

## Trailblazers

*Sakhalin 2 is Russia's first LNG project. Sakhalin Energy chief executive Andrei Galayev outlined its achievements and goals in a recent interview with Argus*

### **How were your LNG sales affected by the Fukushima-Daiichi nuclear disaster in Japan?**

Over 40pc of Japanese power-generating capacity comes from gas-fired plants operating on regasified LNG. As their load increased following the damage to the nuclear power plants, there was a steep rise in gas demand. Demand from Chubu Electric, Japan's third-largest energy company, grew by 30pc. To respond to this, we provided extra LNG cargoes and we are prepared to further increase supplies beyond the contracted quantities.

### **How many extra LNG shipments can Sakhalin Energy supply each month?**

Between January and July, we exported 19 standard 145,000m<sup>3</sup> LNG cargoes to Japan above and beyond the contracted volumes. These included cargoes diverted by our shareholders. We produced an extra 1.16mn m<sup>3</sup> of LNG during this period. This was made possible by our flexible LNG transportation system and the fact that our LNG plant is now producing 10mn t/yr of LNG, more than its nameplate capacity of 9.6mn t/yr, thanks to structural optimisation, debottlenecking and rerating.

### **How much more LNG can you produce?**

It is too early for exact figures because debottlenecking is continuing. I can only say we went into 2011 having exceeded design capacity by almost 5pc, hitting output of 10mn t/yr. In 2010, Sakhalin Energy also exported over 6.1mn t (47mm bl) of Vityaz crude from the Prigorodnoye terminal, up by over 10pc on 2009.

### **How did you achieve this?**

First of all, we applied debottlenecking and rerating at all our facilities. Last year, we drilled and completed two gas production wells at the Lunskeye field and two crude production wells and three water-injection wells in the Piltun area. The water-injection wells enable us to increase crude recovery by maintaining the pressure. So, there are now eight gas wells, one oil rim well and one cuttings reinjection (CRI) well at Lunskeye, and nine oil wells, one CRI well and four water-injection wells at Piltun.

In the Astokh area, where the Molikpaq (PA-A) platform operates, the well stock was unchanged last year at 13 oil wells, four water-injection wells, one gas-reinjection well and one CRI well. Intensive modernisation is being carried out on the platform, which should enable us to drill new wells and boost production efficiency. The overhaul should be complete by December, when Sakhalin Energy plans to start a new Molikpaq drilling programme.

To debottleneck operations at existing wells and improve future Molikpaq wells' layout and trajectories, we

carried out the first 4D offshore seismic in Russia — at the Astokh area — to study the changes that have occurred in the field after 12 years of crude production. The seismic data was processed and issued for interpretation, which is expected to be finished by the end of 2011.

### **What are your drilling plans for 2011?**

This is the first year in which Sakhalin Energy has conducted simultaneous drilling at all three platforms. At the PA-B platform in the Piltun area of the Piltun-Astokhskeye field, we plan to finish drilling an oil production well — the first well that will also be used for follow-up exploration of the undeveloped Piltun 2 block.

We will drill two gas wells and one water-reinjection well at Lunskeye, Sakhalin Energy's gas and condensate field. We build most of our gas production wells using large-diameter casing strings, which helps obtain an impressive production rate of 10mn m<sup>3</sup>/d from each well. We can now maintain a stable production rate for a significantly longer period, saving on costs and well slots at the platform. As I mentioned, Astokh is completing an upgrade to its drilling module, after which drilling will resume.

### **Where will you drill? And why do you need new wells?**

We will drill at all three platforms. Wells set out in the project documentation are being drilled in all areas. There will be no extra drilling beyond the approved plan. Most new wells are production wells, but we are also drilling other types. Even though the existing stock of gas wells effectively supports the design capacity of the LNG plant, two new gas production wells will be drilled to maintain stable production and create a reserve for gas supplies. A water-reinjection well is required to operate the oil rim wells that are expected to produce a lot of water.

As I said, we are going to drill our first production well at Piltun's undeveloped block 2. A pilot hole will also be drilled through the same well to locate the gas-oil contact. Based on the results of this, we will decide how to place and operate the subsequent wells.

We plan to drill the first sidetrack from a watered well at Astokh by the end of this year. Astokh has been producing for 12 years, so the water front came very close to some wells in the down-dip part of the field, causing high sand production. Sidetracking from wells into the high-saturation oil zones is expected to boost oil recovery. In the future, similar work will be done in other wells.

### **What kind of challenges did you face at Lunskeye? Can you give any more details about production rates?**

Lunskeye gas is produced from the largest-diameter wells ever drilled in Russia. Two new gas production wells were

completed in 2010, which brought the total number of wells to seven. Each Lun-A gas production well now produces 10mn m<sup>3</sup>/d, which means each Lun-A well can feed a fully operational 2GW power plant.

As well as all the usual problems — highly abrasive sand in the lower reservoir sections, long intervals drilled with underreamers, the non-standard size of the drill assembly equipment — the Lunskoye drillers face many other difficulties, including the oil rim development. When we started developing Lunskoye, Russia had no experience of drilling wells into an oil rim. And even though the drillers had access to all of the available data on the oil rim, it did not make their task any easier because they wanted proof that the oil rim location and thickness had not changed and, most importantly, that developing the oil rim was still economically viable. It took a sophisticated geosteering equipment package just to locate the oil rim when drilling the pilot well, which penetrated the oil rim and defined its thickness.

We also managed to measure pore pressure for the first time using a StethoScope equipment package (43 points — a record for Russia). For detailed measurements of reservoir properties, we tried lowering a logging tool into the well, but the equipment got stuck and the operation failed.

Our drilling technologies deserve a special mention — it is the first time some have been used in Russia. For example, when drilling a 2km well section, we used a special type of underreamer to allow efficient well flushing with a large amount of mud. To drill into a section of the gas reservoir, our engineers developed a special type of salt water-based cement slurry. Also, for the first time in the project, we used a new directional drilling technology — Point the Bit, or Rotary Steerable System (RSS) — which has shown itself to good advantage.

#### **Is expanding Sakhalin 2 possible under the framework of the existing production-sharing agreement (PSA)?**

It depends what you mean by “expansion”. Sakhalin 2’s PSA covers full-field development of Piltun-Astokhs koye and Lunskoye. So work that is part of their full-field development has to be carried out under the Sakhalin 2 PSA.

#### **Can Sakhalin 2 share its infrastructure with the Sakhalin 3 partners?**

Infrastructure sharing by Sakhalin’s offshore project operators has always been on the agenda. We share infrastructure with Sakhalin 1, such as Nogliki airport and charter flights. And oil and gas operators have agreed to share oil spill response resources, if necessary. As for sharing Sakhalin 2 infrastructure, we examine this when we sign individual deals, although the particulars of such commercial information are confidential.

#### **How much Sakhalin 2 gas will be sold in Russia?**

It is inaccurate to say Sakhalin 2 plans to sell its gas on the domestic market. Our gas supplies are planned in compliance with the PSA, which requires Sakhalin Energy to allo-

cate the Russian state’s share of production and any additional revenues and royalties in the form of gas. So Sakhalin Energy does not sell its gas, but allocates it without charging to an organisation, Gazprom in this case, that is responsible for receiving the Russian state’s share and delivering it to customers. The government appoints this organisation. We are talking here about some 19bn m<sup>3</sup> to be supplied until 2020. About a third of this will be supplied to southern Sakhalin and the rest to Gazprom’s Sakhalin-Khabarovsk-Vladivostok pipeline.

#### **Will supplies be year-round or seasonal?**

Year-round, although we expect demand to be distinctly seasonal, because gas consumption in winter is normally much higher than in summer.

#### **For how long do you plan to supply gas to the domestic market?**

According to the PSA, Sakhalin Energy will allocate gas to the Russian state throughout the project’s lifetime.

#### **For how long do you expect to maintain current levels of gas, oil and condensate production?**

The easiest answer would be with respect to gas production at Lunskoye. We started developing Lunskoye in 2009. Two-and-a-half years of drilling and operation resulted in an effective re-estimation of reserves, the proving of gas reserves and productivity and the gaining of valuable experience in large-diameter well drilling. Today it is safe to say that for the next 15-20 years we will be able to maintain stable and reliable gas output to support our LNG plant. By then, further Piltun-Astokhs koye reserves will be on stream, extending sustainable production for years.

As for oil, different methods need to be applied at each development stage to secure stable production. It is vital to re-estimate reserves at the development drilling stage, to manage the movement of water into the formation at the peak production stage and to locate any undeveloped oil deposits and drill new wells at the project closing stage. Sakhalin Energy has been quite successful in performing all those tasks, applying individual technologies to different areas. For example, to maintain Astokh oil output, we plan to use sidetracking and in-fill drilling.

Two-and-a-half years of developing Piltun showed the reservoir properties to be very different from those we encountered during the early gas breakthroughs. Applying smart well technology to up to six intervals of the producing wells will help to mitigate early breakthroughs and effectively recover reserves from each formation. Drilling smart water-injection wells should result in effective management of water-injection volumes and distribution across the layers.

The South Piltun development is expected to provide an effective reserve to support oil and gas output. Today, based on Astokh and Piltun data, we are studying data to update oil and gas reserves and consider various options for the South Piltun development.