Russia’s downstream sector: sights set on modernization
Russia's oil refining industry, which traces its roots back to the 1930s (with eight refineries commissioned before World War II), is now developing rapidly. Indeed, since the year 2000, the total output of Russian refineries has risen from 190 million tonnes to 275 million tonnes, almost hitting the record high of the mid-1980s (slightly above 300 million tonnes). The refining output in the USSR peaked in 1985, with 27 refineries in Russia; seven in Ukraine; three in Kazakhstan; two each in Azerbaijan, Belarus and Turkmenistan; and one each in Lithuania, Uzbekistan and Georgia, jointly contributing to a total of 481 million tonnes of petroleum products produced in the country.

The current growth trends prevailing in the downstream segment are primarily driven by increased output at existing refineries operated by vertically integrated oil companies (VIOCs), which constitute 57% of additional volumes, construction of a large number of “teapot” refineries (34% of increased volumes), and the launch of Taneco, Tatneft’s major petrochemical complex in Nizhnekamsk. Note that the rise in production was paralleled by equally dynamic growth of investments in the upgrading and expanding refining capacities. In only eight years, from 2005 to 2013, total downstream investments by domestic VIOCs soared from US$1.4b to US$10b, with investments over the past three years rising by US$2.3b*.

What are the factors contributing to the renaissance of the national downstream industry? A favorable price environment, distribution of the tax burden between upstream and downstream segments, and a high market capacity are the three major economic enablers of an improved refining margin, resulting in increased product output.

But it is far too early for the domestic sector to rest on its laurels as the refining depth of 72% still compares poorly with 85% in Europe and over 90% in the US and has not improved markedly since 1960 (67%) and the late 1980s (63%). For this reason, the average basket price for Russian oil products in Europe is still lower than that of crude oil (US$765/t against US$789/t in 2013).

Among the first moves toward a wider modernization of the national industry were the adoption of the 60-66-90-100 tax regime in late 2011, the introduction of new technical regulations and differential rates of excise duties on light petroleum products, and the signing of quadripartite agreements between government bodies and VIOCs. While this path should be pursued further, it is crucial that all stakeholders work jointly to consider potential implications and make informed decisions based on a number of tangible factors – most importantly, fiscal revenues, domestic and external prices, domestic product demand.

* The information on VIOCs presented herein was retrieved from corporate reports and statements for the relevant period published on company websites and available in other publicly accessible sources.
National oil refining industry before and after the breakup of the USSR

The national oil refining industry traces its roots back to the 1930s, the years of the massive industrialization of the USSR. The majority of large refineries, however, were constructed later, in the 1950s and 1960s. The specifics of the Soviet political and economic model had an impact on various facets of the Russian downstream segment.

First, given the strategic importance of refining facilities in the event of war, many were located far away from the country’s borders. Second, the majority of refineries were focused on the domestic market, which also had an impact on the choice of location. Third, feedstock transportation costs were regarded as an important economic factor – most refineries were therefore constructed in close proximity to major producing areas. Finally, in selecting the process scheme for a given refining unit, consideration was given to the high domestic demand for fuel oil as an energy source for heating.

<table>
<thead>
<tr>
<th>Refinery</th>
<th>Year of commission</th>
<th>Region</th>
<th>Annual capacity, million tonnes</th>
<th>Utilization of primary processing capacities, %</th>
<th>Contribution to total domestic output, %</th>
<th>Depth of refining, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Omsk Refinery (Gazprom Neft)</td>
<td>1955</td>
<td>Omsk Region</td>
<td>21.1</td>
<td>96</td>
<td>7.4%</td>
<td>92%</td>
</tr>
<tr>
<td>Kirshinefteorgsintez (Surgutneftegas)</td>
<td>1966</td>
<td>Leningrad Region</td>
<td>20.1</td>
<td>98</td>
<td>7.2%</td>
<td>57%</td>
</tr>
<tr>
<td>Ryazan Refining Company (Rosneft)</td>
<td>1960</td>
<td>Ryazan Region</td>
<td>19.1</td>
<td>91</td>
<td>6.3%</td>
<td>67%</td>
</tr>
<tr>
<td>Nizhegorodnfteorquisintez (LUKOIL)</td>
<td>1958</td>
<td>Nizhny Novgorod Region</td>
<td>17.0</td>
<td>101</td>
<td>6.2%</td>
<td>65%</td>
</tr>
<tr>
<td>Yaroslavnftооргsintez (Slavneft)</td>
<td>1961</td>
<td>Yaroslavl Region</td>
<td>15.0</td>
<td>100</td>
<td>5.5%</td>
<td>67%</td>
</tr>
<tr>
<td>Permnefteorgsintez (LUKOIL)</td>
<td>1958</td>
<td>Perm Territory</td>
<td>13.1</td>
<td>98</td>
<td>4.7%</td>
<td>84%</td>
</tr>
<tr>
<td>Moscow Refinery (Gazprom Neft)</td>
<td>1938</td>
<td>Moscow Region/Moscow</td>
<td>12.3</td>
<td>90</td>
<td>4.0%</td>
<td>74%</td>
</tr>
<tr>
<td>Tuapse Refinery (Rosneft)</td>
<td>1929</td>
<td>Krasnodar Territory</td>
<td>12.0</td>
<td>47</td>
<td>2.0%</td>
<td>56%</td>
</tr>
<tr>
<td>Volgogradnftepererobtka (LUKOIL)</td>
<td>1957</td>
<td>Volgograd Region</td>
<td>11.4</td>
<td>98</td>
<td>4.0%</td>
<td>92%</td>
</tr>
<tr>
<td>Angarsk Petrochemical Company (Rosneft)</td>
<td>1955</td>
<td>Irkutsk Region</td>
<td>10.2</td>
<td>100</td>
<td>3.7%</td>
<td>75%</td>
</tr>
<tr>
<td>Salavatnefteorgsintez (Gazprom)</td>
<td>1948</td>
<td>Republic of Bashkortostan</td>
<td>10.0</td>
<td>74</td>
<td>2.7%</td>
<td>82%</td>
</tr>
<tr>
<td>Refinery</td>
<td>Year of commissioning</td>
<td>Region</td>
<td>Annual capacity, million tonnes</td>
<td>Utilization of primary processing capacities, %</td>
<td>Contribution to total domestic output, %</td>
<td>Depth of refining, %</td>
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</tr>
<tr>
<td>Novokuibyshev Refinery (Rosneft)</td>
<td>1951</td>
<td>Samara Region</td>
<td>9.5</td>
<td>86%</td>
<td>3.0%</td>
<td>72%</td>
</tr>
<tr>
<td>Ufaneftekhim (Bashneft)</td>
<td>1957</td>
<td>Republic of Bashkortostan</td>
<td>9.5</td>
<td>88%</td>
<td>3.2%</td>
<td>92%</td>
</tr>
<tr>
<td>Novo-Ufa Refinery (Bashneft)</td>
<td>1951</td>
<td>Republic of Bashkortostan</td>
<td>9.0</td>
<td>74%</td>
<td>2.5%</td>
<td>88%</td>
</tr>
<tr>
<td>Syzran Refinery (Rosneft)</td>
<td>1942</td>
<td>Samara Region</td>
<td>8.5</td>
<td>82%</td>
<td>2.5%</td>
<td>69%</td>
</tr>
<tr>
<td>TAIF-NK</td>
<td>1980</td>
<td>Republic of Tatarstan</td>
<td>8.3</td>
<td>99%</td>
<td>3.0%</td>
<td>75%</td>
</tr>
<tr>
<td>Komsomolsk Refinery (Rosneft)</td>
<td>1942</td>
<td>Khabarovsk Territory</td>
<td>8.0</td>
<td>89%</td>
<td>2.6%</td>
<td>61%</td>
</tr>
<tr>
<td>Ufa Refinery (Bashneft)</td>
<td>1937</td>
<td>Republic of Bashkortostan</td>
<td>7.5</td>
<td>83%</td>
<td>2.0%</td>
<td>73%</td>
</tr>
<tr>
<td>Achinsk Refinery VNK (Rosneft)</td>
<td>1982</td>
<td>Krasnoyarsk Territory</td>
<td>7.5</td>
<td>99%</td>
<td>2.7%</td>
<td>62%</td>
</tr>
<tr>
<td>Taneco (Tatneft)</td>
<td>2011</td>
<td>Republic of Tatarstan</td>
<td>7.0</td>
<td>109%</td>
<td>2.8%</td>
<td>75%</td>
</tr>
<tr>
<td>Kuibyshev Refinery (Rosneft)</td>
<td>1945</td>
<td>Samara Region</td>
<td>7.0</td>
<td>99%</td>
<td>2.5%</td>
<td>61%</td>
</tr>
<tr>
<td>Saratov Refinery (Rosneft)</td>
<td>1934</td>
<td>Saratov Region</td>
<td>7.0</td>
<td>88%</td>
<td>2.2%</td>
<td>67%</td>
</tr>
<tr>
<td>Orsknefteorgsintez (Russneft)</td>
<td>1935</td>
<td>Orenburg Region</td>
<td>5.8</td>
<td>102%</td>
<td>2.1%</td>
<td>69%</td>
</tr>
<tr>
<td>Afipsky Refinery</td>
<td>1964</td>
<td>Krasnodar Territory</td>
<td>5.3</td>
<td>93%</td>
<td>1.8%</td>
<td>56%</td>
</tr>
<tr>
<td>Khabarovsk Refinery (NK Alliance)</td>
<td>1935</td>
<td>Khabarovsk Territory</td>
<td>5.0</td>
<td>88%</td>
<td>1.6%</td>
<td>65%</td>
</tr>
<tr>
<td>Ukhtaneftepererabotka (LUKOIL)</td>
<td>1933</td>
<td>Komi Republic</td>
<td>4.1</td>
<td>97%</td>
<td>1.5%</td>
<td>62%</td>
</tr>
<tr>
<td>Antipino Refinery</td>
<td>2008</td>
<td>Tyumen Region</td>
<td>3.6</td>
<td>109%</td>
<td>1.4%</td>
<td>53%</td>
</tr>
<tr>
<td>Krasnodareconeft</td>
<td>1991</td>
<td>Krasnodar Territory</td>
<td>3.0</td>
<td>83%</td>
<td>0.9%</td>
<td>55%</td>
</tr>
<tr>
<td>Novoshakhtinsk Refinery</td>
<td>2009</td>
<td>Rostov Region</td>
<td>2.5</td>
<td>102%</td>
<td>0.9%</td>
<td>45%</td>
</tr>
<tr>
<td>Mari El Refinery</td>
<td>1998</td>
<td>Mari El Republic</td>
<td>1.4</td>
<td>31%</td>
<td>0.2%</td>
<td>77%</td>
</tr>
</tbody>
</table>

Sources: InfoTEK, company data, EY Moscow Oil & Gas Center estimates
The events of 1991, leading to structural changes in the country's social and economic landscape, had a substantial impact on the domestic downstream segment. The major outcome of the reform was that the overwhelming majority of domestic refineries became part of newly formed, vertically integrated oil companies. This helped, to some extent, alleviate the effects of the 1991–98 crisis, which had brought with it hyperinflation and a deficit in working capital amid non-payments and falling demand. Despite this move, the overall refining output more than halved, with utilization rates dropping to 60%.

Obviously, in those circumstances, the industry was focused on mere survival rather than upgrading outdated capacities inherited from the Soviet past.

Following the 1998 default that led to the devaluation of the national currency, domestic refining output began to creep upward (Figure 1) in response to the simultaneous rise of petroleum product and crude oil prices (from US$10/bbl in early 1999 to US$29/bbl in 2003 and US$111/bbl in 2011). This marked the beginning of the present stage of development of the national downstream industry.

At present, there are 50 refineries in Russia, including 23 major refineries integrated within VIOCs, 8 independent refineries with an annual capacity of more than 1 million tonnes, and 15 small refineries with an annual capacity of less than 1 million tonnes. Russia’s refining output in 2013 totaled 275.2 million tonnes, with a weighted average utilization rate and depth of refining standing at 92.9% and 72%, respectively. In the same year, Russia exported about 70 million tonnes of fuel oil and vacuum gas oil (roughly 75% of total production), 35.5 million tonnes of diesel fuel (about 50% of total production), and over 10 million tonnes of naphtha and gasoline.

The Central, Volga, North and Northwest federal districts, known as high car-density areas in the country, are major domestic consumers of gasoline and diesel fuel, while domestic fuel oil sales, which account for less than one-third of the total volumes produced in Russia, are mainly in the Northwest, South and Far East, the regions having access to the sea (Figure 2).

Figure 1. Primary oil processing, 1991–2013

![Graph showing primary oil processing, 1991–2013](image)

**Sources:** Rosstat, InfoTEK, EY Moscow Oil & Gas Center estimates
Figure 2. Domestic consumption of oil products, 2013

Sources: InfoTEK, EY Moscow Oil & Gas Center estimates
The Government’s fiscal policy, along with the external market environment and domestic demand for oil products, has become a key factor impacting the development of the national downstream sector. The year 1999 saw a number of targeted moves by the Government, such as linking the level of export duties on petroleum products to that on crude oil (the export duty on fuel oil constituted about 50% of that on crude oil, while the export duty on light products ranged from 80% to 120% of that on crude oil). In 2003, duties on all petroleum products were equalized at 90% of the export duty on crude oil. Differential rates of export duties (about 40% and 72% of the export duty on crude oil for heavy and light products, respectively) were re-introduced in 2005 and applied until 2011. This move was accompanied by the implementation of a sliding-scale scheme, whereby the export duty on crude oil was calculated using a special formula linked to the export price.

Beginning in the mid-2000s, after Transneft resolved the export capacity deficit, crude oil has been priced domestically as a function of export netback price. Lower export duties on oil products, compared with those on crude oil, at the backdrop of subdued oil prices on the domestic market, resulted in cross-subsidy between upstream and downstream segments, providing significant impetus to refineries, including primary processing plants. The hopes were that refiners would use cost savings from lower export duties on heavy products to upgrade production technologies and increase the depth of refining. However, those hopes vanished as oil companies continued to expand their primary processing capacities and the share of fuel oil in total output dropped only marginally.

In 2008, the Russian Government embarked on a number of legislative initiatives to encourage gradual and extensive renovation of domestic refineries. Among them was Decree No. 118 of 28 February 2008, introducing new technical requirements for automotive and aviation gasoline, diesel and marine fuel, jet fuel and heating oil, and setting quality limits on oil products and time frames for transition to higher-grade fuels.

In line with the new requirements, from 1 January 2013, Russia no longer uses Class 2 fuels. From 1 January 2015, it is planned to discontinue the use of Class 3 fuels, and in a year’s time, Class 4 fuels (equivalent to Euro II, III and IV in the EU).

In 2011, the Government took another step to push the development of the national downstream sector by adopting a State Program aimed at the upgrading of existing refining capacities and the introduction of secondary processing capacities by 2020. The intent of the Program is to renovate and construct 124 secondary processing units at existing refineries within the next four to five years. The Program envisages three consecutive phases: (i) an engineering phase; (ii) a procurement phase (mostly long-lead items); and (iii) a construction phase (construction, assembly and commissioning, as provided by quadripartite agreements between the Russian Federal Anti-monopoly Service, the Federal Service for Environmental, Technical and Nuclear Oversight, the Federal Agency for Technical Regulation and Metrology and VIOCs). The Russian Ministry of Energy, a government agency appointed to oversee the progress of work under the Program, underlines that the upgrading of refining capacities will have major social, fiscal, environmental and economic impacts.

With that in mind, a favorable tax environment is seen as a crucial driver of investment activity in the downstream segment. Different levels of government take depending on the type and class of oil products would make upgrading costs economically viable.

Another critical issue that deserves close attention is the rational use of oil resources, as it affects a number of key areas, such as sustainability of fiscal revenues, social and economic efficiency, and energy security. In the current tax regime, in which most taxes are based on gross receipts rather than net profits, lower export duties on oil products, compared with those on crude oil, make crude oil exports more attractive to the Government. When it comes to the added value, the average export product mix of local VIOCs leaves much to be desired (Figure 3), as the depth of refining in Russia has traditionally been objectively low. Suffice it to say that fuel oil, which has long been one of the major export commodities, is traded at a significant discount to crude oil (ranging, over the past five years, from US$80/t to US$300/t).
As seen in Figure 4, in the 22 years since the collapse of the Soviet Union, the depth of refining has not changed markedly and in the last couple of years has remained at 72%. This compares poorly with the depth in other countries: over 90% in the US and roughly 85% in Europe and China.

Sources: company data, EY Moscow Oil & Gas Center estimates

Figure 3. Price of crude oil, fuel oil, diesel fuel and export oil product mix

Sources: company data, EY Moscow Oil & Gas Center estimates

Figure 4. Movements in domestic refining product mix, 1991–2013

Sources: InfoTEK, EY Moscow Oil & Gas Center estimates
In the past 10 years, the growth in refining capacities has been outpacing production growth, which was gradually losing momentum in the face of a deteriorating resource base and limited investment in exploration.

The current standstill on the downstream front is compounded by the high tax burden on oil producers, who have to bear higher costs as they face an increasingly harder task of turning reserves into production. Note that oil producers keep only 18 cents of every additional dollar they earn when the oil price exceeds the US$25 mark. At the same time, the level of Government take in the Russian upstream segment (excluding PSA-based projects and tax benefits) is significantly high (over 70%). Maintaining and increasing production levels may only be possible if the Government pursues a balanced fiscal policy and eases pressure on taxpayers. It is worth mentioning that in the past 10 years, the growth in refining capacities has been outpacing production growth, which was gradually losing momentum in the face of a deteriorating resource base and limited investment in exploration.

Figure 5. Crude refined domestically vs. exported

![Figure 5](chart.png)

Sources: InfoTEK, EY Moscow Oil & Gas Center estimates
These factors collectively triggered a new tax system, known as 60-66 or 60-66-90-100, that was introduced in October 2011 by Government Decree No.719 of 26 August 2011. Under the new tax system, the maximum rate of export duty on crude oil was decreased from 65% to 60%, while export duties on light and heavy products were equalized at 66% of the export duty on crude oil, thus wiping out the excess profits from fuel oil. In April 2011, following the gasoline crisis in the domestic market, the Government raised the export duty on gasoline to 90% of that on crude oil although this measure had not been originally anticipated (the duty on straight-run gasoline was also increased from 1 June 2012).

With the introduction of Federal Law No.263-FZ of 30 September 2013 (the “tax maneuver”), the rates of export duty and the base rate of mineral extraction tax (MET) on crude oil were changed as of 1 January 2014. The tax maneuver calls for an incremental reduction in the maximum export rate on crude oil (decreasing a coefficient used in the formula) from the current 60% to 59% in the period from 1 January through 31 December 2014; 57% from 1 January through 31 December 2015; and 55% from 1 January 2016. These changes also involve lowering the level of export duty on light products (with the exception of gasoline), established by a decree of the Russian Government on a monthly basis, from the current 66% of the oil duty to 65% in 2014, 63% in 2015 and 61% beginning in 2016.

It is anticipated that from 1 January 2015 the export rate on heavy products will increase to equal that on crude oil.

According to officials at the Ministry of Finance,1 in the near future the Ministry is likely to embark on a “big tax maneuver” that will change fundamentally the existing tax principles by reducing or abolishing excise and export duties on crude oil and petroleum products in parallel with raising the current rates of MET. At the heart of this decision is the intention to reduce the shortfall in government receipts (from 2015, estimated at US$30-US$40b) as a result of oil supplies from Russia to Belarus and Kazakhstan within a Common Economic Space planned to be created by 2015. In the meantime, however, the discussions are still ongoing and the resulting impact of the “big maneuver” on the wider industry and its players may be assessed once there is more clarity on the parameters of the new system.

The key reason behind the shift to the new tax system in the downstream segment (60-66-90-100, followed by 55-61-90-100) was to ease the subsidy burden on the upstream segment (i.e., lowering crude oil export duties, resulting in a netback increase), and to gradually widen the gap between export duties on heavy and light products (raising export duties on heavy products, while lowering the same on light products). Apart from positive implications for the upstream segment, this move was supposed to reduce the profitability of heavy products (resulting in the shutdown of inefficient processing plants) and improve the depth of refining at the remaining facilities.

The desired goal, however, was not achieved. Why? First and foremost, because of a completely different price environment surrounding the 60-66-90-100 system. It is known that the price differential between crude oil and the oil product mix (which, among others, includes fuel oil) widens as the price of liquid hydrocarbons goes up, and vice versa. As a result, even though the increase in heavy product duty to 66% of oil duty significantly undermined the economics of fuel oil exports (with profit losses against the 46.7% and 39% scenarios amounting to $90/t and $125/t, respectively), primary processing was still profitable on the back of strong trading gains from light products.

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1. Ministry of Finance of Russia is looking toward new tax maneuver in oil and gas industry from 2015, Reuters, 13 March 2014
Though the increase in heavy product duty to 66% of oil duty significantly undermined the economics of fuel oil exports (with profit losses against the 46.7% and 39% scenarios amounting to US$90/t and US$125/t, respectively), primary processing was still profitable on the back of strong trading gains from light products.

We believe that in order to effectively eliminate the cross-subsidy between upstream and downstream segments and improve the sector’s overall efficiency, it is crucial that the viability of proposed fiscal initiatives be considered under various price scenarios.

Figure 6 below shows how the break-even point is determined for different types of domestic refineries (basic, complex, country average). In our opinion, the distribution between upstream and downstream income under the 60-66-90-100 system (and its variations) is optimal with oil prices ranging between US$90/bbl and US$95/bbl.

Source: EY Moscow Oil & Gas Center estimates
Refining economics and upgrading

As mentioned earlier, the presence of cross-subsidy between upstream and downstream segments is one of the key prerequisites for the profitable operation of most domestic refiners. For instance, in 2013 crude oil feedstock costs made up over 60% of total refining costs (the crude oil price is derived by reference to the “export netback price,” which depends on the rate of the export duty on crude oil). Furthermore, a relatively moderate (compared to the upstream segment) tax burden on the average oil product mix is responsible for a fairly high level of the refining margin in Russia (roughly US$7/bbl), even though the depth of refining remains low (Figure 7).

This level of the refining margin exceeds that of European peers, including those refining crude oil of the same grade (Figure 8).

Note that prior to the introduction of the 60-66-90-100 system, the refining margin in Russia had been substantially higher.

Prior to the introduction of the 60-66-90-100 system, the refining margin in Russia had been substantially higher.

In comparing the economics of domestic and European refineries (most of which are less profitable than an average refinery in Russia), consideration must be given to a more complex refining process, with the depth of refining in Europe at about 85% against 72% in Russia.
In a hypothetical scenario where the rate of oil export duty is reduced to zero while all other variables remain unchanged, an average refining margin in Russia becomes negative (—US$14/bbl). For details, see Figure 9.

The oil product pricing mechanism in Russia is largely similar to that of crude oil, although the ultimate price of gasoline or diesel depends on many more variables, such as export netback. Other major variables include logistics and the relation between supply and demand on regional markets. Unlike crude oil prices, domestic oil product prices are therefore not strictly tied to the export netback price as adjusted for a domestic market premium/discount. Its amount varies depending on supply and demand, local market conditions and a given product type. Our estimates suggest that the premium in 2013 was roughly US$70 per tonne on gasoline and close to zero on diesel fuel.

As previously noted, in the past years VIOCs have been investing heavily in the downstream segment. According to published financials of key domestic players, their capital investments have seen more than a sixfold increase — from US$1.4b in 2005 to US$10b in 2013. Prior to 2011, downstream investments had accounted for about 20% of the sector’s total capital spending, while in 2013 their share rose to 24%. A major contributor to the growing level of investments was the quadripartite agreement to upgrade or construct 124 processing plants that was signed in 2011 between the Russian Federal Anti-monopoly Service, the Federal Service for Environmental, Technical and Nuclear Oversight, the Federal Agency for Technical Regulation and Metrology and VIOCs, as well as the introduction of the 60-66-90-100 system that marked the beginning of a wider tax reform.

As seen in Figure 10, Rosneft, including TNK-BP, has contributed more than 50% to total investments in the downstream segment over the past three years. The Russian oil giant has invested in the renovation and expansion of refining capacities at the Tuapse, Novokuibyshev, Kuibyshev, Komsomolsk, Angarsk, Achinsk, Syzran and Ryazan refineries.

![Figure 10. Downstream capital spending by major domestic players](image)

*Includes TNK-BP capital spending prior to 2013

Sources: company data, EY Moscow Oil & Gas Center estimates
LUKOIL’s contribution to capital investments in the domestic downstream segment varied between 13% and 17% from 2011 to 2013. The bulk of the company’s investments were in Nizhegorodnefteorgsintez (a catalytic cracking unit) and Volgogradneftepererabotka (a hydrocracking unit and a vacuum gas oil deep conversion complex).

Gazprom Neft cut down on its capital spending in the downstream segment in 2013 following completion of a hydrocracking unit at Omsk Refinery.

Tatneft’s share in total downstream investments fell from 13% in 2011 to 6% in the following years as it completed the construction of Taneco refinery.

In the coming years, we expect primary processing capacities in Russia to add another 12.2 million tonnes (or 5.2 million tonnes, excluding Taneco’s potential expansion). Russia’s total processing capacities (including condensate) may therefore rise from around 295 million tonnes to 300.2 million tonnes (or even to 307.2 million tonnes if Taneco’s expansion is completed). Consequently, the share of secondary processing may grow from the current 70% to about 100% (this compares with 140% in the US).

To assess the efficiency of facility upgrading, we have developed financial and economic models for investment projects involving the construction of hydro- and catalytic cracking units. Note, however, that our models are both generic and conditional in nature, as each project in the downstream segment often has unique technological and operational challenges.

Capital investments in the construction of a hydrocracking unit with an annual capacity of 2 million tonnes are assumed at US$800m (Figure 11). The oil product mix is 50% diesel fuel, 10% kerosene, 10% fuel oil, and 30% other products. According to our estimates, the project’s net present value (NPV) is around US$1,128m and internal rate of return (IRR) is 31%.

The construction of a catalytic cracking unit with an annual capacity of 2 million tonnes requires investments worth US$700m (Figure 12). The oil product mix is 50% gasoline, 10% diesel fuel, 10% fuel oil, 30% other products. The project’s NPV is US$763m and IRR is 26%.

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2. For both projects, we used the following key assumptions: oil price of US$110/bbl throughout the forecast period (10 years), the current tax regime, 2.5-year investment phase, 15% discount rate, 2% terminal growth rate, no domestic premium on oil products. “Current tax regime” means the 55-61-90-100 system, with the rate of export duty on fuel oil not to be raised to that on crude.
We believe that in the current economic environment, most of recently announced processing and refining projects will come to life, as these remain economically attractive (Figure 13). Our estimates suggest that by 2020, after the commissioning of 18 hydrocracking and 11 catalytic cracking units that are designed to produce higher added-value products from fuel oil (diesel fuel and gasoline, respectively), the output of diesel fuel will jump by 21.6 million tonnes, with another 6 million tonnes added to gasoline output.

With new cracking units and other facilities impacting the refining performance (isomerization, coking, visbreaking, catalytic reforming) coming on stream, the depth of refining in Russia is set to rise from the current 72% to 85% by 2020. According to our estimates, domestic refineries will have the following product mix: gasoline (18%), diesel fuel (33%), fuel oil (15%), other products (34%). For details, see Figure 14.
Scenarios for the future of Russia’s downstream sector

In 2013, Russia produced 71.2 million tonnes of diesel fuel (up 4.6% from the year before), of which 35.3 million tonnes were sold on the domestic market, 1.1% more than in 2012. Gasoline output rose by 2.9% to 38.7 million tonnes, of which domestic sales were 35.3 million tonnes, up 3.1% year-on-year. Over the past decade (from 2003 to 2013), the consumption of gasoline in Russia grew faster than diesel fuel – 3.5% against 2.8% on average.

During the 2008–09 downturn, the number of cars (most of which are gasoline-fueled) was rising steadily, as opposed to trucks, which run predominantly on diesel fuel. In the post-crisis period, the domestic car fleet has grown twice or 2 and a half times as fast as the truck fleet. Diesel engines are more common in trucks (mostly used by the haulage and construction sectors, which are susceptible to economic cycles) than in cars, resulting in greater volatility of demand for diesel fuel, as seen in Figure 15.

The analysis of motor fuel consumption in Russia against the country’s economic growth pattern over the past 10 years reveals a strong correlation between oil product demand and GDP (Figure 16). For example, a correlation between gasoline consumption and GDP in 2003–13 (with the 2003 level taken as 100%) was 97%. A similar correlation is seen for diesel fuel. The GDP influence on consumption, expressed as a determination coefficient (R2), is also high: 93% for gasoline and 94% for diesel fuel.

Considering the high GDP influence on fuel consumption, our demand forecast was based on GDP growth projections for 2014–18. In forecasting GDP growth, we relied on the estimates made by the Ministry for Economic Development of Russia (a base case, as revised in December 2013). Note that the Ministry’s current forecast is on the same general level as forecasts made by the EIU, the World Bank, Global Insight and Oxford Economics (Table 2).
We estimate that over the next seven years the demand for diesel fuel and gasoline will grow at an average of 2.8% and 2.4% per annum, respectively, provided that GDP annual growth reaches 3.1% on average (Figure 17).

With current trends toward fleet renovation and fuel efficiency, it is logical to expect that oil product consumption will grow more slowly than GDP.

According to our estimates, by 2020, Russia will consume 40.6 million tonnes of gasoline and 42.7 million tonnes of diesel fuel annually (up by 6.1 million tonnes and 7.4 million tonnes from the current level).

With the imminent increase in secondary processing capacities and growth in domestic demand, export supplies of diesel fuel are set to rise from the current 36 million tonnes to 51 million tonnes, while gasoline surplus will reach 10 million tonnes. Note that about 80% of Russia’s diesel fuel exports are sent to Europe (2013: roughly 30 million tonnes).

Wood Mackenzie projects that motor fuel consumption in Europe will not change markedly by 2020, with diesel fuel continuing to gain momentum. Gasoline consumption is forecast to shrink by 9 million tonnes losing, on average, 1.7% a year from 2013 to 2020, while the
demand for diesel fuel is expected to expand by 32 million tonnes at an average annual rate of 1.4%.

With the economy at a standstill, refining margins in Europe remain subdued (from US$0/bbl to US$2/bbl over the past year), leading to a wave of closures in the sector. According to Wood Mackenzie, local refiners shut down 582,000 bpd of capacity in 2012 and 439,000 bpd the following year. We therefore do not expect any increase in supplies from Europe. By 2020, Russia’s export supplies of diesel fuel will increase by about 16 million tonnes (Table 3). Russian refiners may supply additional 13 million tonnes to Europe, provided that the current export structure remains unchanged.

Table 3. Balance of motor fuels in Russia

<table>
<thead>
<tr>
<th></th>
<th>2013 million tonnes</th>
<th>2020F* million tonnes</th>
<th>Growth million tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gasoline</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td>38.7</td>
<td>50.3</td>
<td>11.5</td>
</tr>
<tr>
<td>Domestic sales</td>
<td>34.4</td>
<td>40.6</td>
<td>6.1</td>
</tr>
<tr>
<td>Export sales</td>
<td>4.3</td>
<td>9.7</td>
<td>5.4</td>
</tr>
<tr>
<td>Diesel fuel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td>71.2</td>
<td>94.1</td>
<td>22.9</td>
</tr>
<tr>
<td>Domestic sales</td>
<td>35.3</td>
<td>42.7</td>
<td>7.4</td>
</tr>
<tr>
<td>Export sales</td>
<td>35.9</td>
<td>51.4</td>
<td>15.5</td>
</tr>
</tbody>
</table>

*F — forecast.
Sources: InfoTEK, EY Moscow Oil & Gas Center estimates

To allow a more reliable assessment of the economic impacts of the upcoming upgrades, we classified domestic refineries into the following three groups (Appendix 1):

- **Group 1:** refineries with a high depth of refining and/or enjoying a favorable location; total output around 101 million tonnes in 2013
- **Group 2:** refineries with a high depth of refining and unfavorable location; plants with a depth of refining close to the country’s average; refineries with a low depth of refining, but enjoying a favorable geographic location; total output around 113 million tonnes in 2013
- **Group 3:** refineries with a high share of fuel oil in the product mix (over 30%) or a relatively poor location; total output around 61 million tonnes in 2013

For each group we ran three scenarios. The key metrics of each scenario are presented in Table 4.
It should be noted that the export duty rates in Scenario 1 reflect the fiscal terms that are currently set for 2016. Scenarios 2 and 3 were developed to cater for a proposed major increase in the rate of export duty on fuel oil, a change broadly discussed in various regulatory sources.

**Scenario 1**

Our estimates suggest that, with planned upgrading proceeding on schedule, the switch to the 2016 tax regime (reduced export duties on crude oil and diesel fuel) will lead to much better margin performance (Figure 18).

A growth in refining costs driven by increased export netback is partially offset by a growth in netback from diesel fuel. On the other hand, higher product yields have a major positive impact on the refining margin. The impact of various factors (using Group 1 as an example) is presented in Figure 19.

Once the upgrading is complete, the refining margin of Group 1 refineries will increase to around US$15/bbl, while Group 2 and 3 refineries will be earning US$12/bbl and US$3/bbl, respectively.

**Scenario 2**

Figure 20 presents a benchmarking of current margins against refining margins in Scenarios 1 and 2.

Our estimates suggest that if, upon completion of upgrading, the export duty on fuel oil is raised to match that of crude, the refining margins of Group 1 and 2 refineries will still be US$1–US$2/bbl above the current level as the positive impact from upgrading (using Group 1 as an example) will offset the negative impact from the upward revision of the export duty on fuel oil (about US$6/bbl versus US$4.5/bbl). By contrast to Groups 1 and 2, the situation for Group 3 is critical, with losses of about US$6/bbl.
Scenario 3

In the last scenario, we review the impact of a lighter subsidy burden on the upstream segment (as a result of lowering the rate of export duty on crude oil from the current 59% to 55%) and a higher rate of export duty on fuel oil (up to 100%), with the current refining configuration remaining unchanged. Our estimates suggest that the above changes in the fiscal regime, if introduced now, will lead to shutdowns of Group 2 and 3 refineries, which produced collectively 177 million tonnes, or 64% of Russia’s total refining output in 2013. The margin of top-performing refineries included in Group 1 will stand at about US$1.5/bbl, which compares well with that of European peers (Figure 21).

The findings from our analysis indicate the urgent need for upgrading the domestic refining infrastructure and the overall importance of subsidies for the downstream segment. The detailed impact of each factor (using Group 1 as an example) is presented in Figure 22.

Weaker netback from crude oil will be partially offset by stronger netback from diesel fuel. In the current refining configuration, the taxation of fuel oil, which accounts for about 30% of domestic oil product output, is critical to profitability of refining operations – a higher rate of export duty translates into losses of about US$7/bbl.

We used Scenario 2 (a full-scope upgrading program under the current tax regime) as a guideline for analyzing sensitivities across all three groups of refineries (Tables 5, 6, 7).

Figure 21. Refining margin by group of refineries, Scenario 3

![Figure 21](image1)

Source: EY Moscow Oil & Gas Center estimates

Figure 22. Factors affecting the refining margin of Group 1, Scenario 3

![Figure 22](image2)

Source: EY Moscow Oil & Gas Center estimates

Table 5. Group 1 refining margin: sensitivity to oil price and export duty

<table>
<thead>
<tr>
<th>Export duty rate on fuel oil</th>
<th>Oil price US$/bbl</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
<th>90</th>
<th>100</th>
<th>110</th>
</tr>
</thead>
<tbody>
<tr>
<td>66%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70%</td>
<td></td>
<td>1.0</td>
<td>4.0</td>
<td>6.0</td>
<td>9.0</td>
<td>11.0</td>
<td>13.0</td>
<td>15.3</td>
</tr>
<tr>
<td>80%</td>
<td></td>
<td>1.0</td>
<td>3.0</td>
<td>5.0</td>
<td>7.0</td>
<td>9.0</td>
<td>11.0</td>
<td>13.0</td>
</tr>
<tr>
<td>90%</td>
<td></td>
<td>0.0</td>
<td>2.0</td>
<td>4.0</td>
<td>6.0</td>
<td>8.0</td>
<td>10.0</td>
<td>12.0</td>
</tr>
<tr>
<td>100%</td>
<td></td>
<td>-1.0</td>
<td>1.6</td>
<td>3.0</td>
<td>5.0</td>
<td>7.0</td>
<td>9.0</td>
<td>10.0</td>
</tr>
</tbody>
</table>

Source: EY Moscow Oil & Gas Center estimates
Our estimates suggest that refineries in Group 1 with the depth of refining at 85% (after upgrading) will still be profitable if the oil price falls to US$60/bbl and the export duty on fuel oil is raised to 100%. A decline in price below that level will lead to a negative margin.

Table 6. Group 2 refining margin: sensitivity to oil price and export duty

<table>
<thead>
<tr>
<th>Export duty rate on fuel oil</th>
<th>Oil price US$/bbl</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50</td>
</tr>
<tr>
<td>66%</td>
<td>-2.0</td>
</tr>
<tr>
<td>70%</td>
<td>-2.0</td>
</tr>
<tr>
<td>80%</td>
<td>-3.0</td>
</tr>
<tr>
<td>90%</td>
<td>-3.0</td>
</tr>
<tr>
<td>100%</td>
<td>-4.0</td>
</tr>
</tbody>
</table>

Source: EY Moscow Oil & Gas Center estimates

The sensitivity analysis of Group 2 refineries demonstrates robust economics (Table 6), albeit not as strong as in Group 1. The refining margin remains positive even if an oil price drops to US$80/bbl and the export duty on fuel oil is raised to match that on crude. With an oil price approaching the US$60/bbl mark, refineries within this group start incurring losses.

Table 7. Group 3 refining margin: sensitivity to oil price and export duty

<table>
<thead>
<tr>
<th>Export duty rate on fuel oil</th>
<th>Oil price US$/bbl</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50</td>
</tr>
<tr>
<td>66%</td>
<td>-15.0</td>
</tr>
<tr>
<td>70%</td>
<td>-15.0</td>
</tr>
<tr>
<td>80%</td>
<td>-16.0</td>
</tr>
<tr>
<td>90%</td>
<td>-17.0</td>
</tr>
<tr>
<td>100%</td>
<td>-18.0</td>
</tr>
</tbody>
</table>

Source: EY Moscow Oil & Gas Center estimates

Yields of heavy products will remain high at many refineries in Group 3. Therefore, should the rate of export duty on fuel oil be raised from the current 66% to 100% (and even to 90%), the refining margin will drop below the zero mark – even with oil prices remaining at the current level of US$110/bbl.
Conclusion

It is absolutely obvious that Russia's downstream segment is continuing to develop rapidly. Oil product prices and the current tax environment remain supportive of development, contributing to increased refining outputs and a higher level of investments. If the upgrading of the domestic refining infrastructure keeps up at its current pace, the depth of refining in Russia will rise from 72% to 85% by 2020. It should be noted that hydrocracking is more profitable than catalytic cracking due to higher net present values under the current tax configuration and a continued spread between export duties on gasoline and diesel fuel. Diesel fuel, therefore, will become the main addition to the domestic product mix. We estimate that by 2020 the supply of this oil product will rise by about 23 million tonnes, with domestic consumption growing by 7.4 million tonnes. On the gasoline front, the prospects are also good, albeit not as impressive. With a projected growth in consumption of 6 million tonnes, gasoline output may reach 11.5 million tonnes. This means that lowering the protective duty on gasoline would be quite reasonable to consider.

However, with the depth of refining remaining low, the Government's intention to raise export duty on heavy products to match that on crude – referred to as “the 2015 problem” – may seriously impair the prospects for the refining industry. With a long investment cycle required for upgrading, most refineries that are currently undergoing upgrades to increase light product yield will not be able to achieve fundamental improvements by 1 January 2015. Due to the specifics of petroleum refining processes, stopping production of certain products will reduce the output of light products, including gasoline, which may lead to a deficit on the domestic market.

Is there a way out of the stalemate? In our opinion, two alternatives should be considered.

If the Government elects to go ahead with the “big tax maneuver,” an optimal combination of add-ons to the existing industry model will need to be found. A key objective is to carefully weigh and link together numerous variables sensitive to potential changes in the operating landscape (crude oil production vs. refining vs. product mix), having considered various price scenarios. It is also critical that the upgrading aspect be factored into the “big maneuver.”

If it is decided to keep the 55-61-90-100 system, the industry will not be ready for a 100% export duty on fuel oil until the upgrading is complete. Our estimates suggest that the export duty may not be raised above 75%–80% of that on crude oil. The resulting shortfall in government receipts should be offset by a higher MET rate (according to our estimates, from 530 rubles per tonne to 555–560 rubles per tonne in 2015). In US dollar terms, the increase will be from US$25.8/bbl to around US$27/bbl, with an oil price of US$110/bbl. Such steps, however, may put yet another burden on upstream players, a challenge compounded by an increasingly harder task of putting reserves into production – unless the Government decides to gradually replace the current tax model with a windfall tax payable on net income.

Whatever the situation may be, any meaningful tax decisions require a collaborative approach, with input from federal government bodies, market participants, industry experts and analysts. A tough stance on taxation may upset the existing equilibrium, affecting industry revenues and government receipts alike.
## Appendix 1

<table>
<thead>
<tr>
<th>Group</th>
<th>Refinery</th>
<th>Total annual output</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group 1</strong></td>
<td>Tuapse Refinery, Volgogradnftepererabotka, Moscow Refinery, Kirishinefteorgsintez, Yaroslavlnefteorgsintez, Ryazan Refining Company, Novo-Ufa Refinery, Ufaneftekhim, Ufa Refinery</td>
<td>101 million tonnes</td>
</tr>
<tr>
<td><strong>Group 2</strong></td>
<td>Angarsk Petrochemical Company, Achinsk Refinery, Kulbychev Refinery, Novokulbychev Refinery, Syzran Refinery, Nizhegorodnftetheorgsintez, Permnefteorgsintez, Omsk Refinery, Gazprom Neftekhim Salavat, TAIF-NK, Krasnodar Refinery, Afipsky Refinery</td>
<td>113 million tonnes</td>
</tr>
<tr>
<td><strong>Group 3</strong></td>
<td>Komsomolsk Refinery, Ukhtaneftepererabotka, Khabarovsk Refinery, Taneco, Saratov Refinery, Orsknefteorgsintez, Antipino Refinery, Mari El Refinery, Novoshakhtinsk Refinery, Transbunker and others</td>
<td>61 million tonnes</td>
</tr>
</tbody>
</table>

*Source: InfoTEK, EY Moscow Oil & Gas Center estimates*
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Russia's downstream sector: sights set on modernization
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