PLATTS GUIDE TO NORD STREAM 1 AND 2 GAS PIPELINE PROJECTS

NATURAL GAS SPECIAL REPORT
SEPTEMBER 2016
Siobhan Hall, Senior Editor
Stuart Elliott, Senior Writer

www.platts.com/natural-gas
NORD STREAM 2 FACES NEW ENERGY WORLD ORDER

- Shareholders buckle under opposition
- Lower prices, demand compared with Nord Stream 1
- EU’s relations with Russia have worsened

Gazprom’s plan to build the Nord Stream 2 gas pipeline was intended to be a mirror image of the first Nord Stream pipeline.

While the technical specifications remain the same, the decision on August 12 by the five European partners in the Nord Stream 2 project to withdraw from the consortium has significantly changed its profile.

The move was triggered after Poland’s anti-competition authority objected to the creation of the JV, saying it could have a business impact on the companies’ operations in Poland.

All five partners — Germany’s Wintershall and Uniper, France’s Engie, Austria’s OMV and Shell — are now looking at other ways they can contribute to the project.

Nord Stream 2 is a twin in every technical aspect to the Nord Stream 1 pipeline that came online in 2011, and is proving just as controversial, but the similarities stop there, analysis by Platts shows.

The 55 Bcm/year Nord Stream 2 gas pipeline would double capacity from Russia to Germany across the Baltic Sea, but faces poorer market and regulatory conditions than its Nord Stream 1 twin.

The Polish opposition that ultimately led to the end of the JV as it was intended is evidence of that.

Low oil and gas prices, LNG oversupply, and long-term climate policies intended to shift the EU’s energy system from fossil fuels to low carbon alternatives such as renewables, are new determining factors.

Political relations between Russia and both the EU and Ukraine, the main rival export route to the Nord Stream pipelines, are also far worse.

In the market, gas prices are down across the globe.

THE TECHNICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Details</th>
<th>Nord Stream 1 &amp; 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>55 Bcm/year</td>
</tr>
<tr>
<td>Number of lines</td>
<td>2 x 27.5 Bcm</td>
</tr>
<tr>
<td>Length</td>
<td>c1,200 km</td>
</tr>
<tr>
<td>Cost</td>
<td>Eur8 billion</td>
</tr>
<tr>
<td>Route</td>
<td>Russia to Germany via Baltic Sea</td>
</tr>
<tr>
<td>German landing point</td>
<td>Near Greifswald</td>
</tr>
<tr>
<td>Project company status</td>
<td>Registered in Switzerland under Swiss law</td>
</tr>
<tr>
<td>Project financing split</td>
<td>30% shareholders, 70% loans*</td>
</tr>
</tbody>
</table>

*Prior to August 12 announcement

Source: Nord Stream, Platts

THE TIMINGS AND SHAREHOLDERS

<table>
<thead>
<tr>
<th>Details</th>
<th>Nord Stream 1</th>
<th>Nord Stream 2</th>
</tr>
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<tbody>
<tr>
<td>Shareholder agreement signed</td>
<td>December 2005</td>
<td>September 2015</td>
</tr>
<tr>
<td>Work on laying first line starts</td>
<td>2010</td>
<td>2018 (tbc)</td>
</tr>
<tr>
<td>First line operational</td>
<td>2011</td>
<td>end-2019 (tbc)</td>
</tr>
<tr>
<td>Final shareholders</td>
<td>Gazprom (51%), BASF/Wintershall, E.ON (each 15.5%), Gasunie (joined 2008), GDF Suez (now Engie - joined 2010) - each 9%</td>
<td>Gazprom (50%), BASF, Uniper, Shell, Engie, OMV (each 10%)*</td>
</tr>
<tr>
<td>Final shareholders’ home countries</td>
<td>Russia, Germany, The Netherlands, France</td>
<td>Russia, Germany, The Netherlands/UK, France, Austria*</td>
</tr>
</tbody>
</table>

Source: Nord Stream, Platts

EUROPEAN 2030 GAS DEMAND FORECASTS, 2005 VS 2015

![Diagram showing gas demand forecasts for Europe 2030]

Source: IEA World Energy Outlook 2005 and 2015

For example, month-ahead gas prices at continental Europe’s most liquid hub, the TTF, averaged $6.40/MMBtu in 2015, as assessed by Platts.

This is down a third from an average $9.50/MMBtu in 2011, when Nord Stream 1 came online.

Average Asian and US Henry Hub month ahead prices have also fallen by similar amounts in the last five years.

Russia’s gas production costs are, however, very low, and Gazprom has shown willingness to reduce long-term contract prices for key customers, such as it did this year for France’s Engie and Germany’s Uniper.

Engie and E.ON are shareholders in Nord Stream 1 and had been part of the provisional Nord Stream 2 consortium.

Demand forecasts down

European gas demand forecasts are also lower. The International Energy Agency’s 2030 gas demand forecast for...
OECD Europe was 526 Bcm in 2015, down about a third from the 788 Bcm it forecast for 2030 in 2005.

2005 was the year Russia’s Gazprom and Germany’s BASF/Wintershall and E.ON first agreed to build the 55 Bcm/year Nord Stream 1 pipeline.

In 2005 the IEA estimated OECD Europe would need 498 Bcm of imports by 2030. In 2015 it lowered this estimate to 325 Bcm, again down by about a third.

Gazprom, however, says its focus is on the extra imports needed to replace falling gas output from the EU and Norway, on top of existing imports such as through Nord Stream 1.

This could be as much as 144 Bcm by 2035, based on a 2015 forecast by consultancy IHS cited by Nord Stream 2 on its website.

IHS Energy forecast EU demand rising to around 500 Bcm by 2035, from an average of 462 Bcm/year from 2010 to 2014, while average EU and Norwegian production falls by around 106 Bcm.

This is not far off the IEA’s 2015 forecast for OECD Europe, which covers 21 EU countries, plus Iceland, Norway, Switzerland and Turkey.

Both are higher, however, than the European Commission’s latest 2030 EU gas demand estimate of 380 Bcm to 450 Bcm.

The EC’s estimate is based on the EU achieving its 2030 targets to increase renewables’ share of final EU energy demand to at least 27%, and to improve energy savings by at least 27% against business as usual.

These targets are linked to the EU’s goal to cut its greenhouse gas emissions by at least 40% on 1990 levels by 2030, and at least 80% by 2050.

This means that without viable carbon capture and storage technology, and if the EU follows through on its goals, there will be increasing political pressure to reduce fossil fuel use – even lower carbon ones such as gas.

If EU demand fell to 380 Bcm by 2030, as in the lower end of the EC forecast, and stayed there, the need for extra imports in the IHS Energy scenario would be just 24 Bcm in 2035, all other things being equal.

Nord Stream 2 is planned online by end-2019, so there is a potentially limited window to earn money just from replacing falling production.

**Re-routing Russian exports**

One of the key impacts of Nord Stream 1 has been to reduce Russian export flows through Ukraine to the EU from up to 80% in 2009 to around 50% or less in 2015.

Russia only flowed 64 Bcm through Ukraine in 2015, less than half the 140 Bcm/year technical capacity (see map on page 4).
**Nord Stream 1 & 2 Major Milestones**

- **December 2005**: Shareholders agree on NS1 project
- **June 2006**: EC approves Opal’s exemption
- **February 2007**: German regulator gives Opal limited exemption from EU rules***
- **January 2008**: Russian gas flows to EU via Ukraine disrupted
- **February 2009**: Esso consultation starts**
- **November 2009**: Permitting process starts**
- **October 2010**: First line operational (NS1)
- **April 2011**: Work to lay first line starts
- **November 2011**: Second line operational (NS1)
- **February 2012**: Work on Espoo consultation starts
- **October 2012**: Third line operational (NS1)
- **January 2013**: Work to lay third line starts
- **May 2013**: Work on feasibility of third and fourth lines (NS2) starts
- **September 2013**: New shareholders agree on NS2 project
- **October 2013**: Pipelines of NS1 and NS2 project start construction
- **May 2014**: Work to lay second line starts
- **End-2014**: Target to complete NS2 permitting, including Espoo, environmental reports
- **May 2015**: Work to lay second line finishes
- **End-2015**: NS2 planned online
- **October 2016**: Work to lay NS2 lines to start (fbc)
- **September 2017**: Pipelines of NS2 project start construction
- **August 2017**: European shareholders pull out of JV leaving Gazprom as sole shareholder
- **End-2017**: Target to complete NS2 permitting, including Espoo, environmental reports

*With all nine Baltic countries: Denmark, Estonia, Finland, Germany, Latvia, Lithuania, Poland, Russia, Sweden
**With five host countries: Denmark, Finland, Germany, Russia, Sweden
*** Opal carries NS1 gas across Germany to Czech Republic
Source: Nord Stream, Platts
All its other export pipelines flowed at nearly full capacity, except Nord Stream 1, which flowed 39 Bcm or around 70% of its 55 Bcm/year technical capacity.

Nord Stream 1 gained strong political and regulatory support from the EC and German federal energy regulator BNA for helping to diversify the EU's import routes.

This strong support came after unexpected disruptions to Russian gas supplies to the EU via Ukraine, in 2006 and 2009.

The EC has said that Nord Stream 2, however, which is set to lie alongside Nord Stream 1, does not help diversify the EU's gas import routes and so should not receive any special political or financial support.

There have also been no disruptions of Russian gas to the EU via Ukraine since early 2009, and the EU has been actively involved in helping Ukraine negotiate with Russia on supply issues to ensure stable transit. The EU also upgraded its gas supply security rules in 2010, and proposed further upgrades in February.

**Transit contracts**

Nord Stream 2 is still planned online at the end of 2019, which is also when Russia's gas transit contract with Ukraine expires.

The current transit contract was signed in 2009, when the Nord Stream 1 project was already quite advanced – pipe-laying work started the next year.

Permitting for Nord Stream 1 took just over three years, but the Nord Stream 2 consortium are clearly hoping that doing it all a second time will be quicker.

It is aiming to complete all permitting, including an Espoo international consultation on environmental issues, by the end of 2017, and start laying the pipe in 2018 (see timeline on page 4).

The build timetable is similar to the Nord Stream 1, with first gas expected within two years of starting to lay the pipe.

Ukraine's gas company Naftogaz wants to start talks with Gazprom on a post-2019 transit contract, preferably with the EU involved this time, its CEO Andriy Kobolyev said in April.

Gazprom, however, is not interested, he said. Both sides are waiting for a ruling on the disputed 2009 contract from Stockholm's arbitration court, expected by the end of this year, or start of 2017.

Kobolyev said he doubted that Gazprom would be able to bring Nord Stream 2 online by end-2019, and so it would have to negotiate a new transit contract with Ukraine.