The materials presented in this issue relate to the problem of associated gas flaring. They contain annually updated data, and are intended for government bodies, companies mining, refining and using hydrocarbon raw materials, research institutes, and financial and public organizations, as well as entities and individuals interested in the problem of associated gas use.

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<td>APG</td>
<td>associated petroleum gas</td>
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<td>AS</td>
<td>artificial satellite</td>
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<td>bcm</td>
<td>billion cubic meters</td>
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<td>CDM</td>
<td>clean development mechanism</td>
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<td>ERU</td>
<td>emission reduction unit</td>
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<td>FSSS</td>
<td>Federal State Statistics Service</td>
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<td>GGFR</td>
<td>Global Gas Flaring Reduction</td>
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<td>GPP</td>
<td>gas processing plant</td>
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<td>GR</td>
<td>gas refinery</td>
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<td>GTP</td>
<td>gas turbine plant</td>
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<td>JI</td>
<td>joint implementation</td>
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<td>LPG</td>
<td>liquefied petroleum gases</td>
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<tr>
<td>mcm</td>
<td>million cubic meters</td>
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<td>MET</td>
<td>mineral extraction tax</td>
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<td>NOAA</td>
<td>National Oceanic and Atmospheric Administration (USA)</td>
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<td>UNFCCC</td>
<td>United Nations Framework Convention on Climate Change</td>
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FOREWORD

Since 2008, politicians at the highest level in Russia have been actively working to make the country’s economy more energy efficient. Goals have also been set for tackling one of the biggest problems of the fuel-and-energy industry: associated gas flaring. In particular, Government Decree 7 of January 8, 2009, “On measures to stimulate the reduction of air pollution from associated gas flaring products” states that from 2012 no more than 5% of APG output should be flared.

In November 2009, Dmitry Medvedev noted in his Presidential Address to the Federal Assembly that “One of the most glaring examples of ineffective energy resource use is the flaring of gas extracted alongside oil. This pollutes the environment and sends tens of billions of rubles up in smoke…. We really do need to take fast and decisive action, and no objections from the production companies should be accepted.”

However, little progress has been made on this issue so far: the issue remains marked by a lack of transparency, with different sources giving different figures for APG flaring volumes, and the government being inconsistent, not least in terms of the regulatory and legal framework and the confirmed strategies and objectives for development of the oil and gas sector and the Russian economy overall.

Although APG flaring is a problem for all oil-producing countries, Russia’s flare volumes are truly shocking, particularly in terms of the environmental damage and the waste of energy resources. Russia’s APG flaring volumes significantly exceed the global average, and are more than double those in Nigeria, the country with the second-highest volumes.

Going by various sources, Russia flares 15-35 bcm of associated petroleum gas a year. Moreover, the number of regions where flaring is becoming the main factor in overall environmental pollution is increasing.

Since 2009, as part of a public campaign for the problem of APG flaring in Russia to be dealt with as soon as possible, WWF-Russia has published an annual report...

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1 Meeting of the Commission for Modernisation and Technological Development of Russia’s Economy/News, June 27, 2011

2 Presidential Address to the Federal Assembly/News, November 12, 2009.
on the current situation regarding this issue. The 2011 report has been written jointly with KPMG, a global network of firms providing audit, tax and advisory services, including in the field of sustainable development.

Data on the volumes of associated gas flared by Russia’s biggest oil and gas producing companies in 2010 shows that some not only failed to improve their APG utilization, but, on the contrary, got worse. For example, the volumes of APG utilized at Rosneft fell to 56% rate.

At the same time, more and more oil-producing countries worldwide are finding effective solutions for using associated gas. This report looks in particular at how the issue is being dealt with in Kazakhstan, which has achieved considerable success in recent years in utilizing APG and developing a system of accounting and control, including using satellite methods.

There has been increased attention to APG flaring problem in Russia in recent years: figures for APG utilization have become an essential aspect of the non-financial reporting of most oil-producing companies, major media outlets highlight the problem practically every month, and conferences and seminars on the issue are being held.

One of the positive developments in Russia is that implementation in the country of Joint Implementation (JI) Projects for flare gas utilization under the Kyoto Protocol has started. That gives opportunities for companies to invest in APG utilization projects, gaining profit and competitive advantages. New opportunities for applying these and other economic incentives in this area need to be supported and developed in future enabling APG flaring problem to be effectively solved.
Studying and tackling the problem of associated gas flaring requires a comprehensive, multi-faceted approach. Given the global scale of this issue, the use of remote methods currently under active development enabling a wide range of problems to be effectively solved is facilitating objective monitoring of current conditions both in individual regions and worldwide.

Thus, in June 2011, President Medvedev, addressing a meeting of the Commission for Modernisation and Technological Development of Russia’s Economy, named establishing a space-based environmental monitoring system first in a list of priority projects to focus on in the near future, saying: “Satellites make it possible to see a lot from space, practically anything really, including our big facilities and even our waste gas flares. I know that there has been some progress on the gas flare issue, but this is not enough, and we need to look at what more we can do here, including in the matter of processing the gas associated with oil production.”

Information received from foreign satellites is used for 90% of environmental monitoring activities in Russia today. ScanEx is the only Russian company that has signed license agreements with the top world remote sensing
operators for direct data acquisition from IRS, SPOT, EROS, RADARSAT and ENVISAT satellites series to its proprietary UniScan™ ground stations, enabling regular near real-time monitoring of territory in Russia and the CIS countries with spatial resolution from hundreds to less than one meter. It thus provides solutions with regard to operational satellite monitoring, including gas flare monitoring (Figure 1).

Fig. 1: Examples of satellite monitoring of associated gas flaring (using ScanEx data)

**Satellite imagery products: APG flare monitoring (a series of photographs taken at different times).**

Landsat-5, 05.06.10

Landsat-5, 05.06.10

Landsat-5, 30.07.2010

Spot-4, 13.02.2011

The red points are APG flaring facilities at the Samotlor field in Khanty-Mansi Autonomous Okrug
Satellite imagery products take the form of regional maps of industrial infrastructure based on high-resolution photography, as well as series of images produced at different times (Figure 2).

**Fig. 2: Satellite imagery products (based on ScanEx data)**

**Satellite imagery products: APG flare monitoring, regional map.**

Landsat-5, 30.07.2010

Spot-4, 13.02.2011

The red points are APG flares at the Samotlor field in Khanty-Mansi Autonomous Okrug

Globally, Earth remote sensing methods have already been developed and are constantly being improved. For example, the USA’s National Oceanic and Atmospheric Administration (NOAA), under a project with the World Bank’s Global Gas Flaring Reduction (GGFR) Partnership, uses satellite data to estimate APG flaring volumes.

According to the latest data, the world overall saw a positive reduction in APG flaring in the period 2006-2010, from 162 bcm to 134 bcm (Table 1). Despite the growth in world crude oil production in 2010, APG flaring fell by 13 bcm, or 9.7%, compared to 2009. This has been achieved thanks to a reduction in APG flaring by 11.4 bcm in Russia and by 1.2 bcm in Kazakhstan, which, according to GGFR data, is roughly equivalent to 30 million tons of CO₂ emissions.⁵ Overall, the flaring of gas adds about 360 million tons of carbon dioxide in annual emissions, roughly equivalent to the annual emissions from 70 million cars, according to the GGFR Partnership.⁶

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⁵ Gas Flaring Reductions Avoid 30 Million Tons of Carbon Dioxide Emissions in 2010.

⁶ Russia, Kazakhstan Lead Way to Reduce Gas Flaring and Lower Emissions.
Table 1. Estimated Flared Volumes from Satellite Data, 2006-2010 (bcm)\(^7\)

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<thead>
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<td>52.3</td>
<td>42.0</td>
<td>46.6</td>
<td>35.2</td>
<td>-11.4</td>
<td>-32.4</td>
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<td>2. Nigeria</td>
<td>18.6</td>
<td>16.3</td>
<td>15.5</td>
<td>14.9</td>
<td>15.2</td>
<td>0.3</td>
<td>2.0</td>
<td>11.3</td>
</tr>
<tr>
<td>3. Iran</td>
<td>12.2</td>
<td>10.7</td>
<td>10.8</td>
<td>10.9</td>
<td>11.3</td>
<td>0.4</td>
<td>3.5</td>
<td>8.4</td>
</tr>
<tr>
<td>4. Iraq</td>
<td>7.2</td>
<td>6.7</td>
<td>7.1</td>
<td>8.1</td>
<td>9.1</td>
<td>1.0</td>
<td>11.0</td>
<td>6.8</td>
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<tr>
<td>5. Algeria</td>
<td>6.4</td>
<td>5.6</td>
<td>6.2</td>
<td>4.9</td>
<td>5.4</td>
<td>0.5</td>
<td>9.3</td>
<td>4.0</td>
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<tr>
<td>6. Angola</td>
<td>4.0</td>
<td>3.5</td>
<td>3.5</td>
<td>3.4</td>
<td>4.1</td>
<td>0.7</td>
<td>17.1</td>
<td>3.1</td>
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<td>7. Kazakhstan</td>
<td>6.2</td>
<td>5.5</td>
<td>5.4</td>
<td>5.0</td>
<td>3.8</td>
<td>-1.2</td>
<td>-31.6</td>
<td>2.8</td>
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<tr>
<td>8. Libya</td>
<td>4.4</td>
<td>3.8</td>
<td>4.0</td>
<td>3.5</td>
<td>3.8</td>
<td>0.3</td>
<td>7.9</td>
<td>2.8</td>
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<tr>
<td>9. Saudi Arabia</td>
<td>4.2</td>
<td>4.2</td>
<td>4.3</td>
<td>3.9</td>
<td>3.7</td>
<td>-0.2</td>
<td>-5.4</td>
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</tr>
<tr>
<td>10. Venezuela</td>
<td>2.1</td>
<td>2.2</td>
<td>2.7</td>
<td>2.8</td>
<td>2.8</td>
<td>0.0</td>
<td>0.0</td>
<td>2.1</td>
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<tr>
<td>11. Mexico</td>
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<td>2.7</td>
<td>3.6</td>
<td>3.0</td>
<td>2.5</td>
<td>-0.5</td>
<td>-20.0</td>
<td>1.9</td>
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<tr>
<td>12. Indonesia</td>
<td>3.2</td>
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<td>2.3</td>
<td>-0.6</td>
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<tr>
<td>13. China</td>
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<td>2.6</td>
<td>2.5</td>
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<td>-0.3</td>
<td>-14.3</td>
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<tr>
<td>14. Canada</td>
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<td>1.9</td>
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<td>2.1</td>
<td>0.3</td>
<td>14.3</td>
<td>1.6</td>
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<td>15. USA*</td>
<td>2.0</td>
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<td>2.0</td>
<td>2.1</td>
<td>0.1</td>
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<td>1.6</td>
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<tr>
<td>16. Uzbekistan</td>
<td>2.9</td>
<td>2.1</td>
<td>2.1</td>
<td>1.7</td>
<td>1.9</td>
<td>0.2</td>
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<td>17. Qatar</td>
<td>2.3</td>
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<td>18. Oman</td>
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<td>2.0</td>
<td>1.9</td>
<td>1.8</td>
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<td>1.5</td>
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<td>1.8</td>
<td>1.5</td>
<td>-0.3</td>
<td>-20.0</td>
<td>1.1</td>
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</table>

| Total top 20 | 138   | 133   | 125   | 126   | 114   | -12.0                        | -10.5                         | 85                                     |
| Rest of the world | 23   | 21    | 22    | 21    | 20    | -1.0                         | -5.0                          | 15                                     |
| Global flaring level | 162  | 154   | 146   | 147   | 134   | -13.0                        | -9.7                          | 11                                     |

* Coverage limited to Gulf of Mexico, Alaska, and partial continental USA

However, Russia, with 35.2 bcm in 2010, remains the world leader in gas flaring, accounting for about 26% of the global total. Russia flared more than twice as much gas as second-placed Nigeria (with 15.2 bcm).

Russia, Nigeria, Iran and Iraq account total for more than half (52.8%) of global APG flaring (Figure 3).

Fig. 3: Estimated flared volumes from satellite data, 2010 (bcm) and share of global flaring level, 2010 (%)

---

\(^7\) NOAA Satellite data.
In the last five years, Russia has managed to reduce flaring by 14.8 bcm, with the biggest decrease, of 11.4 bcm (32.4%) coming between 2009 and 2010 (Figure 4).

Fig. 4: Estimated flared volumes in Russia from satellite data, 2006-2010 (bcm)

It should be noted that monitoring APG flaring using satellite instruments capable of measuring atmospheric concentrations of substances sufficiently accurately involves a range of aspects that need taking into account in the calculations and may affect the quantitative estimation of APG flaring volumes, particularly at flaring units at gas fields, gas processing plants, and so on.

Thus, calculated data obtained using satellite sensing reveal a positive trend towards a reduction in associated gas flaring worldwide in recent years. Russia achieved the highest reduction in APG flaring in 2010, but it remains the world’s leading gas flarer.
2. Production and use of associated gas in Russia

In June 2011, at a State Council Presidium meeting on environmental safety, Yuri Trutnev, Russia's Minister of Natural Resources and the Environment, said in a speech entitled “Measures to ensure environmental safety and reverse accumulated ecological damage” noted that according to Russian Energy Ministry data, roughly 15.5 bcm of APG a year is flared at Russia’s oil fields, and the utilization rate is 76.3%. The annual volume of APG gas flared is expected to fall to 11.3 bcm by 2012, when the utilization rate will be roughly 83%.

2.1. Analysis of APG production and utilization indicators for Russia

Associated petroleum gas production was 65.4 bcm in 2010, APG flaring – 15.7 bcm.

During the analysis of APG production and utilization indicators, the petrochemicals company Sibur proposed grouping Russia’s regions into nine zones to illustrate the analysis of APG production and flaring (Figure 5).

Fig. 5: Geographic distribution of main APG flaring volumes (bcm)

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* Meeting of the Presidium of the State Council of the Russian Federation on the environment on June 9, 2011, “Measures to ensure environmental safety and reverse accumulated ecological damage”.

* Sibur data: presentation “APG production and use in Russia in 2010”, 25.03.2011.
The bulk of APG production takes place in Western Siberia, which accounts for 45 bcm, more than half of which is produced in Khanty-Mansi Autonomous Okrug (KhMAO). KhMAO, Yamalo-Nenets Autonomous Okrug (YNAO) and Eastern Siberia together produce roughly 80% of the APG. Production is increasing significantly in Eastern Siberia (Tomsk Oblast, the north of Krasnoyarsk Krai, and Irkutsk Oblast) and the Komi Republic. Thus, the new oil-producing regions are becoming new APG producing regions.

By statistical estimates, Khanty-Mansi Autonomous Okrug, with 33% of the national total, still flares the greatest volumes, but Eastern Siberia, with 31%, has almost caught up. YNAO and the Komi Republic, where considerable volumes of gas are flared in a relatively compact area, come third and fourth. Despite the increase in gas processing volumes, the volume of flaring in absolute terms is not falling, since the utilization issue is not being tackled when operations at the new fields begin.

It is worth noting the large discrepancy between the regional figures for gas flaring and APG production: the absolute leader for APG production (KhMAO) flares just 0.3 bcm a year more than Eastern Siberia. However, Eastern Siberia produces 30.7 bcm less APG a year than KhMAO, according to 2010 data (Figure 6).

Hence, the following trend is being maintained: in the so-called “new” production regions (Nenets Autonomous Okrug (NAO), YNAO, and the north of Krasnoyarsk Krai), development and production funding significantly exceeds gas processing investment. For this reason, these regions will probably have the lowest level of APG use in the coming years. At the same time, traditional oil-producing regions such as KhMAO already recognize the consequences of inefficient APG use, and are acting to reduce associated gas flaring and increase utilization. Thus, KhMAO’s share of total flaring fell over the last one-two years.

Roughly 24% of the associated gas output is flared. The remaining 76% goes to consumers (13%), internal needs (15%) and a gas processing plant (48%). Thus, less than half the APG is suitably processed (Figure 7).
The total volume of APG processed in Russia in 2010 was 31.6 bcm, including 17.5 bcm (56% of the national total for APG processing at gas processing plants (GPPs)) at Sibur plants, which process APG from most vertically-integrated oil companies in Western Siberia.

According to Sibur data, the leading sources of APG for processing are TNK-BP, Surgutneftegaz and Rosneft. 100% of the processed APG from Gazprom Neft and Slavneft, and more than 90% of the processed APG from TNK-BP, Rosneft and RussNeft, is processed at Sibur GPPs (Figure 8).

Thus, the growth in APG production and the delay in introducing infrastructure for utilizing it are leading to a situation where the new oil and gas provinces (Eastern Siberia and the Komi Republic) are flaring practically all their APG output. Given the rates of growth of associated gas production and the lack of processing facilities in the “new” region, as well as the reduction, in contrast, in flaring in KhMAO, it is possible that Eastern Siberia will become the leading flaring region in the near future. At present, the increase in APG processing volumes is the main factor contributing to the growth in production of petrochemical raw materials. The development of new fields in new regions (Eastern Siberia, the Komi Republic, the Yamal peninsula) is making it possible to create new major associated petroleum gas processing plants.
2.2. Change in APG production and utilization indicators for leading Russian oil producing companies

At present, all the major oil-and-gas producing companies have confirmed target programs to raise their level of APG rational use to 95%. However, not all of them have so far achieved the required utilization level, and some are even showing negative results in this area. Although figures for associated petroleum gas production and use are an integral part of the non-financial reporting statements of major oil-and-gas producing companies, and an important sign of environmental responsibility and commitment to sustainable development, some companies are not showing transparency in this matter.

As a part of a public campaign for the APG flaring problem to be dealt with as soon as possible, WWF-Russia has, for the third year, asked leading Russian oil companies to provide figures for APG output, flaring and utilization rates over the past year (Table 2).

Table 2
AGP output (bcm) and utilization rates (%) (Data provided by the companies or taken from their public reports (annual reports & sustainable development reports)

<table>
<thead>
<tr>
<th>Company</th>
<th>APG output (bcm)</th>
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<th>APG utilization rate, %</th>
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<tr>
<td></td>
<td>2006</td>
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<td>2006</td>
<td>2007</td>
<td>2008</td>
<td>2009</td>
<td>2010</td>
</tr>
<tr>
<td>1. Surgutneftegaz</td>
<td>15,630*</td>
<td>14,990*</td>
<td>14,780*</td>
<td>14,030*</td>
<td>13,930*</td>
<td>93,5*</td>
<td>94,3*</td>
<td>95,4*</td>
<td>96,9*</td>
<td>95,9*</td>
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<tr>
<td>2. Rosneft</td>
<td>8,600*</td>
<td>10,100*</td>
<td>10,900*</td>
<td>11,700*</td>
<td>13,800*</td>
<td>59,0*</td>
<td>60,3*</td>
<td>63,2*</td>
<td>67,0*</td>
<td>56,2*</td>
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<td>3. TNK-BP</td>
<td>11,300*</td>
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<td>12,200*</td>
<td>12,500*</td>
<td>13,100*</td>
<td>79,8*</td>
<td>68,4*</td>
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</tr>
<tr>
<td>4. Lukoil</td>
<td>6,700*</td>
<td>7,600*</td>
<td>7,400*</td>
<td>8,200*</td>
<td>8,600*</td>
<td>75,0*</td>
<td>70,0*</td>
<td>71,0*</td>
<td>71,1*</td>
<td>76,8*</td>
</tr>
<tr>
<td>5. Gazprom Neft</td>
<td>4,532*</td>
<td>4,885*</td>
<td>4,569*</td>
<td>4,282*</td>
<td>4,376*</td>
<td>45,0*</td>
<td>35,7*</td>
<td>46,8*</td>
<td>48,1*</td>
<td>55,2*</td>
</tr>
<tr>
<td>6. RussNeft</td>
<td>1,634</td>
<td>1,546</td>
<td>1,488</td>
<td>**</td>
<td>1,461*</td>
<td>71,0*</td>
<td>70,3</td>
<td>61,0</td>
<td>68,9</td>
<td>70,0*</td>
</tr>
<tr>
<td>7. Slavneft</td>
<td>0,925</td>
<td>0,928</td>
<td>0,899</td>
<td>0,905</td>
<td>0,851</td>
<td>62,5</td>
<td>68,1</td>
<td>69,5</td>
<td>71,1</td>
<td>71,9</td>
</tr>
<tr>
<td>8. Tatneft</td>
<td>0,739*</td>
<td>0,738*</td>
<td>0,762*</td>
<td>0,757*</td>
<td>0,770*</td>
<td>95,1*</td>
<td>94,0*</td>
<td>94,6*</td>
<td>93,7*</td>
<td>94,7*</td>
</tr>
<tr>
<td>9. Bashneft</td>
<td>0,389</td>
<td>0,370</td>
<td>0,362</td>
<td>0,377</td>
<td>0,436</td>
<td>78,2</td>
<td>82,1</td>
<td>84,5</td>
<td>85,7</td>
<td>83,1</td>
</tr>
</tbody>
</table>

*Data provided per request.
** No data available.
In the last five years, against a backdrop of a general increase in oil production volumes, in 2010 APG output fell at the following companies: TNK-BP, Rosneft, Lukoil, Tatneft and Bashneft.

The companies’ utilization rate in 2010 was higher than in 2009, except at Rosneft, Surgutneftegaz, Bashneft. However, it should be noted that Surgutneftegaz remains the leader in terms of rational APG use, and that it has maintained a utilization rate above 95% since 2008 (Figure 9).

In 2010, the highest APG volumes were produced by Surgutneftegaz, Rosneft and TNK-BP. The highest utilization rates were at Surgutneftegaz, Tatneft and TNK-BP. Moreover, only Surgutneftegaz and Tatneft (with 95.9% and 94.7% respectively) have a utilization rate of more or less 95%.

The lowest utilization figures are at Gazprom Neft (utilization rate in 2010 is 55.2%), Rosneft (56.2%) and RussNeft (70%).

Despite its very low figures compared to other companies, Gazprom Neft has managed to achieve the greatest increase in the APG utilization rate in the last five years, by almost 10 percentage points, whereas Rosneft’s rate fell by almost 11 percentage points last year (Figure 10).

Today, the companies need to take urgent and more effective measures to reduce APG flaring and achieve the required utilization level (minimum 95%) from 2012. There is also a need for more effective initiatives from the state to encourage oil companies in matters of associated gas utilization, such as creating conditions for participating in international mechanisms enabling them to receive additional funding.
The first commitment period of the Kyoto Protocol to the UNFCCC – an international agreement setting binding targets for industrialized countries and countries in transition for reducing or stabilizing greenhouse gas emissions – ends in 2012. At present, however, there are still disagreements regarding its future fate and the economic mechanisms connected with it: joint implementation (JI) Projects, clean development mechanism (CDM), and international emissions trading in quotas. Russia, Japan, Canada and a number of other countries are calling for a new agreement; they consider the Kyoto Protocol ineffective. Thus, Russian Presidential Adviser Alexander Bedritsky stressed at the 2010 United Nations Climate Change Conference in Cancún: “Russia has repeatedly stated... that the adoption of commitments for the second commitment period under the Kyoto Protocol, as it stands now, would be neither scientifically, economically, nor politically effective.... Russia will not participate in the second commitment period of the Kyoto Protocol. At the same time, we consider it judicious to continue to use Kyoto Protocol mechanisms, including in a new agreement.”


At the same time, developing countries, including India, China, Latin American bloc countries and the Alliance of Small Island States (AOSIS) support adopting the second commitment period. The USA, the world’s second-biggest producer of emissions after China, has yet to ratify the protocol.

The second commitment period of the Kyoto Protocol is important not just in economic and political terms, but also in terms of environmental education. Activities on reducing greenhouse gas emissions further understanding of climate problems, give both decision-makers and the man-in-the-street an idea of the “carbon cost” and greenhouse gas emission prices.

Rejection of the second commitment period of the Kyoto Protocol may lead to a situation where countries no longer have official obligations to reduce greenhouse gas emissions under a common global legal agreement, or to complete the development and implementation of the flexible mechanisms facilitating the practical implementation of low carbon solutions. For Russia, it is important that conditions ensuring that there is a Russian market for Joint Implementation projects are in place, that an internal emission reduction market is created, and that an economic profit is made.

Therefore, Russia’s refusal to take part in the second commitment period of the Kyoto Protocol (despite its intention to continue cooperation on reducing greenhouse gas emissions) may affect not only the potential for investment in Russian JI projects facilitating the reduction of greenhouse gas emissions, but also the course of development of the international carbon market, since without Japan and Russia the quantitative obligations of the countries under the protocol from 2013 would cover less than 20% of global emissions.

JI projects on reducing emissions of CO₂ and other greenhouse gases provided an opportunity for obtaining additional investment in projects linked to resource conservation, increasing energy efficiency, and the use of renewable sources of energy.

The number of approved JI projects worldwide is growing all the time. Thus, at the start of July 2011, 303 JI projects worldwide were registered on the UNFCCC website (compared to 185 in July 2010), 23 of which were from Russia. The majority of these are being implemented in countries such as the Czech Republic, Hungary, Poland, Russia, Germany, Ukraine, Romania, Finland, France, Estonia, Spain and New Zealand.

Out of all the registered JI projects, just 4 concern associated gas utilization, but all of these have been set up in Russia (Table 3).¹² to the urgency of the APG flaring problem in developing countries, most APG utilization projects worldwide use the clean development mechanism (CDM). This financial mechanism is similar to a JI project, but it applies to projects in developing countries (non Annex I countries with regard to the UNFCCC), and allows investors from developed countries to participate in them.

Thus, in July 2011 around 18 of the 3,221 registered CDM projects concerned associated gas utilization. The APG CDM projects reduce annual emissions by more than 9 million tonnes of CO₂ equivalent, and are being implemented in countries such as India, Nigeria, Vietnam, Indonesia, Qatar, China, Iran and Mexico.¹³ The number of internationally approved associated gas projects is growing every year, showing the great development potential for Russian JI projects using similar “methodologies” (approved example calculations).

### Table 3 Registered JI projects concerning associated gas utilization

<table>
<thead>
<tr>
<th>ITL project ID</th>
<th>Title</th>
<th>Host party</th>
<th>Last updated</th>
</tr>
</thead>
<tbody>
<tr>
<td>RU1000200</td>
<td>Yety-Purovskoe Oil field Associated gas recovery and Utilization project</td>
<td>Russian Federation</td>
<td>15 Dec 10</td>
</tr>
<tr>
<td>RU1000229</td>
<td>Associated Petroleum Gas Recovery for the Kharampur oil fields of Rosneft</td>
<td>Russian Federation</td>
<td>09 Mar 11</td>
</tr>
<tr>
<td>RU1000230</td>
<td>Associated Gas Recovery Project for the Komsomolskoye Oil Field</td>
<td>Russian Federation</td>
<td>09 Mar 11</td>
</tr>
<tr>
<td>RU1000239</td>
<td>SNG gas gathering</td>
<td>Russian Federation</td>
<td>17 Mar 11</td>
</tr>
</tbody>
</table>

¹² The United Nations Framework Convention on Climate Change.

¹³ The United Nations Framework Convention on Climate Change.
In a JI project, an Annex I country (the “hosting party”) implements the project using investment from another country on the list. The investor earns emission reduction units (ERUs) generated as a result of the project implementation. The mechanism allows ERUs to be transferred and acquired in the period from 2008 through 2012.

To participate in JI projects, countries must meet certain conditions: designating a coordination center to review and approve projects, and adopting national rules and procedures for review and approving JI projects.

To transfer ERUs generated as a result of the implementation of documented and registered JI projects, countries must meet the following requirements:

- ratifying the Kyoto Protocol
- determining a national emissions quota (establishing the quantity)
- creating a national system for estimating greenhouse gas emissions
- setting up a national registry to record the assigned amount and perform transactions with carbon credits
- filing an annual inventory report on greenhouse gas emissions in a timely manner to the FCCC Secretariat.

Depending on their level of compliance with these criteria, participants in a JI project may choose one of two options/arrangements for implementing it: Track 1 (which is chosen if the country meets all the eligibility requirements, and entails procedures for selecting products and estimating emissions reductions in the JI projects implemented) or Track 2 (which is chosen if the country meets only some of the eligibility requirements, and entails international procedures for JI project preparation and implementation). Russia has decided that the review procedure for Track 1 and Track 2 projects should be the same, and as a result only some of the projects have been registered on the UN FCCC site.

The Russian government has developed and adopted various regulations governing the procedure for approving and implementing JI projects in Russia, which has allowed the country to meet international requirements.

Thus, the necessary measures to participate in an international JI project mechanism were approved by Order 121 of the Ministry of Natural Resources, and Order 148 of the Ministry of Economic Development of May 7, 2007.

On October 28, 2009, the Russian government adopted two regulatory documents establishing the procedure for implementing JI projects in Russia:

- Russian Government Resolution 843, “On Measures to Implement Article 6 of the Kyoto Protocol to the United Nations Framework Convention on Climate Change”; and
- the Regulation “On the implementation of Article 6 of the Kyoto Protocol to the United Nations Framework Convention on Climate Change”.

According to Resolution 843, the parties involved in the procedure for approving a JI project and issuing and transferring ERUs are:

1) The Russian Ministry of Economic Development, which acts as a coordination center and is responsible for JI project approval
2) OAO Sberbank Rossii, which acts as a carbon credit operator
3) An Expert Panel established by Sberbank by agreement with the Coordination Center
4) the project investor.

JI project implementation includes the following stages: application selection and project approval; direct JI project implementation; issue and transfer of carbon credits. The tender process involves expert assessment of the applications by Sberbank and the Expert Panel, the results of which, plus the Expert Panel’s recommendations, are sent to the Coordination Center for approval. The Coordination Center then decides whether to approve the projects, which are recorded in a special register.

For each tender, Order 485 of the Russian Ministry of Economic Development, “On approval of the rules for the competitive selection of applications submitted with a view to approval of projects being implemented pursuant to Article 6 of the Kyoto Protocol to the United Nations Climate Convention.”

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14 Joint implementation: a guideline for Russian companies [Moscow: 2008; 70 pp], with the participation of the Ministry of Economic Development and Trade (MEDT).

Framework Convention on Climate Change”, of November 23, 2009, establishes that the maximum amount of emission reduction units resulting from the implementation of the projects may not exceed 30 million tonnes of CO₂ equivalent.16

Despite the drawn-out process of establishing national procedures for participating in and implementing JI projects, Russian companies have continuously shown interest in this area in recent years, and as a result a significant number of draft JI project proposals have been developed. However, actual implementation of the JI project mechanism in Russia began only in 2010, when Sberbank organized two tenders. According to Mr. German Gref, at the meeting of the Commission for Modernisation and Technological Development of Russia’s Economy in June 2011, a total of 54 applications amounting to roughly 105 million emissions units, or approximately 1 billion EUR in potential investment, were submitted for the two tenders combined. Of those, 33 projects amounting to roughly 60 million emissions units, or approximately 600 million EUR, have already been approved and signed by order of the Ministry of Economic Development.17

Under Ministry of Economic Development Order 326, of July 23, 2010, 15 projects were approved following the first tender. According to Sberbank, 40 bids were submitted, from 30 companies, with a total potential reduction of 72.3 million tonnes of CO₂ equivalent. 9 of the winning projects have been implemented, and 5 are still at the construction stage. According to Sberbank, the total volume of investment in the approved bids was 1.6 billion EUR, of which 19.2% is “Kyoto money” and the rest private investment. The total profit for Russian investors from the first tender is estimated at roughly 300 million EUR.18

Following the second JI project tender, pursuant to the Order “On confirmation of the list of projects being performed in accordance with Article 6 of the Kyoto Protocol to the United Nations Framework Convention on Climate Change”, of February 1, 2011, 18 winning projects offering total reductions of roughly 30 million tonnes of CO₂ equivalent were selected.

17 Meeting of the Commission for Modernisation and Technological Development of Russia’s Economy//News, June 27, 2011.
18 Sberbank official website.
Following the two tenders, 8 APG utilization projects were approved (the project at the Yuzhny Balyk gas refinery was split into two phases and approved under both tenders using the same project documentation, so the number of approved projects is 8, not 9): 6 in July 2010 and 2 in February 2011. The total reduction in CO₂ emissions (ERUs), according to the project documentation, was more than 20 million tonnes of CO₂ equivalent. The potential revenue, at 10 EUR per tonne of CO₂, is more than 200 million EUR. At the June 2011 meeting of the Meeting of the Commission for Modernisation and Technological Development of Russia’s Economy, German Gref noted that the price of a carbon credit under JI projects, which had recently been 12-15 EUR, had lately fallen to 9.5 EUR, but still remained “very attractive” (Table 4).19

Table 4. APG JI projects approved under the two tenders

<table>
<thead>
<tr>
<th>Investment project</th>
<th>Project investor</th>
<th>Total reductions (ECUs) according to the project design documents (PDD), 2008-2012 (tonnes of CO₂-equivalent)</th>
<th>Potential profit from ECUs (thousand EUR, assuming a price of 10 EUR per tonne of CO₂-equivalent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tender 1 results:</td>
<td>Order 326 of the</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. SNG gas gathering</td>
<td>OAO Samotlornetegaz</td>
<td>846,000</td>
<td>8,460</td>
</tr>
<tr>
<td>2. Yety-Purovskoe Oil field</td>
<td>OAO Gazprom Neft</td>
<td>3,110,000</td>
<td>31,100</td>
</tr>
<tr>
<td>3. Associated Gas Recovery Project for the Komsomolskoye Oil Field</td>
<td>OAO NK Rosneft</td>
<td>4,000,000</td>
<td>40,000</td>
</tr>
<tr>
<td>4. Utilization of associated petroleum gas at the Vostochno-Perevalnoye oil field</td>
<td>OAO RITEK</td>
<td>311,600</td>
<td>3,116</td>
</tr>
<tr>
<td>5. Utilization of associated petroleum gas at the Sredne-Khulymsk oil field</td>
<td>OAO RITEK</td>
<td>526,000</td>
<td>5,260</td>
</tr>
<tr>
<td>6. Expansion of the Yuzhny Balyk gas refinery (Phase 1)</td>
<td>OAO Sibur Holding</td>
<td>According to the PDD, the total volume of reductions for the entire period is 9,640,842</td>
<td>Potential profit for the entire period is 96,408</td>
</tr>
</tbody>
</table>

Tender 2 results: Order “On confirmation of the list of projects being performed in accordance with Article 6 of the Kyoto Protocol to the United Nations Framework Convention on Climate Change”, of February 1, 2011

| Associated Petroleum Gas Recovery for the Kharampur oil fields | OAO NK Rosneft | 1,500,000 | 15,000 |
| Utilization of associated petroleum gas at the Serginskoye oil field | OAO RITEK | 107,000 | 1,070 |
| A project on refining associated petroleum gas at the Yuzhny Balyk gas refinery (Phase 2) | OAO Sibur Holding | According to the PDD, the total volume of reductions for the entire period is 9,640,842 | Potential profit for the entire period is 96,408 |
| TOTAL | | 20,041,400 | 200,414 |

19 Meeting of the Commission for Modernisation and Technological Development of Russia’s Economy//News, June 27, 2011.
In 2011, the first JI project (involving Gazprom Neft and Japan’s Mitsubishi Corporation and Nippon Oil Corporation) in Russia was carried out. Under it, ERUs were transferred from Russia’s carbon credit registry to Japan’s. This project envisages the utilization of associated petroleum gas at the Ety-Purovsk (Yety-Purovskoe) oil field (for more details, see the inset “The first Russian transaction involving the sale of emission reduction units under a procedure established in Russia for implementing a Kyoto Protocol mechanism”).

The national JI project implementation procedures are still in development, and many aspects remain unclear, including the assessment of the applications received by the carbon credit operator, the ERU transfer arrangements (purchase and sale), and the price per tonne of ERUs, which may fall as a result of the unclarity regarding future international agreement.

At the same time, it should be said that applying the JI project mechanism helps not only to reduce APG flaring and atmospheric emissions of CO₂, but also to improve the economic indicators for APG utilization projects and to attract additional funds, and has a positive effect on the project’s rate of return.

However, the JI project mechanisms contain an important feature: the projects must comply with the principle of "additionality" – i.e., that their implementation must not be commercially profitable without the emission reduction units or administratively regulated. This feature may influence the implementation of Russian JI projects on APG utilization connected with the current improvement of the regulatory and legal framework for APG flaring and the establishment of a maximum APG flaring rate of 5% from 2012.

At the June 2011 meeting of the Commission for Modernization and Technological Development of Russia’s Economy, President Medvedev, speaking on the climate factor in economic modernization and the Kyoto Protocol, said: "I think we have not made full use of the possibilities it offers. We should speed up the selection and approval of the relevant projects. We are losing not just time but also the investors who could potentially enter the relevant sectors. We need to draft proposals on reinvesting the money obtained from carrying joint initiatives directly into energy-saving and nature protection projects."20

Thus, the complex and lengthy process of developing national procedures and, consequently, the delayed start of JI project implementation in Russia (which has prevented many projects from being implemented), and now a refusal to take part in the second commitment period of the Kyoto Protocol as well, could lead to a loss of the opportunity to attract additional investment to solve APG utilization problems. In this light, it is important for Russia’s strategy at international negotiations on the second commitment period of the Kyoto Protocol to provide opportunities for additional funding for projects aimed at resource conservation and energy efficiency, including APG utilization.

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In July 2010, a Gazprom Neft JI project received approval from the Sberbank Rossii Expert Panel during the first tender process and, pursuant to Order 326 of the Russian Ministry of Economic Development, of July 23, 2010, was included in the confirmed list of projects being performed in accordance with Article 6 of the Kyoto Protocol to the United Nations Framework Convention on Climate Change.

This joint project between Gazprom Neft and Japan’s Mitsubishi Corporation and Nippon Oil Corporation envisages the utilization of associated petroleum gas previously flared at the Yety-Pur oil field in Yamalo-Nenets Autonomous Okrug, with the subsequent sale of emission reduction units (ECRs). During the implementation of the JIP a 70 km pipeline was constructed from the Ety-Purovsk deposit. This allowed the APG obtained at the deposit to be sent for utilization to SIBUR’s Vyngayakhinsk Compressor Station.

Gazprom Neft was responsible for the construction of facilities, their operation and technical maintenance. The experience of working with Mitsubishi Corporation and JX Nippon Oil & Energy Corporation provided a successful operation fully compliant with the Kyoto Protocol.

JX Nippon Oil & Energy has provided project coordination and ensured that the project complies with applicable Russian law and the standards of the Kyoto Protocol.

In February 2011, Gazprom Neft and Mitsubishi Corporation signed a contract in the presence of Sberbank for conversion of carbon credits to ERUs. Once the Ety-Purovsk field JI project had been registered in Russia’s carbon credit registry and a number had been assigned in the International Transaction Log (ITL), the participants in the project announced a tender for the purchase of ERUs.

After the Gazprom Neft ERUs had been transferred from Russia’s carbon credit registry to Japan’s national carbon credit registry, the ERUs were sold to a major European energy company following the tender. The sold ERUs were received during the implementation of the JI project between August and December 2009. The transaction volume was 295,000 ERUs, and the price was determined by the current market.

Between August 2009 (when the facility entered operation) and December 2012, Gazprom Neft could receive about 3.1 million ERUs (each unit corresponds to one tonne of CO₂) under the project.

Thus, the Gazprom Neft JI project was the first Russian-Japanese project carried out in accordance with the implementation procedure for the Kyoto Protocol mechanism, and the first Japanese government-approved Russian project, under which Russia transferred greenhouse gas emissions quotas during the project implementation.

21 Gazprom Neft’s official website.
22 The United Nations Framework Convention on Climate Change.
An effective solution to the APG flaring problem is possible only if the government plays an active role as an institution representing national economic and environmental interests. Furthermore, the government, with its wide range of regulatory instruments, has the ability to craft a sensible policy in this area, such as by creating a regulatory/legal and procedural framework.

In 2010 and the first half of 2011, the government adopted various APG flaring measures, including improving the regulatory and legal framework.

- For example, the Federal Law On amendments to Article 32 of the Federal Law On the Electric Power Industry, of March 9, 2010, has been passed. The amendments facilitate priority access to the Unified National Electricity Grid for electricity production facilities powered by associated petroleum gas and its derivatives.

- Government Resolution 118, of March 3, 2010, drafted by the Ministry of Natural Resources, has approved the regulations on the preparation, agreement and approval of engineering designs for the development of mineral deposits and other design documents for the performance of work connected with the use of subsoil plots. Points 12 and 13 of the regulations stipulate that the design documents for the development of mineral deposits should include measures to ensure that environmental protection and ecological safety requirements are met when using the subsoil, and that measures to ensure APG use must be taken in the case of hydrocarbon deposits.
Order 505 / 449 / 582 of the Ministry of Energy, the Ministry of Natural Resources, and the Federal Antimonopoly Service, of October 18, 2010, On an interdepartmental commission to address issues relating to the use of petroleum (associated) gas and access to the capacity of the OAO Gazprom gas transportation system for suppliers of dry gas derived from the processing of petroleum (associated) gas, on the creation of an interdepartmental commission to address issues relating to APG use and OAO Gazprom gas transportation system capacity access for suppliers of dry gas derived from APG processing, has been published. The Commission’s responsibilities include: preparing proposals and recommendations on OAO Gazprom gas transportation system capacity access for suppliers; preparing recommendations on the implementation of programs for the use of the APG of oil-and-gas producing entities and OAO Gazprom’s plans for the use of the OAO Gazprom gas transportation system in order to synchronize them; preparing proposals on supporting cooperation between the state, suppliers and OAO Gazprom entities with regard to safeguarding the interests of the said parties in the transportation of dry gas; and preparing opinions on the technical possibility of access for suppliers, including following claims of unwarranted denial of access to OAO Gazprom gas transportation system capacity.

In November 2010, Draft Federal Law 454850-5, On the use of associated petroleum gas and amendments to certain legislative acts of the Russian Federation was submitted to the State Duma, and it is currently under review. The bill has been drafted by Federation Council members and State Duma deputies. Representatives of all the federal executive authorities concerned, including the Ministry of Energy, Ministry of Natural Resources, the Federal Service for Environmental, Technological and Nuclear Supervision, the Federal Service for Supervision of Natural Resources, plus representatives of the Accounts Chamber of the Russian Federation, scientific, design and environmental organizations, the expert community and representatives of all the major gas, gas chemical and oil companies, were also involved in preparing it. 23

It should be noted that various laws have already been drafted to solve the APG flaring problem. For example, in 2009 the Draft Federal Law On amendments to certain legislative acts of the Russian Federation regarding issues of the effective use of petroleum (associated) gas was submitted to the State Duma, but was then withdrawn.

At the June 2011 meeting of the Presidium of the State Council of the Russian Federation on the environment, Yuri Trutnev noted that the Federal Agency on Subsoil Use, when preparing licensing agreements for newly issued and updated licenses, includes a requirement for APG use, in order to ensure that the flaring target of 95% is reached. In addition, the minister noted that the Energy Ministry has developed, and agreed with the federal executive authorities concerned, a draft federal law On amendments to Article 27 of the Federal Law On gas supply in the Russian Federation, stipulating priority access to gas transportation services for dry gas resulting from APG processing.24

Furthermore, the following significant measures have been taken in 2011:

• a draft Russian Government Resolution On measures to encourage the reduction of atmospheric pollution with products of associated petroleum gas flaring has been developed;

• the General Development Program for the Oil Industry to 2020, and the General Development Program for the Gas Industry to 2030, have been approved.

Details on these measures are presented below in separate chapters.


24 Meeting of the Presidium of the State Council of the Russian Federation on the Environment on June 9, 2011, “Measures to ensure environmental safety and reverse accumulated ecological damage”. 
4.1. The Draft Russian Government Resolution *On measures to encourage the reduction of atmospheric pollution with products of associated petroleum gas flaring*

In 2011, the Ministry of Economic Development produced a draft Russian Government Resolution *On measures to encourage the reduction of atmospheric pollution with products of associated petroleum gas flaring*.

The new draft is set to replace the existing Russian Government Resolution 7, of January 8, 2009, *On measures to encourage the reduction of atmospheric pollution with products of associated petroleum gas flaring*, which is currently the main regulatory and legal document aimed at reducing APG flaring.

Government Resolution 7 establishes as a target that from 2012 no more than 5% of associated petroleum gas output should be flared. Under this resolution, a new procedure for calculating payments for emissions of harmful substances/pollutants produced in APG flaring will apply from January 1, 2012. This will include a weighting factor of 4.5 for any volume exceeding the target value, plus a weighting factor of 6 in the absence of measuring and recording equipment.

In May 2011, the Ministry of Economic Development held public consultations for all interested parties with the aim of assessing the new draft Government Resolution. The latter contains standards aimed at preventing atmospheric emissions of harmful substances/pollutants, and at reducing emissions of greenhouse gases produced in associated petroleum gas flaring, including:

- establishing a target amount for APG flaring of no more than 5% of APG output
- introducing a weighting factor, K1, for exceeding the target amount
- introducing a weighting factor, K2, for not having measuring and recording equipment

According to various oil and gas industry experts who took part in the public consultations, the draft regulations establish necessary and achievable requirements. This method of regulation is effective overall, but additional measures would help. These could include introducing a different mineral extraction tax rate for APG and transferring control functions relating to the organization of APG recording from the Federal Service for Environmental, Technological and Nuclear Supervision to a fiscal agency.

Point 4 of the draft, which introduces the weighting factor K1, allows for the flaring volume to exceed 5% of output, subject to the payment of fines. Given the imperfect nature of the recording system, this will not help to solve the APG flaring problem, and could lead to corruption. However, an administrative regulation prohibiting flaring of more than 5% would prevent the implementation of JI projects involving APG utilization.

Attempts to resolve this problem through government resolution have been going on unsuccessfully for more than ten years now. Therefore, President Medvedev, in his Address to the Federation Council in fall 2009, ordered the issue to be made the subject of a law, which has yet to be done.

It should be noted that provisions outlining measures to encourage entrepreneurial activity, and the conditions for investment in APG processing as an independent business with separate accounting, need to be developed.

A positive step in this direction might be to make the 5% target apply to a whole company rather than individual fields. This would make it possible for new economic mechanisms to be used within companies, and for the APG utilization rate to reach 95% faster.

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25 The Russian Ministry of Economic Development announces public consultations to assess the regulatory impact of the draft Russian Government Resolution “On measures to encourage the reduction of atmospheric pollution with products of associated gas flaring”.

In April 2011, a meeting of the Government Commission on the Fuel and Energy Complex, Regeneration of the Mineral and Raw Materials Base and Improvement of the Energy Efficiency of the Economy approved the General Development Program for the Oil Industry to 2020 and the General Development Program for the Gas Industry to 2030.27

The General Development Program for the Oil Industry to 2020 was developed by the Russian Energy Ministry as part of the implementation of an order from Prime Minister Vladimir Putin (Minutes VP-P9-4pr, February 12, 2009), with the active participation of oil and gas companies, and scientific and expert organizations. The General Program is a strategic industry document that includes forecasts for change in the domestic and foreign markets for oil and oil products, and contains an assessment of the development potential for the production of oil, gas condensate and associated gas, taking account of commercial production volumes at existing fields, and of new projects attractive to investors.

In producing the General Development Program for the Oil Industry, the following scenarios/options for oil production were established:

- A “target” scenario with growth up to 505 million tonnes and stabilization of annual oil production from 2013 to 2020 at 505 million tonnes with the current level of production drilling and investment (ensuring the most optimum distribution of income between the state and the investor)
- An “inertia” scenario, based on business plans presented by major Russian oil and gas companies, which would ensure annual output of up to 395 million tonnes by 2020 under current tax conditions
- A “maximum” scenario, based on data provided by oil and gas companies, taking account of forecasts for the development of fields, effective before the distribution of income between the state and investors (i.e., where the tax burden is practically non-existent), ensuring production of up to 570 million tonnes a year, subsequently falling to 547 million tonnes a year by 2020

According to the draft General Development Program for the Oil Industry, APG output is currently 65 bcm a year, of which just 49 bcm (75.9%) is utilized, and 16 bcm is flared.

The inertia scenario ensures the lower output and, consequently, lower APG flaring that would allow a reduction in the environmental impact.

With the target option, seen as the basic option, APG production would be 70 bcm by 2020. Associated petroleum gas production will increase as the structure of the reserves deteriorates and the gas factor increases. Implementation of the projects planned by the oil companies will enable the APG utilization rate to reach 95% only by 2014. The annual volume of APG utilized will grow by 17 bcm (Figure 11).

Fig. 11 Change in the APG utilization rate under the target scenario

Under the target option, the main areas of APG utilization will be: initial gas processing with production of natural gas liquids, stable natural gasoline and dry gas; production of electricity and heat; injection into the reservoir; water-alternating-gas injection; production of ethane; and use in the processes for producing LPG, synthetic hydrocarbons and methanol.

The General Program specifies defining a target value for the rational use of APG at fields at an early stage of development (up to three years old), as well as defining the mechanism for calculating the target flaring value taking account of the composition of the APG and the quota allocation for APG volumes for a single company, as measures necessary for the rational use of associated petroleum gas and achieving a 95% rate. According to calculations for the target scenario, the APG flaring problem will not be resolved until 2014, when the required 95% utilization rate is reached.

It is important for government measures using a system of incentives and penalties in conjunction with active control over the activities of mining and exploration companies to be taken. The state, at both federal and regional level, and oil companies need to work together to achieve an effective outcome. Only such a comprehensive approach can lead to greater results in terms of associated petroleum gas use and utilization.

The main areas of government policy necessary for dealing with the problem include:

- classifying APG as a mineral
- introducing a pricing system mutually advantageous for companies and holders of natural monopolies
- developing and implementing requirements, including methodological, on keeping an instrumental record of volumes of resource production, use and flaring, and the procedure for submitting it
- improving access arrangements to APG reprocessing and transportation facilities for oil companies
- developing and implementing state control and monitoring of APG usage processes
- developing incentive mechanisms for investment projects on APG use, including developing infrastructure and applying innovative technologies and equipment
- establishing quantitative indicators for APG use and making a requirement for effective APG use part of all licenses for subsurface use
- using globally practiced approaches, particularly the mechanisms of the Kyoto Protocol, capable of solving problems

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For more than 10 years, Irkutsk Oil Company (IOC) has been a regional leader in hydrocarbon production and infrastructure construction in Eastern Siberia. During its development, the company has kept up with the latest industrial and environmental safety standards.

Given the total lack of infrastructure in Eastern Siberia, production success would have been impossible without using innovative technologies and even approaches unusual for Russia. Thus, to tackle the problem of utilizing dry natural gas and associated gas, the company has introduced a cycling process.

In August 2009, IOC began operating a gas processing plant (GPP) at the Yarakta field, including facilities for injecting the natural gas into the reservoir with a capacity in first-phase commissioning of 0.9 mcm a day. The dry gas treated at the GPP is compressed and routed in the following manner: the bulk is returned to the reservoir, while the remainder is used for the company’s own needs—it is sent to an energy facility with a capacity of 10 MW, which provides power to all the facilities at the field, to boiler and industrial furnaces.

It should be noted that the Yarakta field GPP is, as yet, Russia’s only project involving the industrial use of cycling to increase the proportion of heavy hydrocarbons removed from natural gas and of associated gas utilized. At the same time, cycling solves the environmental problem of reducing atmospheric emissions of greenhouse gases, and is an example for Russian oil and gas companies of the rational use of natural resources, preserving methane underground so that it can be used in the future, as well as the possibility of reducing APG flaring.

In 2010, the Yarakta field produced 93.7 mcm of associated gas, 3.4 mcm of which was used for the company’s own needs. Solving the APG injection problem quickly is a priority for IOC.

Although in general what happens to gas in a reservoir as a result of cycling is known for most geological reservoirs, the uniqueness of Eastern Siberia is that nowhere in the world has experience of injecting gas into a Precambrian reservoir. Companies need more time for studying and technological preparation in order to collect and carefully analyze information.

The work done so far, and the experience gained, make it probable that IOC will start injecting associated gas into the Yarakta field reservoir at the cycling plant as early as 2012. The company’s plans include increasing the volume of gas, including associated gas, injected to 6 mcm a day by 2015. By then, more than 95% of the associated gas produced should be utilized. 30

5.1. Irkutsk Oil Company’s experience of using cycling to tackle the associated gas flaring problem

According to Irkutsk Oil Company data.
31 Amendments have been made to Article 342 of Part Two of the Tax Code//News, June 4, 2011.

32 Gennady Bukhtin: Yugra government confirms list of indicators for assessing oil company impact on the environment, 07/02/2011.

5.2. Khanty–Mansi Autonomous Okrug (KhMAO)

According to Gennady Bukhtin, KhMAO’s Deputy Governor for the Environment, the environmental situation in the okrug is problematic but stable, with significant damage coming from pollution emissions from associated gas flaring. For example, the volume of emissions from associated gas flaring in 2009 was 2.2 million tonnes. In 2010, this figure fell by 100,000 tonnes.

The Russian government’s stated policy of increasing the proportion of APG utilized to 95% is showing definite results. According to Mr. Bukhtin, the KhMAO government has entered into agreements with oil and gas companies, on participation in the region’s socio-economic development over a three-year period, that focus in particular on environmental cooperation, including measures relating to the rational use of associated gas and the installation of mining counters. The companies have agreed to comply with the regulations and restrictions on environmental impact, to make payments for harm to the environment on time, and, in the event of environmental damage, to clean it up and pay compensation in the established manner.

Mr. Bukhtin notes that the KhMAO government has also signed an agreement with Sibur, which plans to increase its amount of associated gas utilized to 1.7 bcm a year over the next three years, from 13.2 bcm in 2011 to 14.9 bcm in 2015.

In 2011, the okrug government, in seeking to determine companies’ operating efficiency introduced eight indicators allowing it to produce a sort of rating of the most responsible mining and exploration companies: the relative frequency of accidents and incidents; the proportion of oil-polluted land in license areas in use; figures for the proportion of mud pits; the level of reprocessing and decontamination of production and consumption waste; atmospheric emission intensity; the intensity of discharges of contaminated waste water into water bodies, and the overall aggregate figure for the unit costs of implementing nature conservation and restoration measures –the total program costs per 1,000 tonnes of oil produced. These indicators make it possible to assess and compare the companies’ actual work on implementation of their environmental programs, whatever the size of the firm.

On October 9, 2010, KhMAO Government Resolution 248-p confirmed the target program “Ensuring the environmental safety of Khanty-Mansi Autonomous Okrug – Yugra in 2011-2013”. The developer and coordinator of this program is the KhMAO Department for the Environment. The program aims to improve the environmental situation in order to ensure environmental safety.

**CYCLING** is a field development technique where reservoir pressure is maintained by injecting into a producing reservoir flammable natural gas previously extracted from it after natural gas liquids / gas condensate have been removed from it, enabling greater condensate recovery from the reservoir and, correspondingly, recovery of 10-35% of the natural gas liquids.

**AMENDMENTS TO THE TAX CODE**

To encourage the use of cycling in producing gas condensate, the State Duma, at a session on May 20, 2011, passed at the third reading government amendments to Article 342 of Part Two of the Russian Tax Code, thus setting a zero mineral extraction tax rate for natural gas production volumes reinjected into a reservoir to maintain pressure.
The program measures “Construction of associated petroleum gas utilization facilities” and “Restoration of oil-polluted land” are being implemented by companies using natural resources through annual and long-term programs at their own expense.

The state contracting authorities for the program are responsible for the implementation of the measures, and for the effective and targeted use of funds.

In total, implementation of the program in 2011-2013 requires 33,978,732,000 RUB, including 1,551,350 from the KhMAO budget. Funding will also come from local budgets, extra-budgetary sources (enterprises that use natural resources, and sponsors), and the Cooperation program.

According to government statistics, there were 53,177 stationary sources of air pollution in 2009. The annual volume of air pollution in KhMAO remains relatively high, and amounts to about 40% of the total volume of emissions in the Urals Federal District.

The main sources of air pollution are the flare stacks of oil production companies (in 2009 alone, roughly 4.9 bcm of associated gas was flared).

It should be noted that in recent years the proportion of gas utilized has increased; this was 86.5% as at January 1, 2010. This is a result of the introduction of gas-powered generating stations and gas turbine plants, as well as completion of the reconstruction of the Yuzhny Balyk gas refinery, the refining capacity of which has increased by 1.5 bcm.

To tackle problems concerning protection of the atmosphere, the target program stipulates measures relating to constructing associated petroleum gas utilization facilities, developing economic incentives and monitoring the increase in the level of associated petroleum gas utilization and the reduction of pollution emissions, producing an inventory of greenhouse gases, and monitoring the atmosphere at major population centers in the okrug.

The expected outcome of implementation of the program (the socio-economic effectiveness figures) is an increase in the associated petroleum gas utilization rate from 86.5% to 95% from 2012.33

5.3. Implementation of government plans for a full-scale reduction in flaring of associated and natural gas in Kazakhstan34

As the owner of mineral resources, the state should play a leading role in resolving the problem of making associated gas use more efficient. One example of sensible policy in this area comes from Kazakhstan.

According to Mr. Brekeshev, Head of the Department for Gas Industry Development of Kazakhstan’s Ministry of Oil and Gas, Kazakhstan’s significant reserves of associated and natural gas, which, according to the most recent estimates amount to 3.7 trillion cubic meters, taking into account the newly explored Caspian Sea fields, give it the opportunity to increase production in the near future. The forecast volumes for gas production by 2015 have significantly increased, and now amount to 59.3 bcm a year.

The development of the new oil and gas condensate fields will mean an increase in the production of associated gas, as a result of which the question of utilization will become more and more relevant. The Kazakh government has made this issue a matter of special attention, and has taken important a number of steps to reduce flaring of associated and natural gas in Kazakhstan. One of these is that various amendments have been made to Kazakh legislation. In particular, the new law On the Subsurface and Subsurface Use now prohibits associated gas flaring (amendments prohibiting the flaring of associated and/or natural gas except in exceptional cases of “emergency and threat to human health and the environment” have been made). To systematically and effectively reduce gas flaring, the government has established a requirement for mining and exploration companies to develop and implement individual associated gas utilization projects, which must set out the economic and technical justifications for various utilization options. To ensure that the programs are assessed thoroughly and efficiently, a special interdepartmental working group has been created by ministerial order to monitor implementation of the programs. This group includes representatives of interested government bodies (the Environment Ministry, Emergencies Ministry, and the Geological Commission of the Ministry of Energy and Natural Resources). The Commission has approved the programs that provide for associated gas utilization in the greatest volume and in the shortest time. In doing so, it took account of the field development conditions, regional interests in matters relating to the provision of gas to homes and industries,


gas production volumes, the environmental situation in the region, and the implementation deadlines. It was decided that for fields put into commercial operation after July 1, 2006, all measures relating to the full utilization of associated and natural gas must be provided for in the field development project documents.

Initially, despite the efforts of the mining and exploration companies, gas flaring continued. This can be put down to such factors as the distance of the deposits from gas processing sites, the lack of the necessary transportation infrastructure, and so on. In this regard, the main gas utilization measures provided for in the programs were:

- maximum use of gas for internal needs (oil preheaters; electricity production) and heating domestic and industrial facilities
- using gas for technological purposes (i.e., injecting it into the reservoir to increase the oil recovery rate)

Initially, many mining and exploration companies found it very hard to achieve full gas utilization by the deadlines set, so, at their request, the deadlines for implementing the measures were extended and annual gas flaring volumes were agreed.

Overall, the following additional facilities were introduced in 2006-2009 under the approved associated gas utilization projects:

- 10 gas processing plants (GPPs)
- capacity expansion at two gas refineries (Tengiz and Zhanazhol)
- 12 gas turbine plants (GTPs) with a total capacity of more than 256 MW
- 8 gas-powered generating stations (GPGS) with a capacity of 1.6 MW
- compressor stations for injecting gas into a reservoir to maintain reservoir pressure and gas pipelines with a total length of approximately 400 km

In total, the mining and exploration companies plan to invest more than 8 billion USD in carrying out gas utilization measures, including creating a new gas infrastructure for using the gas utilized – e.g.:

- 12 gas turbine plants (GTPs) with a capacity of more than 256 MW
- 12 gas processing plants and gas refineries allowing 8 bcm of gas a year to be refined and more than 220,000 tonnes of liquefied gas a year to be produced.

In the period from 2006 through 2010, the gas utilization programs led to flare gas volumes falling from 3.1 bcm to 1.3 bcm – i.e., by 1.8 bcm, while oil production increased from 64.9 million tonnes in 2006 to 79.7 million tonnes in 2010, and gas production increased from 27.0 bcm to 37.4 bcm respectively.

In 2010, the gas output of the republic’s oil and gas companies was 37,413.0 million cubic meters, 3.9% more than in 2009, while, thanks to the gas utilization measures taken, flare gas volumes fell by 21.9% to 1.3 bcm.

There are a number of cases of successful gas utilization project implementation, where mining and exploration companies have achieved a high level of gas utilization, such as AO CNPC-International Aktobe Petroleum, TOO Tengizchevroil, Karachaganak Petroleum Operating B.V., etc.

At the behest of the government, Order 216, of September 1, 2008, issued jointly with Kazakhstan’s Environment Ministry, amended the instructions on issuing permits for flaring associated and natural gas: an interdepartmental commission was authorized to review, approve and extend gas utilization project implementation deadlines.

With regard to the work on increasing associated gas utilization, it is worth mentioning the active cooperation between the Ministry of Oil and Gas and the Global Gas Flaring Reduction (GGFR) Partnership, in such areas as:

- joint discussion of the concept and principles of the new law on gas and gas supply
- preparing a method for calculating associated gas flaring volumes, and making appropriate changes to the law On the Subsurface and Subsurface Use
- analyzing the gas utilization projects of the oil companies operating in the country, and suggesting recommendations on further improving them. Based on the results of this analysis, GGFR consultants prepared a report describing the current situation, and have proposed measures to further improve gas utilization project implementation by the oil companies. One of the recommendations was a proposal for a pilot project on clustering gas utilization processes at oil fields in Kyzylorda Province. The GGFR Partnership will provide active assistance to the ministry in the development and implementation of this pilot project in the near future.
According to satellite data estimates, there has been a clear global downward trend in associated gas flaring in recent years. The reduction in flaring volumes to 13 bcm in 2010 was achieved mainly thanks to a reduction in APG flaring in Russia and Kazakhstan.

Russia remains the world’s leading gas flarer. In a report to a State Council Presidium meeting on the environment in June 2011, Yuri Trutnev noted that around 15.5 bcm of APG a year is flared at Russia’s oil fields, and the utilization rate is 76.3%. By 2012, the utilization rate is expected to be about 83%35. However, there are still only two companies with a 95% utilization rate (Surgutneftegaz and Tatneft, with 95.9% and 94.7% respectively), while the lowest rates are at Gazprom Neft and Rosneft (55.2% and 56.2% respectively). Therefore, unless additional steps are taken, the current situation in Russia will not produce the required 95% utilization rate by 2012.

In recent years, the government has taken various measures to tackle the associated gas flaring problem, including work to improve the regulatory and legal framework, and to develop national procedures for participating in and carrying out the international mechanism of joint implementation projects.

In 2011, the first JI project (relating to associated gas utilization) in Russia was carried out, under which emission reduction units were transferred. Given the effectiveness and importance of JI projects as a financial mechanism, it is important that the stance Russia takes in international negotiations on the second commitment period of the Kyoto Protocol facilitates further additional funding for projects aimed at resource-saving and energy efficiency, including associated gas utilization.

The government needs to introduce more effective measures based on a system of incentives and fines in conjunction with active control over the activities of mining and exploration companies, including: redistributing within each company quotas for flaring volumes above the set limit from certain license areas where implementing APG utilization is not possible to other areas where APG utilization is more economically justified; and introducing a different mineral extraction tax rate and transferring control functions relating to the organization of APG recording to a fiscal agency. Therefore, the actions of all the parties interested, and the trend outlined towards improvement in APG utilization indicators, will help to solve this long-standing and complex problem for the fuel-and-energy industry.

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35 Meeting of the Presidium of the State Council of the Russian Federation on the environment on June 9, 2011, “Measures to ensure environmental safety and reverse accumulated ecological damage.”