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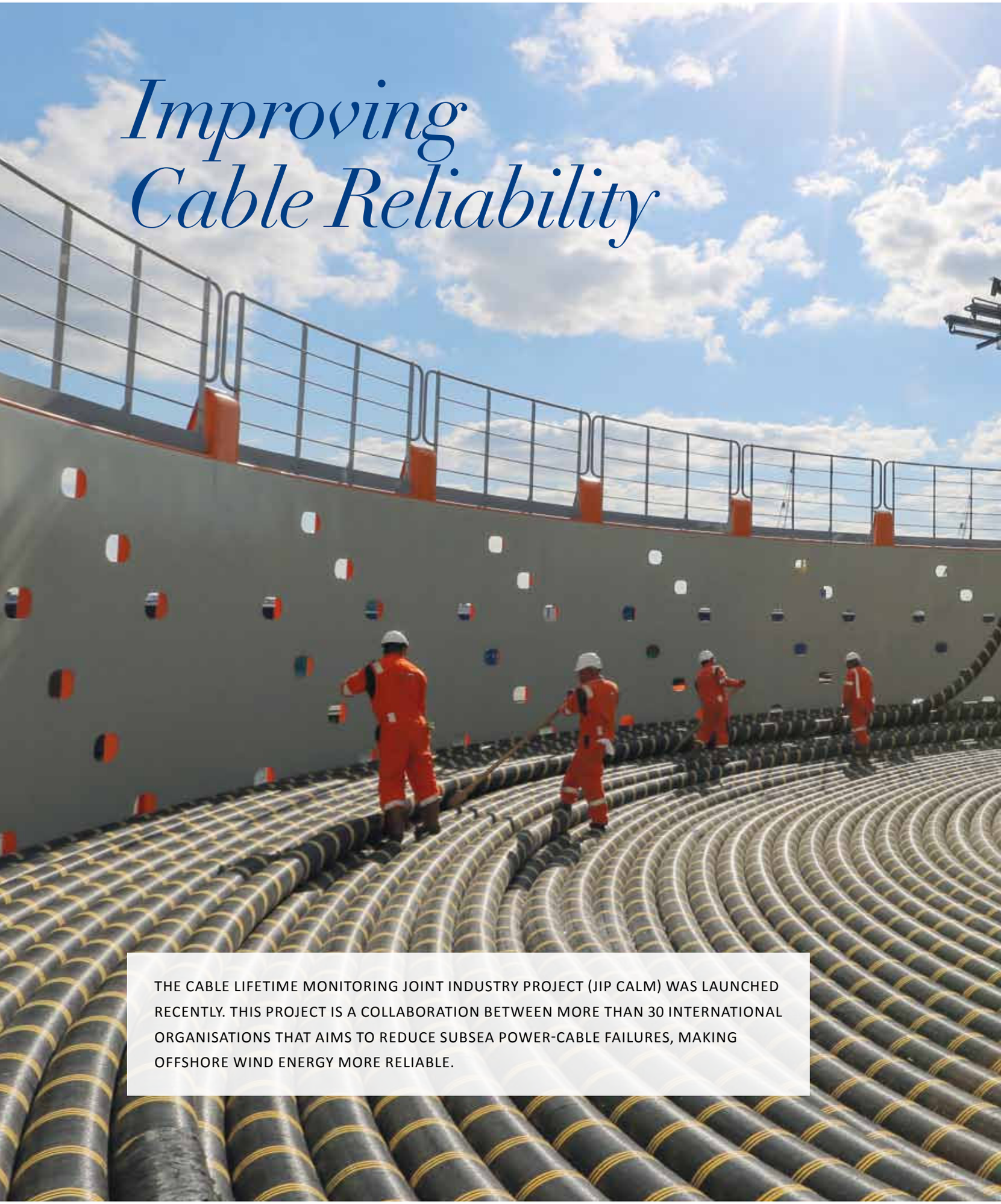
Improving Cable Reliability



THE CABLE LIFETIME MONITORING JOINT INDUSTRY PROJECT (JIP CALM) WAS LAUNCHED RECENTLY. THIS PROJECT IS A COLLABORATION BETWEEN MORE THAN 30 INTERNATIONAL ORGANISATIONS THAT AIMS TO REDUCE SUBSEA POWER-CABLE FAILURES, MAKING OFFSHORE WIND ENERGY MORE RELIABLE.

Photo courtesy of Van Oord.

Both inter-array cables and export cables show failures.

Photo courtesy of Deltares.

Inge Kamp, Offshore Engineer at Deltares and coordinator of the CALM project.

The global transition to a sustainable energy mix requires the development of offshore windfarms. Connecting the electricity supply from offshore windfarms to the electricity grid on land demands reliable transmission from offshore to onshore through subsea cables. That is a challenge.

Large Impact

"When looking at offshore windfarms," Ms Inge Kamp, Offshore Engineer at Deltares and coordinator of the CALM project, explains, "failing subsea power cables are one of the main risks affecting development and operations. They account for 70-80% of the insurance claims in the offshore wind industry. The impact of cable failures is this large because they can shut down the power supply of an entire section of turbines or, in case of an export cable, even an entire windfarm. Additionally, cable inspections and repairs are expensive, time-consuming maritime operations. They can easily be delayed for a few weeks or months because of the weather or limited vessel availability, severely impacting revenue and reducing the technical lifetime of a subsea cable. Reducing the risk of subsea-cable failure will make the offshore energy grid more reliable and give more control over the costs of the offshore cables throughout their lifetime.

Industry Support

JIP CALM was initiated by DNV-GL, ECN part of TNO, BREM Funderingsexpertise, VanDerHoekPhotonics and Deltares. So far, over 30 international industry partners, ranging from suppliers to system integrators, end users and regulators, have joined the project. Due to the wide range of partners, improvements are expected in the areas of design, installation, operations and maintenance of subsea cables. Ms Kamp states, "The consortium enables us to really improve the industry standards for all phases of the lifetime of a subsea cable, and to develop technologies that are well-reviewed and supported by the industry. Our aim is to cut the levelised cost of electricity, insurance costs and the CO_2 footprint of the offshore industry."

Four Pillars

The works performed within the CALM project can be summarised in four >>

Cable inspections and repairs are expensive, time-consuming maritime operations.

Photo courtesy of General Cable.

A subsea cable is a complicated product, consisting of multiple components made from different materials, each with their own characteristics.

categories. “Currently, there is very little statistic information available on subsea cable failures”, Ms Kamp explains. “This is mainly because a lot of information about this is kept private. We are gratefull, however, that so many partners have joined us and committed to share information in order to collectively improve the industry standards together. Our first aim is to collect as much information about cable failure cases as possible from the participating companies, which will then be analysed by the cable experts at DNV-GL, TNO and other partners to identify the root causes.” Based on this, recommendations will be made to improve the industry standards for the design, manufacturing, testing, installation and operation of the subsea cable systems. A second topic covered in the project is the development of cable lifetime monitoring techniques. “If you could continuously monitor the condition of a cable from fabrication through to operation, you would be able to understand the mechanism and predict a failure before it happens”, Ms Inge Kamp says. “Most subsea power cables contain fibre-optic cables for data transmission. However, these fibre-optics can be used for much more! They are already being used to extract information about the temperature of the cables during operation. We want to take this a step further, to really go towards an early warning system where fibre-optic cables show you the condition of cables throughout their entire lifetime. This information could also be stored in the form of a ‘log book’ of the history of a cable.” She continues, “A third issue we are aiming at, is improving the predictions of the seabed dynamics. It is known that these processes can expose subsea cables, which significantly increases the risk of third party damage.”

Finally, an impact assessment tool will be developed to predict the achieved cost reductions, by detailed logistics modelling of transport and installation and operations and maintenance. All findings from the project will eventually be incorporated into recommended practices.

A Complicated Product

A subsea cable is a complicated product, consisting of multiple components made from different materials, each with their own characteristics when looking at conductivity or strength versus flexibility, for example. This, in combination with the harsh offshore environment, makes it hard to predict, and thus prevent, failures. Ms Kamp explains, “Both inter-array cables and export cables show failures. The outcome of the project will be suitable for existing, as well as for future, offshore windfarms. The focus of the JIP lies on the North Sea, but offshore windfarms installed in other areas will profit as well.” The project will run until the end of 2021 and is supported by the Dutch Ministry of Economic Affairs and Climate Policy through the Netherlands Enterprise Agency (RVO). It is expected that intermediate results will be presented during the course of the project. “We really look forward to this unique cooperation between so many parties from both the offshore wind and cable industries,” Ms Kamp ends.

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