

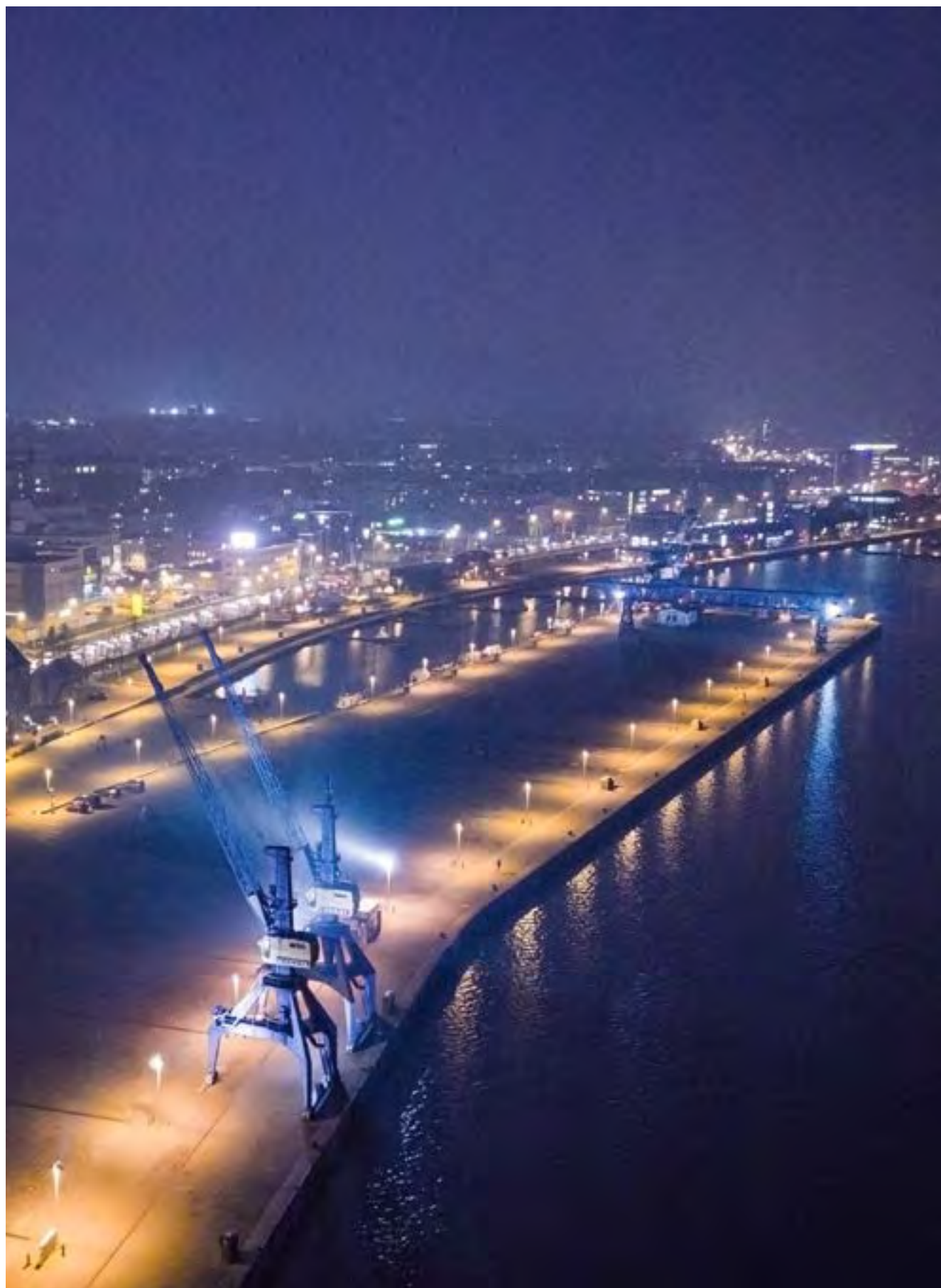


Nord Stream 2

Committed. Reliable. Safe.

ENERGY FOR EUROPE'S FUTURE





A NEW BALTIC SEA PIPELINE

Nord Stream 2 plans to build a new pipeline through the Baltic Sea that will transport natural gas from the world's largest gas reserves in Russia to homes and businesses across Europe. Our vision is to create reliable infrastructure that can enhance Europe's energy security, whilst fulfilling the highest standards for safety and environmental protection. As European production decreases and demand for gas continues to grow, Nord Stream 2 will deliver additional transportation capacity and provide Europe with a secure and robust gas supply long into the future.

Building an offshore pipeline through the Baltic Sea is a significant engineering challenge that benefits hugely from the proven experience and success of the Nord Stream project. Nord Stream was an EU project of common interest, delivered under TEN-E status as trans-European energy infrastructure. From several years of monitoring, we know that a Baltic Seapipeline can be constructed and operated without any significant or lasting environmental impact. We have researched and optimised the most suitable pipeline route, and listened



Matthias Warnig
Chief Executive Officer
Nord Stream 2 AG

to the views of many countries whose waters the pipeline passes through, as well as their neighbours who also have an interest in this new infrastructure. This knowledge is a huge asset as we deliver a new pipeline, but it is only the beginning. Before construction of the Nord Stream 2 Pipeline system begins, there will be further environmental studies to understand any recent changes in the environmental context, as well as a dedicated permitting and consultation process to gain feedback from the people living in countries bordering the

route today. The following pages provide information about the Nord Stream 2 project. It explains how we will deliver an underwater pipeline, and defines the steps being taken not only to ensure that the pipeline will be built with as little impact on the environment as possible, but that it will operate safely for years to come. Nord Stream 2 will be an important gas supply route for Europe, powering Europe's future.

The Nord Stream 2 team has a great deal of experience in planning and constructing pipelines and transporting gas reliably and safely to the markets where it is needed. The support of leading European energy companies and suppliers brings further world-class expertise and access to advanced pipeline technology and materials.

Matthias Warnig

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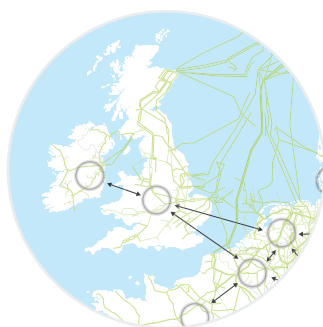
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SAFEGUARDING EUROPEAN ENERGY SECURITY

Securing access to natural gas for households and industry is a high priority in the European Union. With Europe's own gas resources depleting and/or difficult and uneconomic to reach, European suppliers need secure gas imports in the long term to ensure global industrial competitiveness and meet domestic demand. Under the EU's environmental commitments, availability must also be matched with sustainability. Natural gas, as an abundant and flexible fuel, is a cost-effective way to achieve the climate protection targets. The Nord Stream 2 Pipeline is a timely and environmentally-sound solution to bringing large volumes of natural gas to Europe.

Pipelines have supplied energy for decades because they are the safest and most economical way to transport gas over long distances. Currently, there are approximately 2.2 million kilometres of pipeline running through the sea and landscapes, connecting gas production in and around Europe with the local consumers. However, new import routes are still necessary to meet Europe's rising import needs.

“
*2.2 million km
of pipelines
cross Europe*”

Eurogas 2016

The decision to build Nord Stream 2 stems from many years of research and studies into Europe's energy import requirements, existing capacity, environmental considerations, route planning and optimisation. These studies demonstrated the benefit to Europe and the commercial viability of a major pipeline link from the world's largest gas reserves in northern Russia

to consumers in Europe. The proposed route through the Baltic Sea – starting on Russia's Baltic coast and coming ashore near Greifswald in Germany – is the most direct connection and has many environmental advantages. The route has been tested and proven through the construction and operation of the existing Nord Stream system.





The privately-financed Nord Stream 2 Pipeline will deliver modern gas-transportation infrastructure and enhance European energy security. In a challenging economic climate, this investment presents an opportunity for Europe to further strengthen its gas supply infrastructure.

Once gas lands in Europe, it can – in the future – be transported anywhere

within the EU's internal energy market. Adding a new trunk line is therefore expected to stimulate the development of new connections between countries to manage the onward transportation of the gas across Europe. Nord Stream 2 will strengthen the transmission network, ensuring that Europe enjoys a robust gas supply, even at demand peaks, now and in the future.



**German landfall
for the existing
Nord Stream Pipeline**

Nord Stream 2 will run from Russia's Baltic coast to the German coast near Greifswald and largely follow the route of the existing Nord Stream Pipeline.

ENHANCING THE NATURAL

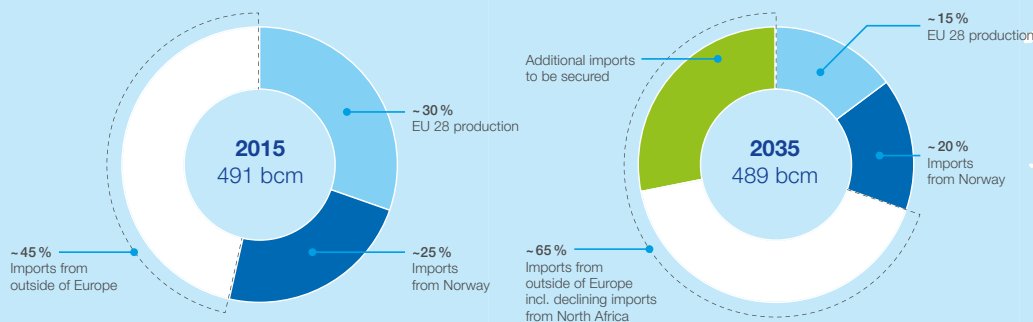
The EU's domestic gas production is in rapid decline. To meet demand, it needs reliable, affordable and sustainable new gas supplies.

The Nord Stream 2 natural gas pipeline will transport gas from the world's largest reserves in Russia to the EU internal market. With capacity to supply up to 26 million households, Nord Stream 2 will substantially enhance the EU's long-term energy security and help maintain its competitiveness.

Europe faces an import gap as demand outstrips supply

EU domestic gas production is set to fall 50 percent in the next 20 years, as ageing assets are retired and hard-to-reach gas in the North Sea becomes uneconomic, particularly at a time of low energy prices. The EU therefore needs to import more affordable gas to meet its needs.

Source: Based on Prognos 2017. Total demand includes all gas sourced from the European market, EU countries, plus Switzerland and western imports by Ukraine.



Complementing existing supply routes

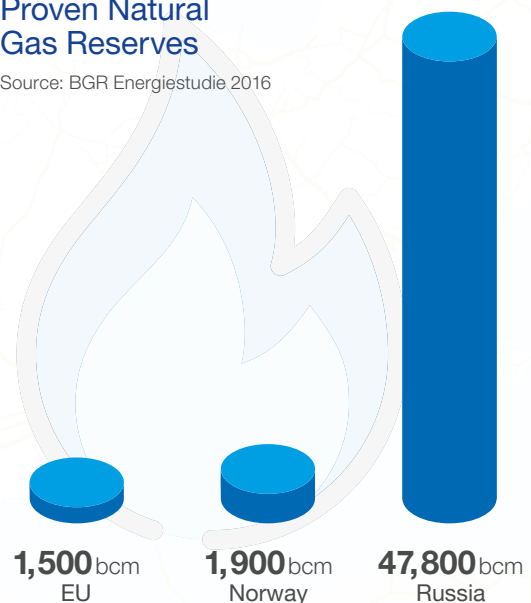
The existing Nord Stream Pipeline already runs at near full capacity – reliably handling the temporary demand peaks of today's consumers. But with a growing import gap, the EU needs to further strengthen and diversify its import capacities to meet future demand. Nord Stream 2 will **supplement existing supply routes** and, together with other new additions such as increased LNG shipments and the Southern Corridor, help to reduce the import gap.

Strengthening the EU's transmission network

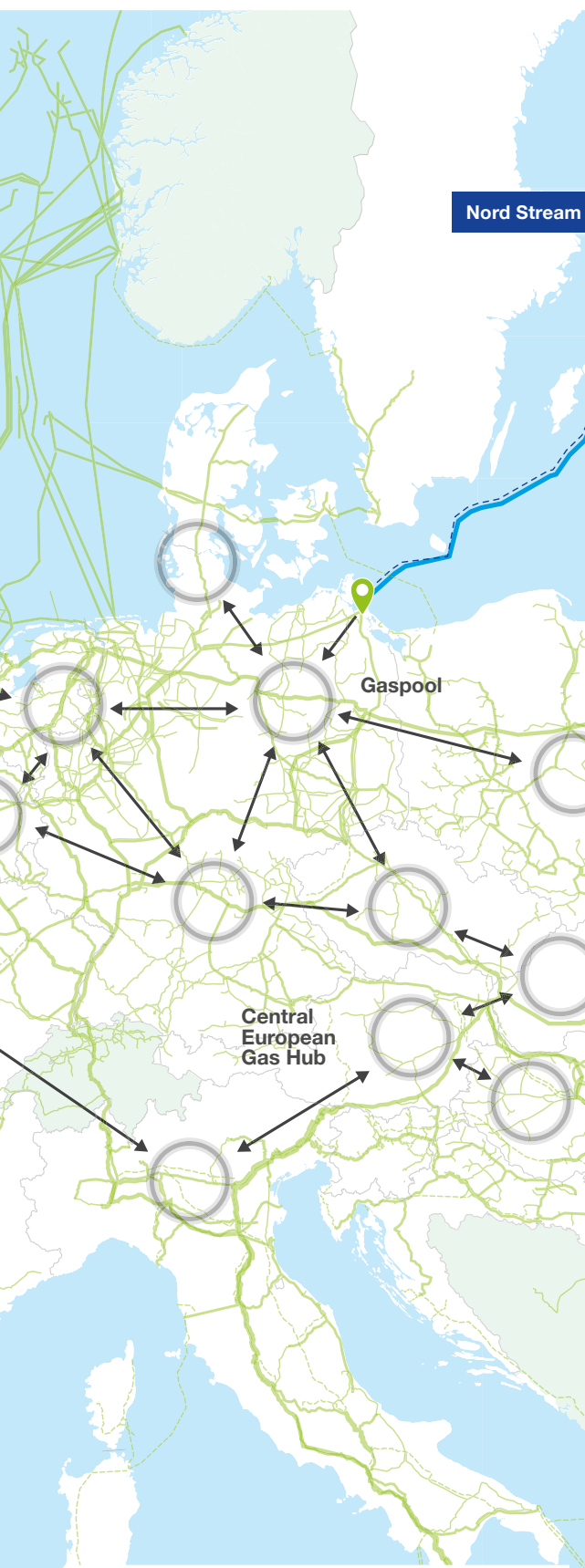
Nord Stream 2 will stimulate the development of onshore infrastructure to transport gas from the pipeline across Europe. This will include inter-country connections and reverse flows, which will help to bring the **benefits of the internal market** to more consumers.

Proven Natural Gas Reserves

Source: BGR Energiestudie 2016



GAS MARKET



- Countries outside the European Union
- Nord Stream Pipeline in operation
- Planned Nord Stream 2 Pipeline
- Indicative direction of onward transportation
- Virtual trading point
- bcm Billion cubic metres

Supplying the EU's internal energy market

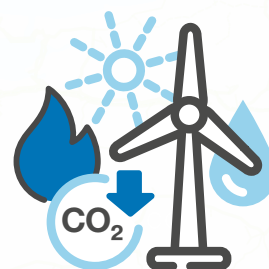
Once gas lands in Germany, it can – in the future – **flow anywhere in the EU's internal energy market via the different hubs**. For example, it will flow from the German Gaspool hub to neighbouring hubs, such as in the Netherlands and Belgium, boosting available gas supplies there. It will also flow to the Austrian hub, boosting liquidity and competitiveness in the southern, central and eastern EU.

A direct connection

Nord Stream 2 will provide a **direct link** between northern Russian gas reserves and European gas consumers, via the shortest possible route through the Baltic Sea. It will build on the success of the existing Nord Stream Pipeline, continuing over 40 years of EU-Russian energy cooperation.

Lower-carbon fuel

The EU must reduce its CO₂ emissions 40 percent by 2030 from 1990 levels. Renewable energy holds great promise, but is not yet sufficiently scalable, reliable or affordable. Natural gas is therefore in demand as a lower-carbon fossil fuel that is flexible for use in power, heating, transport and chemical feedstock. Electricity generation from gas-fired power plants produces **up to 50 percent less CO₂** than coal-fired plants.



NORD STREAM — A PROVEN ROUTE, A PROVEN APPROACH

At a glance

→ Nord Stream 2 will build on the experience of the Nord Stream Pipeline, an EU project of common interest which has been fully operational since 2012.

→ The new pipeline will benefit from extensive research and knowledge gained during that project, with a proven route, modern technology, and effective environmental protection.

The Nord Stream twin pipeline set a new benchmark for European infrastructure projects in terms of safety, environmental protection, international collaboration, public consultation, and efficient delivery. Over several years of planning, construction and operation, the team behind Nord Stream built up a substantial body of research, analysis and expertise regarding conservation of the Baltic Sea environment, the optimal pipeline route, and technical construction considerations. Extensive environmental impact assessments and public consultation feedback demonstrate that a Baltic Sea pipeline can be constructed and operated without any significant or lasting detrimental impact on the local environment or neighbouring communities. This knowledge is an asset for the planning and delivery of Nord Stream 2.

A European success story

The Nord Stream Pipeline has been a European success story: In 2006, a consortium of major European energy companies came together to deliver a privately financed, reliable gas supply for Europe. The challenge was to build a twin pipeline system from Russia to Germany, with a capacity to transport 55 billion cubic metres (bcm) of natural gas a year – enough to supply 26 million European households. Given its significant





← Extensive surveys of the Baltic Sea generated a wealth of research of this unique environment.

contribution to EU energy security, Nord Stream was officially designated an EU project of common interest.

In-depth analysis of the most environmentally-sound route was undertaken, and offshore surveys of the Baltic underwater environment led to the most detailed research of the area ever undertaken. International consultations were carried out and the technical pipe-laying process was safely completed. In 2011, the first of the twin pipelines opened, shortly followed by the second pipeline in 2012. Nord Stream AG – comprising Gazprom, E.ON, BASF/ Wintershall, Nederlandse Gasunie and GDF Suez (now Engie) – had delivered the project within budget and on time. The completion of the Nord Stream Pipeline gave Europe a direct link to Russia's vast energy reserves for the very first time, and the ambitious project received international recognition as a model for major infrastructure development.

The original Nord Stream Pipeline is making an important contribution to the EU's economic and environmental policy objectives. But demand for imported gas is continuing to grow. For this reason, Nord Stream was asked to investigate bringing more Russian gas to Europe through the Baltic Sea to ensure Europe has a robust supply into the future.

Now, Nord Stream 2 will add a second twin pipeline along a similar route. Like Nord Stream, the new pipeline will be carefully planned and constructed to minimise any harm to the Baltic Sea environment and deliver a reliable gas supply to Europe.

“ Nord Stream was designated an EU project of common interest ”



MEETING EUROPE'S ENERGY NEEDS

At a glance

→ As the EU seeks to meet its emissions targets, natural gas is in demand as a lower-carbon fossil fuel: reliable, flexible, scalable and affordable.

→ The EU's domestic gas production is, however, in rapid decline as hard-to-reach gas becomes increasingly uneconomic. The EU must import more gas to meet demand and maintain industrial competitiveness.

→ Russia's geographic proximity, plentiful gas reserves and history of reliable supply make it a natural partner for a new gas transportation route that can enhance security of supply.

Natural gas – a lower carbon fuel

With the EU seeking to reduce its carbon emissions, natural gas offers a solution to meet the region's energy requirements and decarbonisation goals in an affordable way, alongside renewable energy generation technologies.

Natural gas is the cleanest fossil fuel, as it burns with the lowest intensity of carbon dioxide and other emissions such as particulate matter. Natural gas makes up almost a quarter of the EU's total

energy consumption and it is the only fossil fuel with projected growth in the energy mix. The European Commission's Energy Roadmap 2050 envisages an important role for gas as it strives to reduce carbon emissions.

Using gas to generate electricity creates about 50 percent fewer emissions per kilowatt-hour than using coal, which has seen a resurgence in recent years as a surplus of cheap coal supplies has entered the market. Switching just one percent of the EU's overall electricity



“
*Natural
 gas is the
 cleanest
 fossil fuel*”

generation from coal to gas would cut CO₂ emissions by about 5 million tonnes. Natural gas delivered by Nord Stream 2 (55 bcm) could save around 14 percent of the EU's total CO₂ emissions from power generation, if all the gas from the pipeline were used in place of coal-fired power stations.

Partner to renewable energy

In addition to its lower carbon profile, natural gas offers a second significant benefit: its flexibility. Gas-fired turbines can be brought online in minutes rather

than the hours it takes for coal-fired plants, or even days for nuclear reactors. This means that gas is an ideal energy source to supplement renewable energy sources and quickly compensate for fluctuations in renewable energy production. Energy experts from governments, the private sector and environmental organisations agree that natural gas can make an important contribution in adapting rapidly to changing capacities that occur when energy from intermittent renewable resources is fed into the electricity grid.¹

¹ See for example Greenpeace Energy Revolution, 2014, p.27

→
Natural gas
production field
in Siberia, Russia.

↓
**Norwegian
production**

is currently at its peak, but is projected to drop in the coming years as major fields deplete.

**Dutch
production**

is also dropping, as major fields in populated areas face issues of seismicity and production caps.

**UK
production**

is expected to fall in the coming decades, too, leaving only 10 bcm of annual production from its continental shelf.

**German
production**

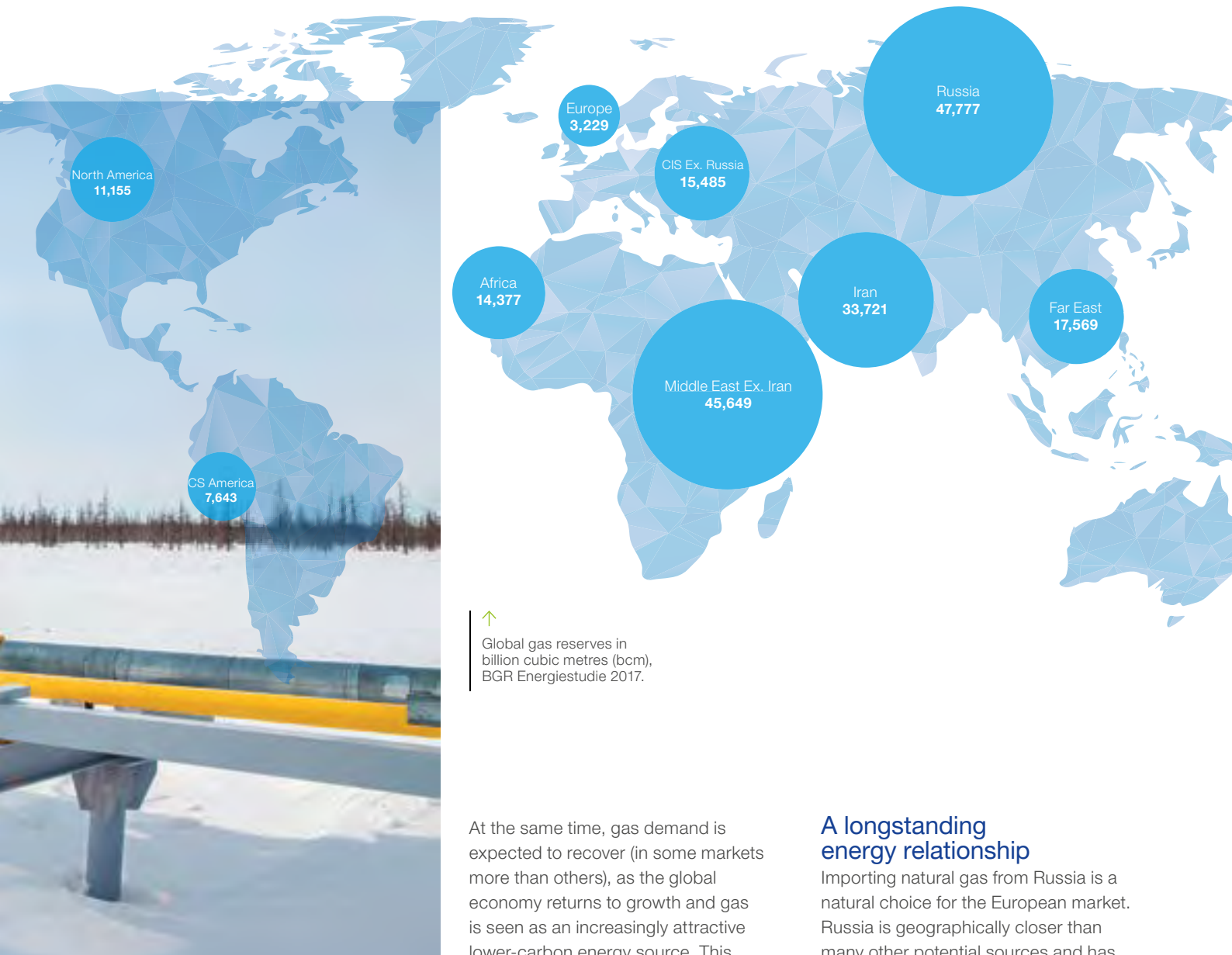
has halved in the past decade and is projected to drop further.



Europe's import gap

Experts, major industry and political bodies all expect a significant drop in European gas production to occur over the coming years. While predictions vary, main producers such as Norway, the Netherlands and the UK all see their production outlooks falling. This production shortfall will need to be replaced by imports. Some exporters, such as the countries of northern Africa, are also facing a projected drop in production and / or increasing domestic demand.





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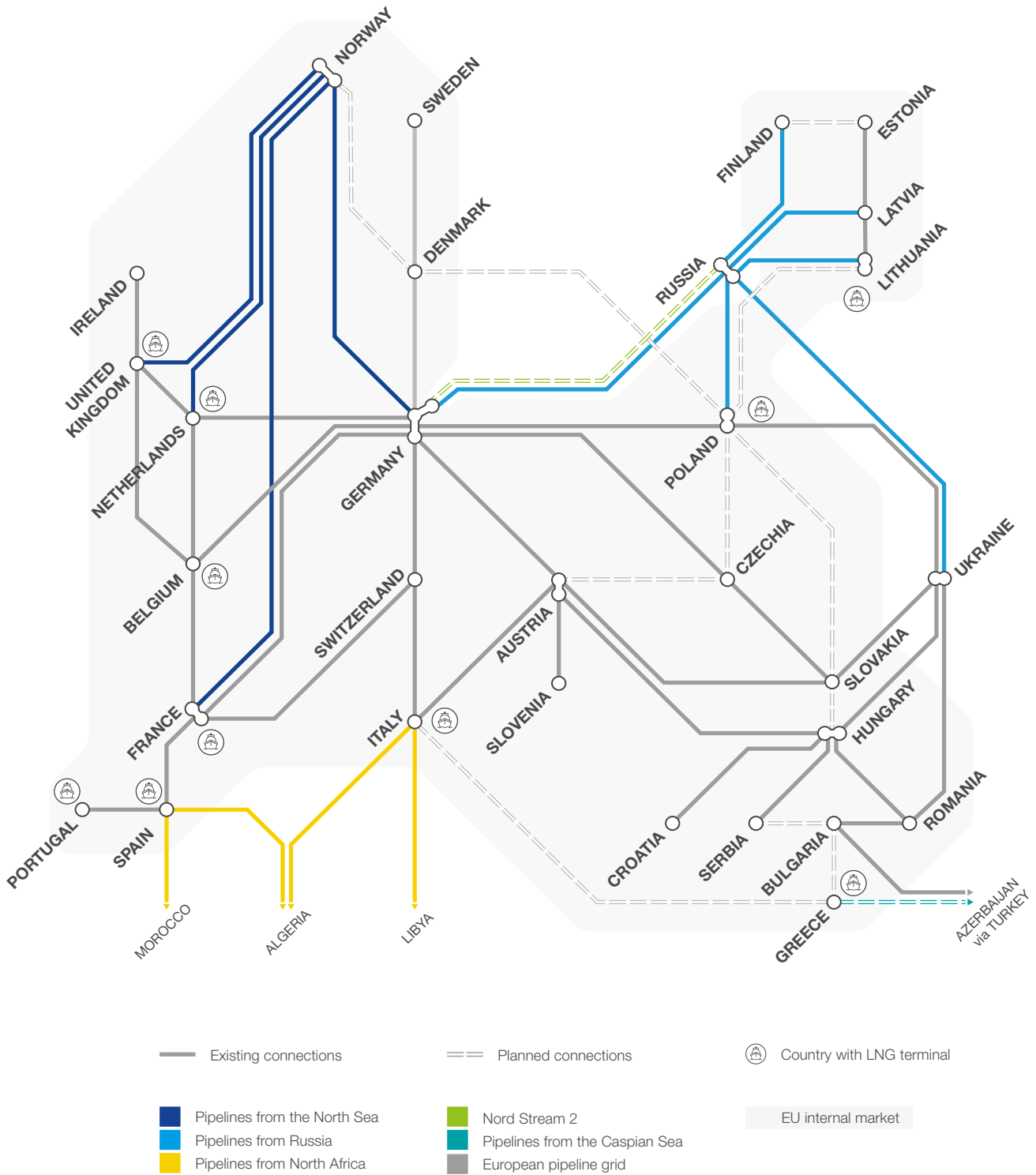
At the same time, gas demand is expected to recover (in some markets more than others), as the global economy returns to growth and gas is seen as an increasingly attractive lower-carbon energy source. This demand is expected to stay at around the same level over the coming decades. In 20 years, the EU could need around 120 bcm of additional imports, when factoring in the projected drop in northern African, Norwegian and domestic production.

While part of this shortfall can be covered by other suppliers, or liquefied natural gas (LNG) shipments – they will not be sufficient to fully cover the growing import requirements. Additional capacity is needed to ensure that supply remains robust to cope with demand and usage spikes.

A longstanding energy relationship

Importing natural gas from Russia is a natural choice for the European market. Russia is geographically closer than many other potential sources and has the world's largest reserves of natural gas. The Nord Stream 2 Pipeline will link the EU directly to Russian gas fields, representing the continuation of a supply relationship of over 40 years. Russian gas makes up about six percent of the EU's total energy consumption. Just as Europe needs a reliable source of gas from Russia to meet its goals, Russia also relies on gas customers in Europe for income.

A CONNECTED EUROPE



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In the future, once the gas lands in Europe, it will be able to flow anywhere in the EU's internal energy market”

At a glance

→ Once gas from the pipeline lands in the EU, it can – in the future – be transported anywhere in the internal market. The gas will be directed via existing hubs to northwest Europe and will strengthen connections to southern, central and eastern Europe.

→ By boosting liquidity and competitiveness across the region, Nord Stream 2 will stimulate the construction of more connections between countries and reverse flows, strengthening the internal energy market and bringing its benefits to more consumers across Europe.

By increasing gas imports through the Baltic Sea to Europe, Nord Stream 2 will be able to supply a portion of the EU's future import requirements and make up for the decline in domestic production. This additional import route will improve supply reliability and energy security.

Supplying Europe's internal energy market

In the future, once the gas reaches the pipeline's landfall near Greifswald in Germany, it will be able to flow anywhere in the EU's internal energy market. Connecting pipelines will redirect and transport the gas on to neighbouring countries and beyond. Germany is already well connected to the rest of Europe via a number of different pipeline routes, but it is anticipated that the increased supply from Nord Stream 2 will induce the construction of additional infrastructure that will help gas flow more easily across the Continent.

In fact, “helping energy cross borders” is one of the core targets in the European Commission's action plan towards enabling unrestricted energy flows throughout the EU. This includes facilitating and investing in

the development of new infrastructure that connects countries, such as interconnectors and reverse flow capabilities. Having sufficient liquidity will be a decisive factor in the success of the internal market, alongside free and fair competition between suppliers and buyers. Nord Stream 2 will support this aim by bringing extra liquidity to the energy market, which can help to keep prices competitive across the whole region.

Strengthening connections

It is anticipated that one third of the additional gas landing in Germany will be transported onwards to northwestern Europe, and increase supply in this well-connected gas market. The remaining two thirds of the gas is expected to be transported to central, eastern and southern Europe, contributing to the expansion of the central European Gas Hub in Baumgarten, Austria. This will help to boost the markets for natural gas in this area to a comparable level of liquidity and competition as markets in northwestern Europe.

This investment is fully privately funded, without subsidies, and the gas price in this competitive market will be determined by supply and demand.



Europe's Inter-connected Gas Network

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Nord Stream 2 is committed to the highest international standards for safety, environmental protection and technical integrity”

AN OPTIMAL ROUTE



At a glance

→ Nord Stream 2 provides a direct connection between Russia's vast gas reserves and EU consumer markets.

→ The route is optimised through years of research to maximise safety, environmental, technological and economic benefits.

→ The pipeline passes through the waters of five countries, which will be extensively consulted throughout the development process, along with other Baltic neighbours.

The planned route of the Nord Stream 2 Pipeline provides the most direct connection between the vast gas reserves in Russia and consumer markets in the European Union. The underwater pipeline enters the Baltic Sea on the Russian coast, passes through the waters of five countries, and reaches land near Greifswald, Germany. Nord Stream 2 will largely follow the route of the existing Nord Stream system.

This route is the result of years of research, optimising for safety, environmental, social, economic and technical considerations. Thanks to this extensive assessment process, the pipeline corridor has been studied for several years. This research has demonstrated that the construction and operation of a pipeline along the planned Nord Stream 2 route will have no long-term detrimental impact on the environment or on neighbouring onshore communities.

The benefits of offshore pipelines

During the route-planning process for the original Nord Stream Pipeline, an alternative land route was the subject of substantial discussion. Part of the challenge posed by an overland route is the need for compressor stations, at regular intervals of about 100 to 200 kilometres, to keep the gas flowing. These compressor stations require fuel to operate, adding to costs and creating carbon dioxide emissions as well. With a maximum input pressure of 220 bar for the offshore Nord Stream Pipeline, no intermediate compression is needed to transport the gas a distance of some 1,230 kilometres. The example of other overland pipelines shows that environmental impacts following land construction are greater and require longer recovery periods than offshore construction.

Transporting gas in tanker ships, in the form of liquefied natural gas (LNG), is also



a supply option. But the LNG process is complex, involving high-pressure liquefaction of gas at the point of export. Specialised gas-liquefaction, shipping and re-gasification technologies are also necessary. Each part of the process involves significant energy loss, as well as further carbon dioxide emissions.

Planning the pipelines

Through Nord Stream and Nord Stream 2, more than 100 million euros have been invested so far in environmental impact studies and public consultations to ensure that the design and the routing of the pipeline through the Baltic Sea minimise any environmental or social impact.

Selection of the optimal route was considered against three main criteria, with safety being a constant, overarching concern. The first criterion is environmental, and focussed on avoiding or minimising any impact on protected or sensitive designated areas, or areas with

ecologically sensitive species of animal or plant life. Also taken into account was minimising any seabed work that might disrupt its natural composition. The field studies included analyses of water and soil samples as well as observation of the behaviour of fish, marine mammals and birds. The second criterion looks at socio-economic factors to minimise any contact with shipping, fishing, dredging, military or tourism-related activities – and with sea installations, such as existing cables or wind turbines. Avoiding known areas with discarded conventional and chemical munitions was also a top priority in the route selection process. The third criterion covered technical considerations, such as minimising construction time, and therefore any disruptions, as well as reducing the technical complexity of the operation to keep the use of resources as low as possible.

A pipeline through the waters of many nations

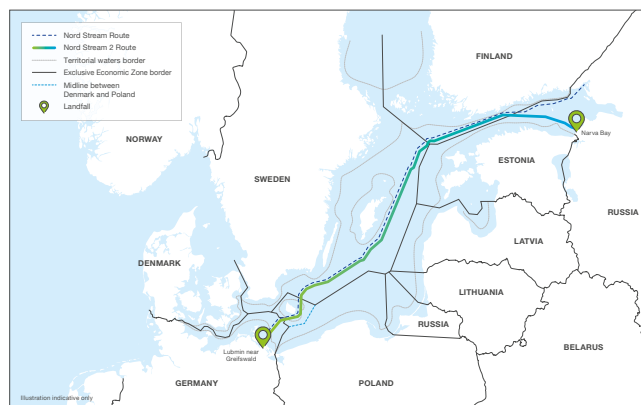
The Nord Stream 2 Pipeline will follow the route of Nord Stream and will connect the Russian Baltic Sea coast with the German Baltic Sea coast. The route crosses the exclusive economic zones of Russia, Finland, Sweden, Denmark and Germany, as well as the territorial waters of Russia, Denmark and Germany.

Nord Stream 2 is committed to delivering a pipeline that meets the highest international standards for safety,

environmental protection and technical integrity. The commitment will be overseen by the authorities of the five countries whose waters the pipeline passes through, as well as international conventions. Nord Stream 2 is undertaking extensive consultations to address any concerns and ensure that the pipeline complies fully with the national legislation. In addition to these five nations, the pipeline may be of interest to neighbouring states such as Estonia, Latvia, Lithuania and Poland, which are also included in the consultation process.

The international consultation process is intended to give all countries possibly affected by the Pipeline the opportunity to review the project. Nord Stream 2 has produced an Environmental Impact Assessment Report, including cross-border consultations, which outlines our coordinated approach to protecting the environment and provides the public and other stakeholders with the opportunity to respond.

The report expands on many years of Nord Stream research, field studies and surveys. In fact, the previous Nord Stream report constituted one of the most significant analyses of the Baltic Sea ecosystem and the seabed along the pipeline route – greatly contributing to scientific understanding of this special ecosystem.



← Nord Stream 2 will largely follow the route of the existing Nord Stream system.

BUILDING AN UNDERSEA HIGHWAY

At a glance

→ Constructing an underwater pipeline is a major undertaking, and Nord Stream 2 will draw on expertise from around the world.

→ An international certification body will oversee and test the pipeline, to ensure that it meets the highest quality standards.

A pipeline is a significant large-scale infrastructure project. Hundreds of engineers work on the planning and design, at pipe production, storage and coating yards, and on specialised vessels to make the pipeline a reality.

The basic technology for constructing offshore pipelines has been developed over the last 40 years. The designers and engineers responsible for Nord Stream 2 have advanced these procedures through Nord Stream and on major projects around the world. Because

the technology is extensively in use, a rigorous certification system has been created to ensure that all procedures are carried out to a high standard.

What is commonly referred to as “the Pipeline” actually consists of two parallel pipelines. Each pipeline will be made up of about 100,000, 12-metre pipe sections, which are welded together out at sea and lowered to the seabed by special pipelay vessels. These vessels are equipped to assemble and lay pipes around the clock, so that each vessel can build up to three kilometres per day. Each completed pipeline will be about 1,230 kilometres in length, but it will be built in sections, which are then joined in a process known as a “tie-in”.

The pipes

Nord Stream 2 pipes will be produced at plants in Germany and Russia, and have a constant internal diameter of 1,153 millimetres and a wall thickness of up to 41 millimetres. The insides will receive an epoxy-based, high-gloss coating as an antifriction measure to increase the system’s flow capacity. An external

coating consisting of three layers of polyethylene is applied to prevent corrosion. Each pipe also receives a final coating of reinforced concrete enhanced with iron ore. This concrete coating adds weight to the pipeline, so that it remains stable on the seabed and gives it added protection.

Welding and pipe laying

Individual pipes are welded to the pipeline in an automated process on the pipelay vessel. Once completed, these welds are tested and the results are reviewed by a quality control team, before being inspected by an independent certification agency. As the pipelay vessel moves, the pipe gradually exits the ship in a continuous motion, curving downward through the water until it reaches the seabed. A steel structure (stinger) protruding from the vessel supports the descending pipeline to avoid buckling.

To prevent collisions with other ships, a three-kilometre exclusion zone will surround each pipelay vessel as it proceeds on its course. Coast guards

1

FORMING STEEL

Foundries in Germany and Russia form special steel into round pipes, each 12 metres long. Pipes are coated to withstand conditions on the seabed.

2

TRANSPORT

After inspections, finished sections are then transported via rail to concrete coating yards.

3

CONCRETE COATING

Iron-enriched concrete provides added protection and weight to help stabilise the pipeline when on the seabed.



6

WELDING AND SEALING

Pipe sections are welded together with an automated welding process and the welded joints are then inspected. Then the welded joint area is coated externally to protect against corrosion and lowered from the pipelay vessel to the seabed.



will also be informed about vessel movements. Once the various completed sections of the pipeline have been linked into a continuous string, the entire system is tested thoroughly prior to commission. Once the pipeline passes examination, it is filled with gas and pressurised for transport.

5

PIPELAY VESSEL

Pipe sections are delivered to the pipelay vessel out in the open sea, and welded onto the end of the pipeline as a consecutive process. The vessel moves at the rate of about three kilometres per day.

“
Each vessel can
build up to 3 km
of pipeline per day”

4

SUPPLY BARGE

Fully coated pipe sections are loaded from storage yards via crane onto a barge which supplies the pipelay vessel out at sea.

Monitoring the flow

The pressurised gas enters the system in Russia and exits in Germany. Pressures and flows within this undersea gas highway are monitored constantly. Engineers oversee operations, and they can take direct control over the pipeline in the event of irregularities of any kind. All operations will comply with established international standards, and are subject to certification. The pipeline will be maintained according to a regular schedule. Periodic inspections of the inside of the pipeline are carried out by a remote-controlled device called a pipeline inspection gauge, or PIG. This device runs inside the length of the pipelines, monitoring the integrity of the material and the exact geometry and position of the lines. When required, visual inspections can also be undertaken on the outside of the pipeline.

The Nord Stream 2 Pipeline's condition will be evaluated continuously to ensure safe operation throughout its design life.



PROTECTING A SENSITIVE ENVIRONMENT

At a glance

- The Baltic Sea is an extraordinary ecosystem that must be preserved with care.
- Nord Stream has conducted years of research, which demonstrates that a pipeline can be constructed and operated in harmony with the Baltic Sea environment.
- Nord Stream 2 will build on this body of research and continue to protect the environment.

The Baltic Sea is an extraordinary natural resource which has played a vital role in the development of the culture of northern Europe. It is the largest body of brackish water on the planet, where salt water from the oceans mixes with freshwater, and it is home to many species of plants and wildlife. Because of its strategic location as an inland sea, it has been an integral part of European trade since the Viking Age, connecting western and eastern Europe, Scandinavia, and Russia. Today, it is home to some of the busiest shipping routes on earth. Millions depend upon the Baltic Sea for their livelihood and for recreation, so preserving its delicate ecosystem is a high priority. Fortunately, many organisations exist to protect this important environment. Nine countries border the sea – Denmark, Estonia,

Finland, Germany, Latvia, Lithuania, Poland, Russia and Sweden – and it is protected by well-established intergovernmental agreements, reinforced by strong international collaboration.

Our commitment to protect the environment

By increasing the amount of natural gas available to European markets to replace coal, the pipeline will help reduce harmful greenhouse gas emissions. Transporting the gas underwater prevents the need for additional shipments by seagoing tankers, at a time when increasing ship traffic is already a cause for concern among ecologists. While the pipeline brings clear environmental benefits, it is also important to be prepared for – and mitigate – any possible risks associated with laying a gas pipeline on the seabed. How can Nord Stream 2 minimise the impact of the

“

More than 55,000 line kilometres were assessed by research vessels, which conducted surveys and underwater investigations to determine a safe and environmentally friendly route”



pipeline on spawning areas for fish, seal breeding grounds or migratory patterns for birds? Could munitions dump sites be disturbed, and what impact will mine clearance have? To answer these and many other questions, Nord Stream 2 is now building upon the comprehensive ecological studies that Nord Stream undertook. The results of several years of monitoring show that the pipeline can be constructed and operated with minimal disruption to the local environment, and well within the accepted international standards for environmental protection. While the construction phase can cause some temporary disruption, this can be managed through carefully planned mitigation measures.

The pipeline route was planned to minimise the impact on nature reserves important to wildlife. In addition the

pipes are designed to withstand a lifetime of service on the seabed. Areas known to contain munitions can be largely avoided, or conventional munitions identified on the route may be removed. A maintenance scheme ensures that the pipeline will be operated to high standards of safety and environmental compatibility – as we are currently seeing with the existing Nord Stream system.

A sensitive ecosystem

The Baltic Sea is an extraordinary and sensitive ecosystem, due in part to its limited exchange of water with the North Sea. The narrow and shallow waters of the transitional Sound and Belt waters around Denmark means the same water – along with all the organic and inorganic matter it contains – can remain in the Baltic for up to 30 years. At the same time, the Baltic is replenished with lighter

fresh water through rainfall, rivers and streams, stemming from a catchment area that is four times that of the sea itself. Salt water flowing in from the North Sea does not mix thoroughly with the less dense water waiting in the Baltic, creating a horizontal boundary called the halocline. The halocline acts as a cap, and oxygen levels in deeper areas decline as a result. As a consequence, only a limited number of animal and plant species can thrive in the Baltic Sea's brackish environment. Some species of marine mammals, plankton, fish, marine plants and other creatures that have adapted to these brackish conditions are under threat from the increased pollution caused by the rapid economic growth of the Baltic countries, according to HELCOM, the Baltic Marine Environment Protection Commission (or Helsinki Commission). Extensive research has helped increase scientific understanding of these worsening conditions, including climate change, the effects of chemical run-off, salinity and sediment, toxic contamination, and the introduction of harmful non-native species. HELCOM has made it a priority to combat excessive nutrient loads from agricultural and industrial run-off.

Given the sensitivity of the Baltic Sea ecosystem, Nord Stream placed a high priority on environmental responsibility, and this commitment has now been taken up by Nord Stream 2.

Nord Stream 2's priority is to build and operate its pipeline safely. Our comprehensive and far-reaching risk assessment will adhere to industry codes and standards. Risk assessment is an ongoing task – potential scenarios and impacts will vary over the life cycle of the project and Nord Stream 2 will continue to monitor and act on these changes.

Nord Stream 2 is working with experienced marine, offshore and engineering partners to ensure that high safety standards are met during design, construction and operation. Our procedures ensure that risk exposure to third parties, people, the environment and equipment remains As Low as Reasonably Practicable (ALARP). For a risk to be considered ALARP, it must be possible to demonstrate that the effort involved in reducing the risk further would be grossly disproportionate to the benefit gained. These levels of risk are calculated in accordance with DNV GL codes, standards and recommended practices, which are designed to safeguard life, property and the environment. DNV GL is a respected, independent Norway-based foundation working across a number of industrial sectors. Nord Stream has received annual recognition from DNV GL for its safe and responsible practices in pipeline operation since the pipeline opened in 2012. Nord Stream 2 intends to follow in these footsteps and meet the highest international standards.

Health, safety and environmental protection

To ensure the safety of staff and contractors, Nord Stream 2 and its partners will continually train them in health, safety and environmental protection

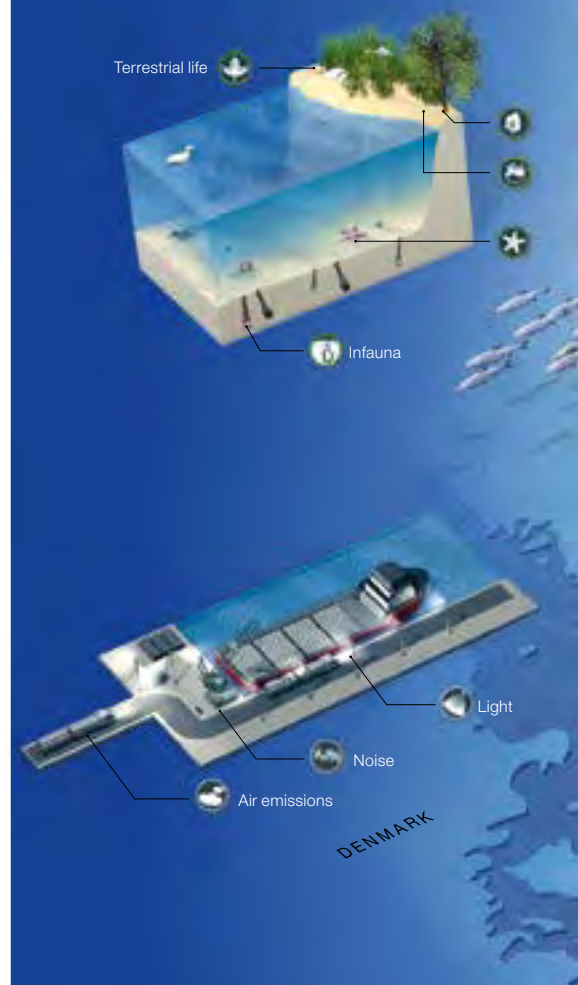
measures and standards to minimise human errors in construction, pipeline safety and reliability. The procedures governing all risk and safety assessments have been developed through international agreements. Under the control of DNV GL, the Nord Stream 2 project also meets all International Maritime Organization risk-assessment criteria. Risk assessments are made to cover every aspect of every stage of the project.

The work is allowed to take place only if a risk is finally assessed as acceptable. One of the main objectives of an environmental assessment is to identify means to reduce risks and the expected impacts of a construction project. To this end, so-called mitigation measures have been integrated into the design of the project in response to impacts that are anticipated to be of significance.

Environmental monitoring

Nord Stream has been monitoring the impact of the pipeline on the environment for several years. All monitoring results have confirmed the findings of the environmental impact assessments and verified that any construction-related impacts were minor, locally limited and predominantly short term. An opinion poll conducted for Nord Stream in 2012 shows that the majority of neighbouring residents (61 percent) see industrial waste as the chief threat to the waters of the Baltic, followed by shipping (25 percent). By contrast, only one in 15 people (7 percent) were concerned about the impact of the pipeline construction. The survey assessed public sentiment in Germany, Sweden, Poland, Finland, Denmark, Estonia, Latvia, Lithuania and Russia.

BUILDING STRONG



ON A HERITAGE

Environmental monitoring activities undertaken for the existing Nord Stream Pipeline

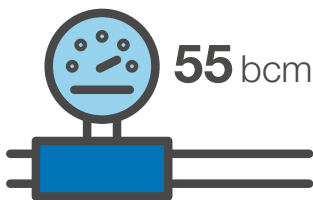
Nord Stream has built a pipeline system in harmony with the Baltic Sea. The results of extensive environmental sustainability studies and monitoring show there are few significant or lasting environmental impacts from the construction or operation of the pipeline. Nord Stream 2 will build on the environmental monitoring and environmental protection measures undertaken by the existing Nord Stream Pipeline.



- | | | | | | |
|-------------------|-------------------|--------------------|--------------------------|-------------------|-------------------------|
| Turbidity air | Sediment | Seabirds | Landscape and topography | Air emissions | Chemical warfare agents |
| Turbidity vessel | Seabed bathymetry | Fish and fisheries | Onshore soil | Noise | Conventional munitions |
| Turbidity sensors | Bottom currents | Mammals | Epifauna | Light | HELCOM |
| Mussel cages | Inflow | Terrestrial life | Infauna | Cultural heritage | Public opinion |

NORD STREAM 2

IN NUMBERS



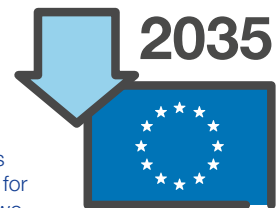
Utilisation of the existing Nord Stream Pipeline **has increased every year** since it opened in 2011. It is now close to delivering its full capacity of

55 bcm per year.

About

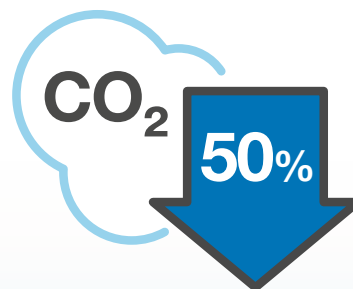
120 bcm

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.



Generating electricity from natural gas produces up to

50 percent less CO₂ than from coal.



Russian natural gas makes up about

6 Prozent of the EU's total energy consumption.

Nord Stream 2 will have capacity to transport **55 bcm** of natural gas per year, enough to supply some

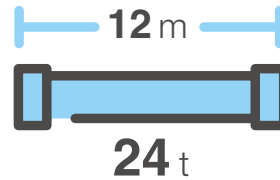
26 million European households.



More than

55,000
line kilometres

were sailed by research vessels to conduct surveys and underwater investigations to determine a safe and environmentally friendly route.



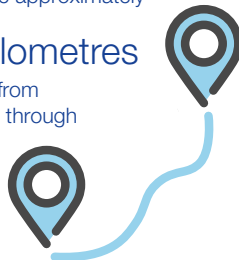
Each pipe

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

The pipeline will be approximately

1,230 kilometres

long, and will run from the Russian coast through the Baltic Sea, reaching landfall in Germany.



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.



Russia has some

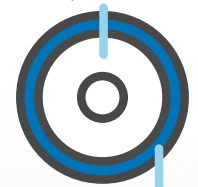
47,800 bcm

of natural gas reserves – the largest natural gas reserves in the world.

The pipelines

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

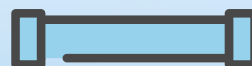
Ø **1,153** mm



up to 41 mm

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

200,000





Nord Stream 2

Committed. Reliable. Safe.



Our values

Energy security

Delivering reliable and economic energy infrastructure

Safety

Fulfilling the highest standards for safe and reliable operations

Environmental protection

Providing environmentally friendly and sustainable supply infrastructure



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