SCOUR AROUND OFFSHORE WIND TURBINE FOUNDATIONS

Analysis of scour around monopiles at your fingertips with the DHI Scour Calculator

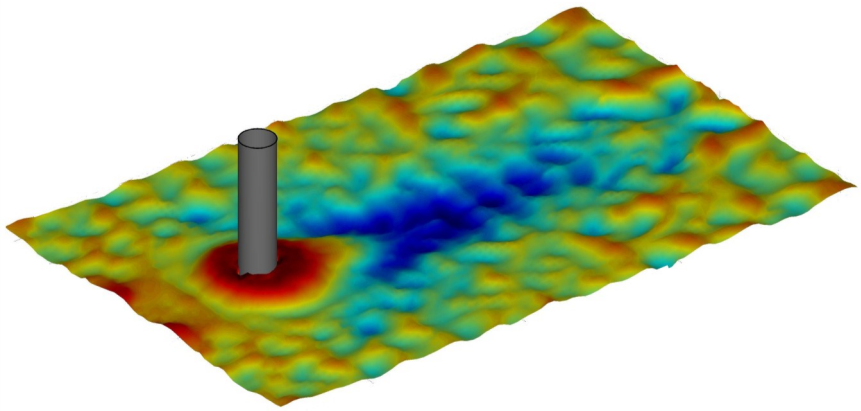
The total offshore wind power capacity is expected to reach 75GW by 2020 and the possibilities are immense. The offshore wind energy industry is stricken with the burden of heavy capital investments. Lowering levelized cost of energy is a challenge for the industry and for planning modern energy infrastructure. We have developed a scour prediction tool which can support the offshore wind industry in their search for lower costs and reduced uncertainty – our Scour Calculator. The Scour Calculator tool can help you predict long-term monopile scouring due to concurrent waves and currents, support simpler and safer turbine foundation designs, and contribute to a reduction of required investment.

OFFSHORE CHALLENGES FOR THE WIND INDUSTRY

When initiating an offshore wind project, larger turbines with more energy capture capability make more economic sense. However, larger turbines require increased investment costs and greater foundation requirements.

Offshore wind farms may be installed on monopile foundations at water depths of up to about 30 metres. The coastal sediments in these areas are often sand and silt, making the seabed very mobile.

As such, one of the most prominent risks to the offshore foundations is scouring due to the wave and current action, which may have a significant effect on the total load on the turbine.



Scour around a protected monopile. © DHI

CLIENT

- Developers and designers of offshore wind energy
- Contractors and certifiers
- Local and national authorities
- Universities and research institutions

CHALLENGE

Protecting exposed wind turbine foundations in harsh offshore environments – a challenging and costly task

SOLUTION

Our Scour Calculator makes proper planning of environmental conditions and scour simple

VALUE

- Predicts site-specific scour around offshore structures, reducing costs, uncertainty, and risks while supporting innovative solutions
- Supports reduction in levelized cost of energy for the offshore wind industry
- Includes a web-based, user friendly interface – backed by experts, courses, and professional support

SCOUR RISKS AND STEEP PRICES – THE NECESSITY OF SCOUR PREDICTION

The presence of a monopile in a marine environment changes the flow pattern in its immediate area, resulting in increased local sediment transport. This causes scouring of the seabed around the monopile – a serious risk that may compromise the stability of the wind turbine foundation.

In addition, the cables on the seabed may risk exposure due to the eroded seabed around the monopile. The foundation must therefore include relatively costly scour protection.

Today, scour protection for a single wind turbine foundation may cost up to EUR 150,000, which adds to the high investment costs. Accurate long-term predictions of scour may reduce this cost and enable the development of innovative solutions, such as improved J-tube designs.

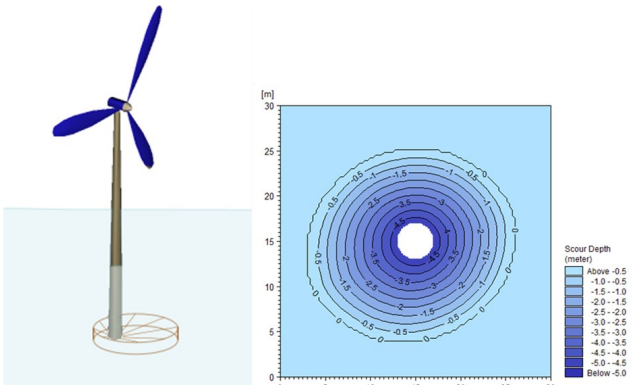
Optimising scour protection using physical model tests. © DHI

THE SCOUR CALCULATOR

Using realistic Metocean data (waves, water level, and currents), site specific sediment characteristics, and structural properties as a basis, our Scour Calculator provides estimates of scour development.

The results are the dynamic development of the scour geometry during a specified period. The Scour Calculator is a scientifically-backed, state-of-the-art research tool that supports you by:

- predicting site specific long-term scour around offshore foundations, providing a basis for scour protection planning
- providing an easy plug-in extension tool to MIKE 21 wave and current simulations
- providing professional and attractive presentation results for project, educational or public presentations



Example of scour analysis using Scour Calculator. © DHI

The Scour Calculator is part of MIKE Powered by DHI's MIKE 21 Toolbox and is available to all users – see www.mikepoweredbydhi.com for more information.

REFERENCE

We have several years of experience working with the offshore wind industry, including providing solutions for scour and sediment related problems. Read more about how we helped design scour protection around Horns Rev, a 160 MW offshore wind farm off the coast of Denmark: http://goo.gl/PK9ao3.

The Scour Calculator is part of our continuous research and innovation efforts that support the offshore industry. For more information on this and our other work in coastal and marine environments, please check here: http://goo.gl/Wjeyhr.

We also offer courses on marine scour at regular intervals through THE ACADEMY by DHI: http://goo.gl/nX5jPx. For more information about our thematic course on how to protect against or mitigate scour formation around offshore wind turbines, take a look at our video introduction: https://goo.gl/RJSgUA. Take a look at our course calendar for the next scour-related course: http://goo.gl/tVtU2B.

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