Gas Market Outlook
A New Pipeline for Europe’s Energy Future
A Key Fuel in Europe’s Energy Mix

Clean-burning, low-emission gas is a vital component in an economically sensible decarbonisation pathway for the EU. Nord Stream 2 will provide access to the quickest and most cost-effective way to reduce emissions – additional natural gas to replace coal.

Natural gas is the least emissions-intensive fossil fuel and can help achieve climate goals if it is used in power generation. It also ensures a reliable power supply as renewables are gradually integrated.

Thanks in part to growing appreciation for natural gas as a clean-burning fuel for power generation, it currently has the second-largest share in the EU’s energy mix – after oil, but clearly before coal, nuclear energy and renewables. The increase in renewable production in past years has mainly resulted in, and made up for, a reduction in the use of coal. Gas is the fossil fuel with the lowest greenhouse gas and particulate emissions. While it can replace other fossil fuels in burner, internal combustion and turbine processes, including those being used for power generation, renewables are predominantly being used for power generation so far.

As long as full integration of renewables has not been achieved (and issues such as the electricity storage issue remain open), renewables will need conventional power plants, fired for example by natural gas, to ensure reliable power supply and grid stability.

Natural gas offers a cost-effective and sustainable way to achieve emissions reduction targets. Depending on the technology used, gas-fired power plants produce about 50 percent less CO₂ than coal-fired power plants. Thanks to its versatility, natural gas is also used in heating and increasingly, road and marine transport.
Nord Stream 2 will bring liquidity to the EU’s already well-interconnected gas market, further improving integration and supporting the bloc’s energy policy goals. The internal gas market has been designed to facilitate the three main objectives of EU energy policies: security of supply, a competitive environment with affordable prices and sustainability of energy consumption.

The North West European region, where the majority of gas is consumed, is already well-interlinked. The successful efforts of the EU to foster the integration of the internal gas market are reflected in the growing degree of interconnector capacity in the market. This has led to a significantly improved energy security in 22 of 28 Member States, with more infrastructure connections being fostered and financially supported by the European Commission.

As markets evolve, price differences recede and competitive gas is available in more European markets. Between 2009 and 2015, the total capacity of EU interconnectors increased by 27 percent from 774 to 984 bcm per year. As a result, the high level of market integration translates into narrow gas hub price differences for the aforementioned EU core markets. Gas hub prices in most countries of the EU core market are now closely aligned with Europe’s most liquid market, the Dutch TTF Hub.

New infrastructure has been deployed to provide Eastern European countries with increased access to Western European gas hubs that offer more liquidity. The well-supplied, integrated European market pool also supplies non-EU countries like Switzerland and Ukraine, which can buy gas from the EU via West-to-East gas flows. Nord Stream 2 was designed to work in this market and will further improve the supply situation.

Towards a Competitive and Integrated Gas Market

The European gas sector and the EU have made significant improvements to complete its infrastructure — closing bottlenecks and offering new supply options. The result is more liberalised, evolved markets where suppliers can compete on a level playing field to the benefit of consumers.
Nord Stream 2 – Gas Market Outlook

Nord Stream 2 will supply part of the gas volumes that will continue to be needed in the EU, where demand is projected to remain at or around current levels for the next two decades.

There are many future projections for gas demand, depending on the underlying assumptions and targets to be met. These projections often hinge upon how quickly and how economically sensible renewable technologies and power storage solutions can be scaled up. Even in the most optimistic target scenarios, which match their projection to meet a pre-defined outcome, gas demand is projected to remain around current levels until the mid-2030s because it is the fuel-of-choice in bolstering an increase in renewables and the phase-out of coal.

Europe's future energy demand needs to be covered even if some form of all-electric energy system does not materialise as quickly as some forecasts project, or political plans for energy efficiency do not lead to lower gas consumption. As gas infrastructure developers, we aim to ensure that our pipeline can contribute to meeting this demand. A robust and modern gas supply infrastructure is needed.

While natural gas used in primary energy consumption is projected to decline by 11 percent, natural gas consumed in transformation is projected to increase by 17 percent, such that the EU's total demand remains mostly stable. The well-connected EU gas market supplies member states as well as Ukraine and Switzerland.

The latter does not have any domestic gas extraction and therefore supplies its entire gas demand via EU territory. In 2013 Ukraine started to cover an increasing part of its demand from EU countries using pipelines from Slovakia, Poland and Hungary. By 2015, all Ukrainian gas imports were bought from Western suppliers at hubs in the EU and supplied from the West – around 10 bcm in 2015. In the future, Ukraine is projected to receive as much as 16 bcm from the EU market. Ukraine’s supply from the West increases thus has to be factored into the European demand pool.

Meeting Gas Demand

Europe's gas demand is projected to remain mostly stable in the next 20 years. Even in more optimistic energy projections it remains the backbone of Europe's energy supply. Nord Stream 2, with its reliable, state-of-the-art technology, will offer safe, affordable and environmentally sound natural gas supplies to help fill this demand.

Gas demand is projected to remain stable in the coming decades.

1 Scenarios depicted here represent relevant projections, but are not exhaustive.
2 Transformation includes power plants, heat plants and CHP (combined heat and power) plants.
While gas demand is projected to remain largely stable for the next two decades, domestic production in the EU will drop dramatically over the same period. Nord Stream 2 will supply gas to compensate for part of the supply.

The EU’s domestic gas production levels are expected to halve over the next 20 years.
Norway and Northern Africa will not be able to maintain current supply levels, and LNG will shift to the higher-paying Asian markets.

Norway and Northern Africa will not be able to fully compensate for the EU’s supply shortfall.

As of 2015, Norway had natural gas reserves of 1.8 tcm and produced about 121 bcm of natural gas, which was almost completely exported. However, production from developed fields will decline significantly after 2020 and needs to be replaced with production from non-developed or undiscovered fields. Thus, despite large natural gas reserves, the sustainability of current production levels there is questionable even in the medium term until 2030.

Northern African exporters Libya and Algeria are not projected to sustainably increase their production. Both countries are expected to export smaller amounts of natural gas to the EU internal gas market. Algeria faces increasing domestic demand and even if constant domestic production is assumed, volumes of natural gas available for exports are decreasing by 23 percent between 2015 and 2020. In absolute terms, this means a decrease from 30 bcm to 24 bcm.

The LNG market is cyclical. It varies between a buyers’ market (supply is higher than demand and prices are low) as is expected until the early 2020s, and a sellers’ market (demand is larger than supply and prices are high), which is expected thereafter. Due to low global LNG prices, there have been no recent investments for liquefaction plants. Once global demand, especially in Asia, picks up, it will outpace the build-up of new facilities and absorb available LNG in the market. While it is theoretically possible to outcompete Asian LNG buyers to fill a supply gap in a tight market, Europe cannot rely on winning that competition and would have to pay a premium that would drive up the import bill. Sufficient import pipeline capacity can mitigate this risk.
### Securing European gas supply in competition with global markets

#### Natural gas demand in other regions [bcm]

*Source: IEA (2016)*

<table>
<thead>
<tr>
<th>Region</th>
<th>2020</th>
<th>2030</th>
<th>2040</th>
</tr>
</thead>
<tbody>
<tr>
<td>North America</td>
<td>461</td>
<td>595</td>
<td>711</td>
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<tr>
<td>Middle East</td>
<td>411</td>
<td>550</td>
<td>683</td>
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<tr>
<td>Africa</td>
<td>1,433</td>
<td>1,748</td>
<td>2,112</td>
</tr>
<tr>
<td>Middle East</td>
<td>1,136</td>
<td>1,543</td>
<td>1,912</td>
</tr>
<tr>
<td>South America</td>
<td>3,395</td>
<td>4,588</td>
<td>5,724</td>
</tr>
</tbody>
</table>

#### Russia has the world’s largest gas reserves

Natural gas reserves 2015 [bcm]

*Source: EGR Energastudie 2015*

<table>
<thead>
<tr>
<th>Region</th>
<th>Total Reserves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia</td>
<td>47,768</td>
</tr>
<tr>
<td>Middle East</td>
<td>45,225</td>
</tr>
<tr>
<td>Iran</td>
<td>33,500</td>
</tr>
<tr>
<td>Far East</td>
<td>16,277</td>
</tr>
<tr>
<td>Asia (ex. Russia)</td>
<td>15,545</td>
</tr>
<tr>
<td>Africa</td>
<td>14,365</td>
</tr>
<tr>
<td>North America</td>
<td>12,792</td>
</tr>
<tr>
<td>Europe</td>
<td>3,395</td>
</tr>
</tbody>
</table>

Total reserves: 197,841

### Competing with Global Markets

With global demand rising by over 25 percent (more than 1,000 bcm) in the coming two decades and its own gas resources depleting, the EU will have to secure gas resources in the long term to ensure global industrial competitiveness. Starting from the mid-2020s, the global gas market will undergo significant shifts as LNG capacities are absorbed by Asian markets.

Europe benefits from its strategically important proximity to vast gas reserves readily available in Northern Russia – pipeline-connected fields which are not subject to resource competition with other regions.

The International Energy Agency (IEA) predicts that over the next decades, natural gas will take on an increasingly important role in global energy due to growing demand in power, industrial use, buildings and transport. Developing countries will see particularly rapid growth as their energy needs rise. Aside from developing domestic resources, additional requirements will be met by rising imports. Over the next 20 years, China will become the fastest-growing gas market with an additional demand of 420 bcm, placing it behind only the United States and the Middle East in terms of overall consumption. Markets in India, Africa and Latin America are also on a rapid expansion course.

Industry, in particular, will account for the bulk of this growth with an additional 625 bcm, or nearly 40 percent of the global gas demand increase. The power sector will make up 34 percent of the projected growth despite facing competition from coal, especially in Asian markets. The transport sector will also see significantly higher demand, growing by 160 bcm up to 280 bcm by 2040.

The increase in demand means that gas trade between regions is also set to increase by 70 percent by 2040, which amounts to a volume of about 460 bcm. In parallel, Asian import demand will also increase significantly. With few pipeline connections to Asia finding financial and political support, the region’s markets will largely rely on LNG imports both from existing suppliers and from growing sources like Australia. Exporters will thus look to the highest-paying markets, further gearing the trade flows towards the Asia-Pacific region.
Additional Imports Are Needed

The European gas market supplies its 28 Member States as well as neighbouring countries. But because production in the EU and some pipeline suppliers such as Norway and Algeria is decreasing, new imports are needed. Only the global LNG market and Russia have sufficient developed resources to close the supply gap.

As domestic production decreases, more imports are needed

Evolution of gas import demand [bcm]

As exporters to the EU are constricted, the growing import gap must be covered

European gas balance [bcm]

Both pipeline gas from Russia and LNG will play a role in closing Europe’s future supply gap – the share will ultimately be set by the market.

As an efficient, reliable, modern offshore transportation system, Nord Stream 2 will offer a competitive option for bringing natural gas to major demand centres within the EU gas market.

Nord Stream 2 can ensure the security of supply in the early 2020s, when considerable, supply and demand risks are projected. The most critical risk factors are uncertainties of the long-term technical feasibility and commercial viability of transit through Ukraine and low LNG supply due to a tightening global market.

Additionally, higher demand or supply-side risks, such as a complete stop of production from the Groningen field in the Netherlands or a halt of exports from North Africa, could endanger the EU’s security of gas supply.

Once it starts operation in 2020, the state-of-the-art Nord Stream 2 transport system will help cover the European market’s projected import gap, while making the EU’s gas supply more robust, economically beneficial and sustainable. The privately funded 8 billion-euro infrastructure project will enhance the ability of the EU to acquire gas, a clean and low carbon fuel necessary to meet its ambitious environmental and decarbonisation objectives.
With modern gas heating, especially in combination with renewable systems, home heating emissions can be cut by 55 percent.

As a replacement for coal, gas from Nord Stream 2 could save about 160 million tonnes of CO2 – or 14 percent of total EU emissions from power generation.

In combination with power from renewables, natural gas has a number of advantages over other fossil fuels, making it the first choice as an additional energy source in an enhanced low-carbon energy strategy. In the EU, gas is expanding its share in the power generation mix and is projected to overtake coal in about 10 years.

In the next 10 years, gas is projected to overtake coal in the EU’s power generation mix.

Natural gas will be a strong partner to the growth of renewable power generation – allowing an economically sensible phase-out of coal and a fallback option in case the further development of nuclear power in Europe does not play out. A combination of renewables and natural gas will provide for a 50 percent reduction in emission.

Cutting residential heating emissions in half

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Supporting the transition to renewable power

Total electricity generation [TWh]

Source: Based on IEA World Energy Outlook, New Policies Scenario (2016)

Total power generation: 3,155 TWh

2014

- coal
- natural gas
- hydro + renewables
- nuclear

+ 53 %
+ 83 %

2035

- coal
- natural gas
- hydro + renewables
- nuclear

Total power generation: 3,416 TWh

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In the next 10 years, gas is projected to overtake coal in the EU’s power generation mix.

Natural Gas and Renewables:
Strong Partners for the Future

Gas-fired generation will play an important role in supporting renewable energy. Natural gas offers versatile applications. In power generation, it emits 50 percent less CO2 when compared to coal. As part of an economically sound reinforcement of Europe’s gas market, Nord Stream 2 will enable this climate-friendly energy transition under sensible economic conditions.

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Natural gas creates significantly lower specific CO2 emissions in power generation compared to all other fossil fuels. In the UK, for instance, emissions from power generation decreased by 29 percent despite an 11 percent increase in energy consumption between 1990 and 2013 – a result attributed to the fuel switch from coal to gas.

Another positive aspect of natural gas is the already existing infrastructure for transport and storage within the EU, which facilitates the security of energy supply at relatively low costs.

The gas infrastructure could even be used as back-up transmission and storage technology in case the expansion of power grids lags further behind – power storage, in particular, still requires substantial technological progress. Natural gas will also have to play an important role in power generation to replace phased-out nuclear power plants and coal or lignite plants in the transition to renewable energy.

Cutting residential heating emissions in half

CO2 emissions of home heating technologies [kgCO2/a]

Source: Eurogas, based on Uniper data

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The Best Option for Europe’s Gas Supply

Nord Stream 2, based on proven, safe and sustainable technology, needs less energy than other existing options. Taking a short route via the Baltic Sea, the transport system will be the most competitive option for the region.

Compared to the central corridor, Nord Stream 2 will transport gas at 20 percent lower tariffs – and 61 percent lower emissions.

Much like the existing Nord Stream Pipeline, the Nord Stream 2 corridor is substantially shorter than the Central corridor – thus requiring fewer compressor stations along its route. Greenhouse gas (GHG) emissions are 61 percent lower than those of the central corridor pipeline routes used to transport Russian gas to Europe.

Nord Stream 2’s GHG footprint will be more than two times lower than that of major LNG exporters. The liquefaction and shipping of LNG creates about one-third more emissions than piped gas. By comparison, the Nord Stream 2 Pipeline is fed by an efficient, new onshore system and will need only one compressor station to propel the gas across the Baltic Sea.

Modern pipeline systems in the Northern corridor allow for significantly higher pressures require less fuel gas. The more efficient system leads to lower transport costs for the shipper – gas transit rates via Nord Stream 2 will be 20 percent lower than current tariffs via Ukraine.

Higher efficiency, lower emissions than LNG alternatives

Carbon footprint of natural gas imports to Central Europe [gCO₂ eq./MJ]

Source: Thinkstep (2017)
Together with other suppliers and transport options, such as LNG, gas from Nord Stream 2 will ensure a competitive supply. Russia’s gas production costs remain the lowest in the world, making it an ideal source for supplying the European market.

A lack of pipeline capacities for competitive supplies from Russia would increasingly subject Europe to a reliance on the global LNG market, which is characterised by its focus on higher Asian prices. Should Europe have to outcompete Asia to get additional gas during a cold spell or to compensate for supply shortfalls, the premium Asian buyers pay on their LNG imports would increase Europe’s import bill.

The result would be a risk of higher gas prices – and a risk to European competitiveness across industries such as steel, bricks and tiles, or refineries, chemicals or fertilizers. Depending on the sector, natural gas prices can have a weight of almost 20 percent on total production costs. Additional capacities built to connect import infrastructure with ever more markets in Europe allow for more flexibility and competitiveness. EU households and industries will benefit from the new infrastructure.

Moreover, Nord Stream 2 will constitute a multi-billion dollar investment in European industry and service, benefiting over 200 companies from 17 countries. By early 2017, the project had awarded tenders for the production of steel, engineering services, construction vessels for pipe-laying, logistics operations, concrete weight-coating and extensive environmental surveys.
Nord Stream 2 – Gas Market Outlook

The pipeline will be approximately 1,200 km long, and will run from the Russian coast through the Baltic Sea, reaching landfall in Germany.

The pipelines will have a constant internal diameter of 1,153 millimetres (48 inches) and a wall thickness of up to 41 millimetres.

About 120 bcm of additional imports need to be secured for the EU in the next two decades, owing to decreasing production and lower output from other exporters to Europe.

Utilisation of the existing Nord Stream pipeline has increased every year since it opened in 2011, reaching 80 percent capacity in 2016.

Generating electricity from natural gas produces up to 50 percent less CO₂ than from coal.

Each pipe joint will be 12 metres long and weigh 24 tonnes with concrete coating.

Russian natural gas makes up about 6 percent of the EU’s total energy consumption.

More than 40,000 line kilometres were sailed by research vessels to conduct surveys and underwater investigations to determine a safe and environmentally friendly route.

200,000 coated steel pipes laid on the seabed. Each pipeline is carefully tested for safety and quality.

Nord Stream 2 will require around 200,000 coated steel pipes laid on the seabed. Each pipeline is carefully tested for safety and quality.

Basic project profile

Nord Stream 2 is a new pipeline through the Baltic Sea planned to deliver natural gas from vast reserves in Russia directly to the European Union (EU) gas market. The pipeline system will contribute to the EU’s security of supply by filling the growing gas import gap.

The twin 1,200-kilometre Nord Stream 2 subsea pipelines will have the capacity to supply about 55 billion cubic metres of gas per year in an economic, environmentally safe and reliable way.

Nord Stream 2 transports gas supplied via the new northern gas corridor in Russia from the fields on the Yamal peninsula, in particular the supegiant field of Bovanenkovo. The production capacity of the Yamal peninsula fields are in the build-up phase, while producing fields from the previously developed Urengoy area that feed into the central gas corridor have reached or passed their plateau production.

The northern corridor and Nord Stream 2 are efficient, modern state-of-the-art systems, with an operating pressure of 120 bar onshore and an inlet pressure of 220 bar to the offshore system.

The privately funded 8 billion-euro infrastructure project will enhance the ability of the EU to acquire gas, a clean and low carbon fuel necessary to meet its ambitious environmental and decarbonisation objectives.

Russia has some 47,800 bcm of natural gas reserves – the largest natural gas reserves in the world.

9 Baltic Sea region countries are involved in consultations about the pipeline. It will run through the exclusive economic zones or territorial waters of five countries – Russia, Finland, Sweden, Denmark and Germany.

Nord Stream 2 will have capacity to transport 55 bcm of natural gas per year, enough to supply some 26 million European households.

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Abbreviations

bpcm = billion cubic metres
CAPEX = capital expenditure
CO2 = carbon dioxide
CO2 eq. = carbon dioxide equivalent
EEZ = Exclusive Economic Zone
kt = thousand tonnes
kWh = kilowatt-hour
LNG = liquefied natural gas
Mt = million tonnes
MWh = megawatt-hour
t = tonne
tcm = trillion cubic metres
TTF = Title Transfer Facility (virtual trading point in the Netherlands)

Sources


