wire 2014: The sector is in the fast lane

The energy turnaround in Germany makes it necessary to modernse and scale up the country's „power autobahn“. An intelligent distribution grid could also be of interest for other European states. Cable manufacturers can hope for numerous orders, the sector is in the fast line.

Around three years ago, the nuclear disaster occur ed in Daiichi, Japan. An earthquake and tsunami caused catastrophic failure at the Fukushima nuclear power plant. Meltdowns took place in several blocks. An entire region was contaminated with radioactivity. In contrast to most European countries, the German government immediately drew consequences. The Federal Government announced a move away from nuclear power and the promotion of renewable sources of energy.

Energy turnaround, thunderbolts and lightning

For the European countries, Germany's turnaround in energy police struck like a thunderbolt. While Europe was rubbing its eyes in surprise following the drastic step and solo effort, politics and business in Germany worked together at implementing the energy turnaround. Comparable projects in European countries are far smaller. Others abstain completely from a turnaround.

One thing is certain: the power grid has to be scaled up and new, environmentally friendly power plants will be built – cable makers can start shipping. For the industry, the energy turnaround was a windfall. However, it isn't always easy to be a pioneer. Implementing the turnaround is proving more difficult than originally thought, as the figures from a grid study released by German energy agency Dena in late 2010 show. Back then, renewables accounted for 20 percent. By 2020, there share is to be over 30 percent. This is in light of the fact that the last German nuclear power plant will go offline in 2022. The

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7 – 11 April 2014
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next few years will be a tour de force for grid operators and energy companies.

New high voltage power lines

The ambitious project can only be realised with an additional 3600 kilometers of new high voltage power lines running through Germany. A total of 36 expansion and grid reinforcements projects are up for discussion – with total costs of at least ten billion euro. The task is to build a sufficient power transport and stores capacity, throughout the entire country. Costs, however, vary: should the power lines be rolled out as underground cables, costs will rise.

One of the cornerstones of nationwide power supply with an increasing share of renewables is the construction of so-called „power highways“, which normally lead from the north into the south of Germany. The development of wind energy on land and off the northern coasts make further power lines necessary. However, costly plan approval procedures and citizen participation first need to be implemented successfully.

Convincing the public

Planners need to work conscientiously and make an effort to involve local residents, in order to avoid things from falling apart like the „Stuttgart 21“ train station project. There is resistance to the plans, especially in Bavaria, where the populace fears a its landscape will be cut up by numerous high voltage transmission lines. The public still needs to be convinced.

One of the largest power line projects of the energy turnaround is the so-called Suedlink transmission network. In 2022, the high voltage direct current (HDVC) transmission is supposed to transport energy from renewable sources from Schleswig-Holstein in the north to the high-consumption regions of Bavaria and Baden-Wuerttemberg. Spanning 800 kilometers, Suedlink will be Germany's longest transmission network. It is being planned and constructed as a joint

venture of the two Germany grid operators TenneT/Bayreuth and TransnetBW/Stuttgart.

Suedlink, a major-scale project

The grid operators are naturally convinced of their project. "With this power line we will be building the main artery of the energy transition, which will bring regenerative wind power from the north to the south of Germany. With this we will be making an important contribution to the energy supply of the future," explained Martin Fuchs, chairman of Tennet's managing board. "The power line is particularly important to those of us here in the south of Germany. It will secure the energy supply to the region in times when an increasing amount of assured power generation from coal or nuclear power plants will be decommissioned," stated Rainer Joswig, CEO of TransnetBW GmbH. .

Suedlink will be based on a high voltage direct current (HDVC) technology, which is particularly suited for the transmission of power over large distances. Thus, power networks which aren't the status quo will be used. An alternating current transmission won't be used here, as it would have higher losses, owing to the length of the power line.

Connected to Norway

Both operators claim the HVDC-based Suedlink power line will play an important role in nationwide balance of renewable energy throughout Germany. Thus. requirements are high for cable manufacturers that need to deliver the proper conductive material. For the greatest part, Suedlink is supposed to be operated as an overhead line with a direct current of around 500 kV. It will have a transmission capacity of four gigawatts, two gigawatts for each line. Construction is planned to commence in 2016, and it is to be completed by 2022.

Requirements for cables to be used for the Nordlink project will be just as high. Should all permissions make it on time, Nordlink will be put into service in 2018. Nordlink will directly connect the power grids in Germany and Norway. Its goal is to utilise Norway's hydroelectric power for Germany, making it a „solid pillar of our energy turnaround". emphasises Robert Habeck, minister for the energy turnaround, environment, agriculture, and rural areas in Schleswig-Holstein. „If there is hardly any wind, or none at all, we can rely on hydroelectric power from Norway, instead of having to keep coal power plants in reserve." Or, in other words: „a European grid will help to balance weather-dependent power feed from wind and solar energy sources between the regions", underscores Rainer Baake, director of Agora Energiewende. High input of wind energy in Germany can be stored temporarily in Norwegian storage power plants.

410 meter deep cables

A transmission capacity of up to 1400 MW is intended for the link between the German federal state of Schleswig-Holstein and southern Norway. Cables weighing between 35 and 50 kg/m will lie in depths of up to 410 Meter on the floor of the North Sea. The cables will have diameters of around eleven to thirteen centimetres. Voltage is supposed to be between 450 and 525 kV. As alternating current is used to supply power in Germany and Norway is based on, converter stations need to be built in both countries, to convert alternating current into direct current. This is supposed to minimise power loss, which could otherwise occur over the distance.

A special cable laying vessel will lay the Nordlink cable on the seabed. A hydraulic plow will dig out a trench on the seabed, in which the cable is buried and covered with the excavated seabed. In areas with a rock seabed, the cable can be protected by sinking stones.

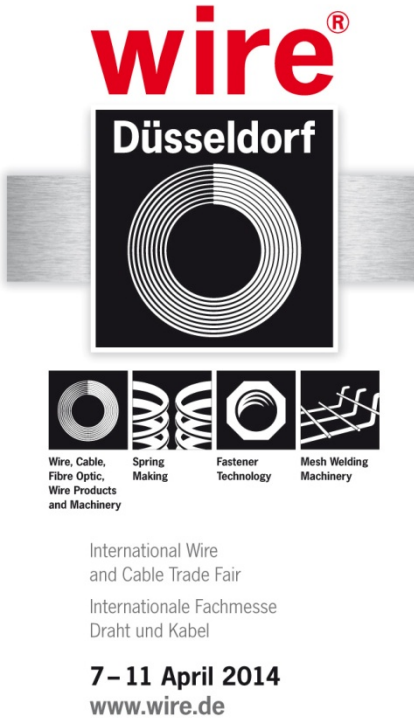
Nordlink is an example for how the German turnaround in energy policy is to a certain degree becoming a European project. Furthermore, there are plans to lay a second cable to Great Britain in 2020, creating a basis for a European grid. Here, cable manufacturers can also expect major orders.

Decentralised power generation

A further part of the energy turnaround's strategy is decentralised power generation. Energy company RWE Deutschland has adapted to this strategy and is supporting home owners, municipal facilities and companies. They themselves can generate and distribute power. As a consequence, distribution grids in the futures will be fed with far more power from newly created, decentralised power generation plants, while at the same time having to handle fluctuations from solar and wind energy sources. In rural regions, grids are therefore being retrofitted and expanded.

In addition, the distribution grid needs to be designed more intelligently, in view of power fluctuations. As part of the EU-backed research and development project Grid4EU, RWE is enhancing the mean voltage (MV) network in the town of Reken, located in the federal state of North Rhine-Westphalia, so that it will in future be able to flexibly react when power from renewables is added to the load. „Agents“ are being implemented into the MV network to create a „smart grid“, which can automatically control, monitor and utilise a power network. Further EU grid projects are underway in Uppsala, Sweden and in Castellón, located in Spain. The projects are designed to test the potential of smart grids for integrating renewable energy.

A smart grid and an energy storage facility have been put into operation on the North Sea island Pellworm. Local storage of power from renewables, as well as the operation of an intelligent grid are here being tested and developed further. „SmartRegion Pellworm“ is the first smart grind in Northern Germany.



The world's longest HTS cable

Cables are also being developed to perform better and more efficiently. An ambitious project in this context is „AmpaCity“. Since April 2013, the world's longest high-temperature superconducting cable is being laid below the ground. Over the length of one kilometer, a modern 10m000 volt superconductor cable will replace two regular 110,000 volt lines between two substations in Essen’s city centre. „Superconductors are regarded as forward-looking solution for space-saving and particularly efficient transmission of electricity in urban areas “, states RWE. Experts claim it will be economical to roll out superconductor cables regionwide already in just a few years.

Cable manufacturers can not only expect orders owing to the demand for modern distribution grids, but also from modern energy plants. Especially wind parks require the proper cables. TenneT, for example, connected the Riffgat wind park off the coast of Borkum. Since February, sustainable wind power has been transmitted from sea to land. Following in the footsteps of alpha ventus , this project is TenneT's second offshore grid connection using three-phase AC. The connection is an 80 kilometer long 155 kilovolt line, which is fed into the 220 kv network in the Emden/Borssum transformer station. The transformer station had to be expanded. The installed power capacity is 108 MW. Next to around 50 kilometers of submarine cable, 30 kilometers of buried cable were laid.

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Role Model for Europe?

With the energy turnaround, Germany has taken a Herculean task on itself. In view of the power grids, all stakeholders, be they the government, energy companies and cable manufacturers, have to face great challenges. Should the turnaround prove to be a success, then it might see other states also undertake a turnaround in their respective energy policies. A model for success, which would create lucrative orders for cable manufacturers across the whole of Europe.

Further technological innovations can be seen at wire 2014 , International wire and cable trade fair, from April 7- 11 at Düsseldorf fairgrounds.

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