



A total of 90,000,000 tonnes of steel pipes and materials, such as cement and magnetite will be handled through the Nord Stream Pipeline project.

A Logistics Chain with Short Transport Routes

What are the foundations of Nord Stream's logistics concept?

Klaus Schmidt: We developed a logistics concept that is as efficient as it is environmentally friendly for the sensitive Baltic Sea. The plan is a green concept that encompasses short transport distances within the Baltic Sea region. Our aim of creating a concept that was environmentally friendly, was a key factor in choosing the five ports that serve our project. Each of the harbours is less than 100 nautical miles, or 185 kilometres from the pipeline route, and therefore pipe carrier vessels can make a round trip within a day.

What other factors heavily influenced the logistics of the project?

KS: Early on, we made the strategic decision to build our own concrete coating plants, rather than using existing ones.

Wasn't building two new sites a more expensive choice?

KS: Had we opted to use existing plants in either Norway or Scotland, the transport distances would have been much longer. Keep in mind that once concrete coated, each pipe has doubled in weight. We calculated that transporting the concrete coated pipes from these locations would cost 60 million euros, which is also the cost for building two new plants in Mukran and Kotka. While the costs were the same, the new sites were much closer to the route, and therefore the ecological benefits were high.

Just how is the environment taken into account in your concept?

KS: Making the choice alone for new concrete coating plants with shorter transport distances to the route results in a savings of 200,000 tonnes of CO₂. Imagine, these 200,000 tonnes are the amount an average-sized lorry would use if it drove around the world 25,000 times! Additionally, transport of pipes by ships is also greatly reduced. The concrete coating locations are situated in areas easily accessible by train and ship. A lorry, for example, can carry just two pipes, but a train can carry 100, and a pipe carrier vessel can hold up to 200. As a result, 96 percent of all of the transport necessary for this project is carried out in an environmentally-friendly manner.

How do the people of the Baltic Sea region benefit from the project?

KS: We invested 100 million euros into developing the necessary harbour infrastructure for our project in the region. The buildings, the cleared storage land, and the improvements to the five harbours will remain after the project is completed, and therefore we are making a lasting contribution to the regional economy and labour markets. Additionally, the logistics sites have directly led to the creation of 400 jobs, and indirectly to 200 jobs at local businesses.



Klaus Schmidt,
Project Manager
Logistics,
Nord Stream

How exactly does this concept work?

KS: In late July 2008, Nord Stream and the French company, EUPEC PipeCoatings signed a contract for the concrete coating of the pipes and logistics services for both lines of the Nord Stream Pipeline. The contract is valued at 650 million euros, EUPEC has proved to be a reliable partner, with 40 years of experience in the field of developing protective coatings for pipes. Additionally, EUPEC and its logistics partners took the Nord Stream logistics concept and followed it to the letter. The handling and transport of pipes in the three marshalling yards, Slite, Karlskrona and Hanko are overseen by the Norwegian NorSea Group, which has a great deal of experience with offshore projects.

How does Nord Stream steer the project?

KS: We have representatives at each location that ensure that our interests are met, and that our concept is followed. They send reports to our headquarters in Zug, Switzerland, where the project is managed at all levels, and where all documentation is archived. With our automated systems, from here we can track where each of the 200,000 pipes in the logistics chain are.

Are you based in Zug?

KS: Yes, however I often visit the sites to coordinate aspects of the logistics, and I am supported by an internal team of experts.



The Logistics Behind the Pipeline

The new gas supply route for Europe



Nord Stream AG

Nord Stream AG is an international consortium of five major companies established for the planning, construction and subsequent operation of an offshore natural gas pipeline through the Baltic Sea. The majority shareholder OAO Gazprom holds a 51 percent stake in the pipeline project. Leading German energy companies Wintershall Holding GmbH and E.ON Ruhrgas AG hold 15.5 percent each, and the Dutch natural gas infrastructure company N.V. Nederlandse Gasunie, along with the leading French energy provider Gdf Suez each hold a 9 percent stake. The combined experience of these companies ensures the best technology, safety and corporate governance for this project, which aims to provide a secure energy supply for Europe.

The Nord Stream Pipeline through the Baltic Sea is the most direct connection between the vast gas reserves in Russia and energy markets in the European Union. When fully operational in 2012, the twin pipelines, each about 1,220 kilometres long, will transport a combined total of about 55 billion cubic metres of gas a year – that's enough to satisfy the energy demand of more than 26 million European households. The European Parliament and Council designated the project as being of "European interest". This status is given to projects that strengthen markets and reinforce security of supply.

Contacts

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Five Harbours Supply Pipes Continuously

> Construction of the pipeline has been taking place around the clock since April 2010. Pipes are delivered to the pipelay vessels from marshalling yards, all strategically located less than 100 nautical miles from the route. When developing the logistics concept, 68 Baltic Sea ports were evaluated, and five were chosen.

Mukran



The existing infrastructure of the publicly owned Murkran port on the island of Rügen, Germany, was improved to make a 520,000 square-metre area ready to store 65,000 pipes, or 65 percent of the pipes for the first pipeline. EUPEC PipeCoatings France S.A, which is contracted to run the concrete coating yard in Mukran, is also overseeing the handling, transport and the interim storage of the pipes. In May 2008, the first pipes were transported from the EUROPIPE plant at Mülheim an der Ruhr in Germany to Mukran by DB Schenker Rail AG. Once coated, the pipes have doubled in weight,

which provides for added stability on the seabed. The coated pipes are then shipped to interim marshalling yards in Slite and Karlskrona, Sweden. EUPEC contracted Sea Terminal Sassnitz to transport, load and unload the pipes.

Karlskrona



With two existing jetties and large area available for storing pipes, the Karlskrona port in Southern Sweden formed the basis for an ideal interim storage facility. The 90,000 square-metre stockyard, which was completed June 2009, will store 14,500 pipes. Since August 2009, coated pipes from Mukran have been shipped to this location. Each shipment consists of about 160 pipes. Transfer and storage of the pipes to this site is handled by NorSea Group.

Slite



Slite on the island of Gotland, is perfectly situated to continuously supply the middle section of the pipeline route with pipes. About 56,000 pipes will be transhipped to Slite from Mukran between 2010 and early 2012. About 6,000 pipes will be stored, and when the yard is full, the "ship-to-ship" loading process of 55,000 pipes will begin from April to June 2010 (see info box on opposite page for more details). EUPEC's subcontractor NorSea, responsible for logistics, has contracted the stevedoring company, Gotland Stuveri, to carry out the logistics on site. This results in 50 new jobs for the company.

Hanko



Hanko is a port located in the most southwestern part of Finland, which places it very near to the pipeline route. For years, the harbour served as an ideal location for the importing of automobiles. However, when the car industry was hit by recession, the location became available for the Nord Stream project. Approximately 12,000 pipes will be stored at this 90,000 square metre interim stockyard, and a total of 45,000 pipes will be handled at this location. Operations for the Nord Stream project at this site started in the first quarter of 2010.

Kotka



Kotka is situated very near to the start of the pipeline in Russia. With a water depth of 14 metres, existing quays of sufficient length and an area of 400,000 square metres, Kotka proved to be the ideal location for a concrete coating plant and marshalling yard. The Kotka harbour authority invested in an additional quay for loading pipes onto pipe carrier vessels. Approximately 35 percent, or 38,000 of the pipes for the pipelines will be delivered to Kotka, where they will be coated at a facility constructed by EUPEC for the Nord Stream project. Over a 24-hour period, the pipes receive a coating that doubles their weight so

that they rest securely on the seabed. The coated pipes will be delivered either directly to the pipelay barge or to the interim stockyard at Hanko. Stella Stevedorica and STEVECO handle all logistics activities at the site.

Tailor-Made Plan For the Baltic Sea

> The Nord Stream Pipeline is currently the biggest infrastructure project in the Baltic Sea region, requiring a customised logistics concept to ensure that it will be built safely and with minimal impacts on the sensitive ecosystem of the Baltic Sea.

The Nord Stream Pipeline system is made up of two 1,224-kilometre long pipelines that will be situated almost parallel to one another. Over 200,000 concrete coated pipes will form the pipelines. The manufacture of these pipes, followed by concrete coating, storage, and finally the transport to the pipelay vessels is all part of the logistics chain developed by Nord Stream. In July 2008, Nord Stream and EUPEC signed a contract for the concrete coating of the pipes and logistics services for both lines of the Nord Stream Pipeline.

A total of 140,000 pipes are produced by EUROPIPE, a German company based in Mülheim an der Ruhr. From Mülheim, the steel pipes are transported by train via DB Schenker Rail Deutschland AG to Mukran on the German island of Rügen, and also to Bremen, where a portion of the pipes will be trans-shipped to Kotka, Finland. A further 50,000 pipes are produced by the Russian manufacturer, OMK. These pipes are transported by train by Russian Railways to Kotka. The final 10,000 pipes are being made in Japan by Sumitomo, and these will be transported by ship. All of the pipes are concrete coated in either Mukran or Kotka, and from there they are loaded onto pipe carrier vessels and transported to interim marshalling yards in Karlskrona or Slite, Sweden, or to Hanko, Finland.

In April 2010 when construction of the first pipeline began, approximately two-thirds of the pipes needed to build it were already stored at the five harbours around the Baltic Sea. By the end of July 2010, 100,000, or half of the pipes needed for the entire project, had been concrete coated. The steel pipes all receive a concrete coating in order to double their weight, ensuring stability on

the seabed, and also to protect them from damage. After analysing whether to use existing concrete coating plants in Scotland, Norway, or France, for example, or to build new ones closer to the pipeline route, Nord Stream opted to build plants in Mukran and Kotka. Building these new plants proved to be more cost effective than using existing plants, and more importantly this was the more environmentally-friendly option, due to the significantly reduced transport distances to the pipeline route. In fact, these shorter transport routes result in a 200,000 tonne reduction in CO₂.

Sustainable Investment

The total value for the raw materials and labour for the logistics for the Nord Stream project is about 650 million euros; 100 million euros of which were invested into establishing the coating and logistics infrastructure sites around the Baltic Sea. The development of these sites also resulted in the creation of 600 new jobs. Investments in the logistics infrastructure will also have long-term, positive indirect effects on business development and employment in all these locations.

An environmentally-based strategy of short transportation routes, along with increased efficiency are the basis of Nord Stream's logistics concept. The harbours Mukran and Kotka are well linked to railways, which means that 96 percent of all transport was handled via train and also by vessel, both environmentally sound means of shipment. Transport by lorry was limited to within the harbours themselves. The five sites are also less than 100 nautical miles (185 kilometres) from the pipeline route, which further reduces greenhouse gas emissions, and enables pipe carrier vessels to make a round trip within 24 hours.

"Ship-to-Ship" Delivery in Slite

Slite, on the Swedish island of Gotland, is centrally located at the midway point of the Nord Stream Pipeline route, making it a prime location for an interim marshalling yard. While the existing port of Slite was ideally located, it unfortunately did not meet other necessary requirements for the project as its quay was not large enough to accommodate the loading and unloading of pipes, and it did not have the space necessary to store pipes.

With these factors in mind, Nord Stream decided to develop a specialised logistics concept for this site. The first step was to modernise the existing quay in order to make "ship-to-ship" delivery possible. This means

that concrete coated pipes can now be transported by carrier vessel from Mukran to the Slite harbour. These pipes are lifted by a mobile crane situated on the quay in Slite directly onto the smaller transport vessel on the opposite side of the quay. As the transport vessel from Mukran holds more pipes than the ship which will bring pipes to the pipelay barge, the surplus is stored on the quay for the next carrier vessel that arrives, or at the nearby interim marshalling yard.

While the majority of cargo handled in Slite takes place in the harbour, up to 6,000 pipes are stored at the secure interim marshalling yard located 1.5 kilometres from the harbour.



Pipes are transferred from one ship to another at the Slite quay.

Nord Stream Logistics Concept

> A pipeline is a major infrastructure project, and many materials are needed at the right place at the right time to ensure its smooth and timely construction. The backbone of the Nord Stream project is a thoroughly planned, environmentally-friendly logistics concept.

The complex Nord Stream logistics concept was first developed in 2006, four years prior to the start of construction of the first of the two 1,224-kilometre pipelines in April 2010. This seemingly early start was necessary not only to assess logistics locations along the Baltic Sea coast for technical feasibility, but also to develop infrastructure, and choose suppliers for raw materials as well as contractors for handling the transport and manufacture of

pipes. Five ports less than 100 nautical miles from the pipeline route were chosen to reduce transport distances, thereby minimising environmental impact. Kotka, Finland, and Mukran, Germany, are the logistics hubs for concrete weight coating and are also interim marshalling yards. The ports of Slite and Karlskrona, Sweden, and Hanko, Finland, serve as interim stockyards. From these five sites, 200,000 pipes will be trans-shipped to build the twin pipelines.

1 Pipes and Materials Delivered

Pipes reach Mukran and Kotka by rail and ship. Cement, magnetite, sand and aggregate are delivered for the concrete coating.

2 Concrete Weight Coating

Concrete weight coating: 60 - 110 mm
Pipe steel: 27 - 41 mm
Antifriction coating
Corrosion protection: 4.2 mm

Each 12.2 m pipe is coated with concrete, doubling its weight to 20-30 tonnes. The weight provides stability on the seabed.

3 Transport to Marshalling Yards

After the steel pipes are concrete coated in Mukran and Kotka they are trans-shipped to interim marshalling yards.

4 Temporary Storage

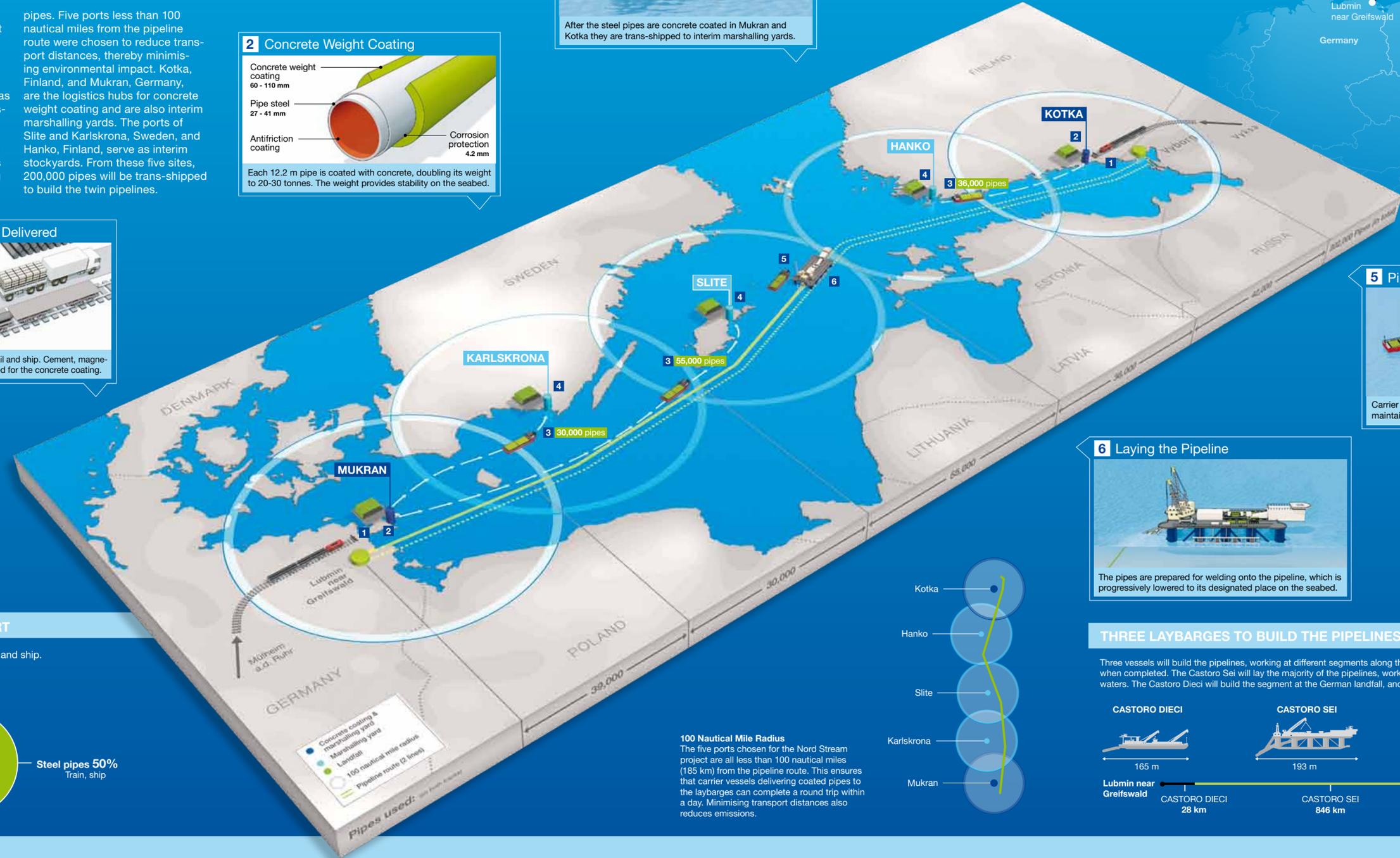
Concrete coated pipes are stored at each of the five marshalling yards located strategically along the route.

5 Pipes Delivered to Laybarges

Carrier vessels continuously deliver pipes to the laybarges to maintain a 24-hour construction schedule.

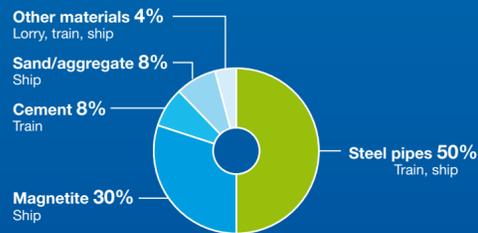
6 Laying the Pipeline

The pipes are prepared for welding onto the pipeline, which is progressively lowered to its designated place on the seabed.



ECO-FRIENDLY TRANSPORT

96% of all transport is handled by train and ship.



100 Nautical Mile Radius
The five ports chosen for the Nord Stream project are all less than 100 nautical miles (185 km) from the pipeline route. This ensures that carrier vessels delivering coated pipes to the laybarges can complete a round trip within a day. Minimising transport distances also reduces emissions.

THREE LAYBARGES TO BUILD THE PIPELINES

Three vessels will build the pipelines, working at different segments along the route. The segments will be connected underwater when completed. The Castoro Sei will lay the majority of the pipelines, working in German, Danish, Swedish, Finnish and Russian waters. The Castoro Dieci will build the segment at the German landfall, and the Solitaire will work in Finnish and Russian waters.



THE LOGISTICS TIMELINE

