irkutsk oblast) is profitable.

Bioenergy International magazine estimated the total number of operating plants and plants under construction at just over 70 in 2006. These facilities (and planned projects) are located in the Komi Republic, Novgorod oblast, Nizhny Novgorod oblast, Leningrad oblast, Pskov oblast, Vologda oblast, Tver oblast, Rostov oblast, Krasnodar kray, Ekaterinburg oblast, Tyumen oblast, Arkhangelsk oblast, Khabarovskiy kray, Novosibirsk, Smolensk and in Moscow oblast. The total declared capacity of these plants is over 900,000 metric tons. However, most experts believe that none of the plants are operating anywhere near their potential capacity, and some are still in the planning stages. The overwhelming majority of the plants have a stated capacity of 10,000 MT annually, but five plants have a potential capacity of over 50,000 MT each: Vologdasprom in Velikiy Ustyug, Evro-Techno in Vologda oblast, Intrust in Kirovsk, Rospolitekhles in St. Petersburg, Transkhimtehnologiya in Volkhov and Yuzhnyi Polyus in Krasnodar kray.

In addition to these plants, there are two projected plants for granulating sunflower seed shells in Nizhny Novgorod (Agroinvest) and Rostov-on-Don (Greenlat). Northwestern Russia

is especially rich in wood biomass, and at least half of the waste (or 8 million m<sup>3</sup>) could potentially be used as an energy source.

Krasnodar kray is another major wood producing region in Russia, with annual wood waste totaling 5 million m<sup>3</sup> on wood cuttings of 9 million m<sup>3</sup>. The local government in Krasnodar Kray developed a campaign to use wood waste as a source of biofuel. They hope that with this campaign, wood waste will create an additional 3 Mega watts of energy. The regional government is also considering investment in the production of 42,000-45,000 MT of wood pellets per year, but at present there has been no action on this plan.

### Rapeseeds Production for Biofuel

Interest in rapeseed production for bio-diesel increased markedly in 2006. The area sown to rapeseed doubled between 2005 and 2006 and production increased from 303,000 MT in 2005 to 525,000 MT in 2006. Sources report that Russian interest in rapeseed is largely fueled by the increasing demand for rapeseed oil in Europe (GAIN RS7042 *Oilseeds and Products Annual, 2007*).

The major constraint to the rapeseed processing and bio-diesel projects in the above sections is the domestic production of rapeseed. The feasibility of these projects is based on a significant increase in the planting and yields of these oilseeds. In reality, the potential increase in rapeseed production is likely to be much smaller. Other profitable crops such as wheat, corn and sunflowers all present competition for fertile, arable land. Planting rapeseed in less fertile areas is possible, but will require significant investments in seed stock and land cultivation. This would also increase the cost of transportation, further driving up the production cost of bio-diesel.

Even with these constraints, profitability is possible from rapeseed investment if the European market provides a stable and growing demand for these products. Russia's western neighbors may facilitate the exports of raw biofuel material from Russia to the EU.

Latvia has developed a set of technical requirements to control the quality of biofuel, provide market regulation and consumer education, and continues to invest in the construction of bio-diesel plants. Lithuania is constructing a bio-diesel plant with a capacity of 110,000 MT per year. It will be located at the port of Klaipeda where the fuel can easily be exported to the rest of Europe. The plant will use rapeseed as the primary material. While it is expected that subsidized Lithuanian rapeseed will be used, the plant may stimulate exports of Russian rapeseed to Lithuania as well.

According to preliminary estimates, almost 20 percent of the Russian rapeseed crop in 2006 will be exported. The following countries are recipients: Estonia, Germany, Latvia, Lithuania, the Netherlands, Belgium, Finland, Denmark and Sweden. Exports of rapeseed oil in market year (MY) 2006 will exceed one-third of production. The main recipients of processed rapeseed oil are Denmark, Greece, the Netherlands, Italy, Germany and Lithuania.

**Table 4. Potential Biofuel Source Export Data, Metric Tons**

	Description	2002	2003	2004	2005	2006
<b>Oilseeds</b>						
1206	SUNFLOWER SEEDS	85,715	291,965	124,454	284,762	233,534
1205	RAPE OR COLZA SEEDS	19,665	25,961	60,401	64,370	63,235
1201	1201 SOYBEANS	83	1,076	4,267	5,567	3,246

Oils						
151211	SUN/SAFFLOWER CRUDE	60,971	68,175	128,377	283,803	619,208
151219	SUN/SAFFLOWER REFIN	13,260	15,334	16,737	29,759	65,556
1514	RAPESEED,COLZO/MUSTRD	304	28	9,265	5,693	50,305
1511	PALM OIL,N CHEM MODIF	2,501	604	462	431	901
1518	FATS & OILS, CHEM MODIFIED; INEDBL	533	515	443	283	409,755
1513	COCONUT,PALM,BABASSU	83	70	72	97	82
1507	SOYBEAN OIL	3,337	791	507	26	1,192
Corn						
110812	CORN STARCH	1,174	3,743	1,167	2,021	1,199
100590	CORN (MAIZE)	1,687	12,587	19,403	69,472	55,490
Wood Granules (pellets)						
4401	Fuel in Log, Chips, Etc.	681,183	832,157	1,056,537	1,307,411	1,422,422
	Including:					
440121	CHIPS,CONIFEROUS	363,037	406,676	562,223	700,626	784,387
440130	SAWDUST,WASTE,SCRAP	125,843	157,077	214,076	325,379	407,192
440110	LOG,BILLET,TWIG,ETC	142,655	200,212	202,040	200,100	152,008
440122	CHIPS,NONCONIFEROUS	49,648	68,192	78,199	81,305	78,835

Source: State Customs Service of the Russian Federation

**Table 5. Exports of Fuel in Logs, Chips, Etc., by Countries, CYs 2004 – 2006, Metric Tons**

	Country	2004	2005	2006
	--The World--	1,056,537	1,307,411	1,422,422
1	Finland	771,965	1,000,812	1,114,463
2	Sweden	30,350	48,407	96,169
3	Japan	112,331	103,179	55,706
4	Turkey	21,581	41,688	54,102
5	Belgium	0	14,158	37,445
6	Denmark	61,373	47,623	23,048
7	Estonia	1,506	3,278	7,309
8	Norway	33,534	24,808	6,705
9	China	0	1,484	5,008
10	Netherlands	59	0	4,706
11	Italy	1,757	264	4,406
12	Lithuania	223	423	3,661
13	Germany	0	21	2,397
14	Virgin Islands (British)	0	0	1,980
15	Ukraine	21	46	1,137
	Other	21,836	21,220	4,180

Source: State Customs Committee

**Ethanol and Bio-Diesel Production and Trade**

There are no official data on the production and trade of ethanol and bio-diesel in Russia. There are no HS numbers in the Russian nomenclature for foreign trade that are specifically designated to ethanol or bio-diesel.