Mapping Emissions to Drive Effective Decarbonisation

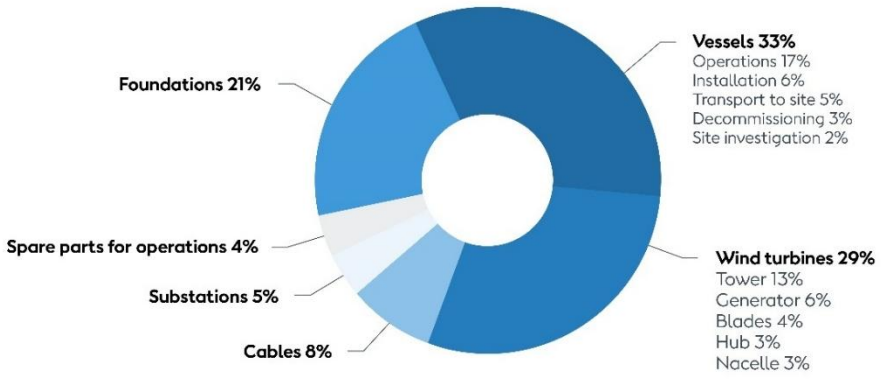
Ørsted has a validated science-based net-zero target for 2040 and has already reached a major milestone by meeting its SBTi target to reduce scope 1-2 emissions intensity with 98 % from 2006 to 2025. This effectively marked completing a green transformation into a renewable energy company, that saw the company's business model pivot from fossil fuels, to becoming a global leader in offshore wind.

Existing lifecycle assessment (LCA) studies show that offshore wind energy has up to a 99% lower emissions footprint than fossil-based energy generation over the full asset lifecycle. Nevertheless, given the company's significant investments in offshore wind development, Ørsted is committed to further decarbonize their energy generation portfolio in line with climate science.

To tackle the next phase of Ørsted's decarbonisation journey, now with a focus on supply chain emissions, Ørsted developed a robust internal LCA model tailored to offshore wind assets. The work began with a comprehensive LCA of a single offshore wind farm to identify environmental hotspots. The insights and data from this initial assessment formed the foundation for the company's current LCA model, which has since been refined over time to better reflect different wind farm configurations.

The development of the model required careful consideration of data availability and technical assumptions. Offshore wind projects vary significantly in design and location. For example, asset-specific characteristics such as foundation type, depending on seabed conditions and water depth, type and length of the export cables, and manufacturing processes across components all impact lifecycle emissions. In addition, wind turbine capacity and site-specific conditions affecting the annual energy production also impact the carbon footprint when expressed as emissions intensity (gCO2e/kWh), and the model was designed to reflect this variability rather than rely solely on average datasets.

Application of the model has enabled the identification of emissions drivers for offshore wind assets. The most emissions come from the production of steel for the foundations and towers, and from marine fuel from vessels transporting, installing and operating the wind farms (as shown in the chart below). These insights support strategic decarbonisation planning and inform priorities for supply chain engagement to focus efforts where they can have the greatest impact.



These numbers are based on an Ørsted life cycle assessment of an average offshore wind farm. In practice, we see substantive variation in the total emissions and the drivers of emissions between wind farms due to differences in factors such as (but not limited to): The distance to shore, depth of waters, wind farm layout, wind turbine capacity, and specific low-carbon solutions implemented in the supply chain and operations of the wind farm.

Externally, the model strengthens the credibility and transparency of Ørsted's scope 3 emissions reporting. As regulatory expectations evolve—particularly with the introduction of the EU's Corporate Sustainability Reporting Directive (CSRD)—having a structured and documented methodology has become increasingly important. The LCA provides a consistent basis for disclosures to regulators, investors, and other stakeholders.

As LCAs became more widely used across the offshore wind sector, methodological differences became apparent. For example, system boundaries defining which wind farm components are included varied across assessments. Similarly, impacts from waste treatment and recycling were estimated and allocated using different methods, leading to substantial differences in reported lifecycle emissions. These inconsistencies limited the ability to compare carbon footprints and hindered coordinated decarbonisation efforts across the supply chain. Divergent methodologies can lead to differing results, hindering a shared understanding of emission hotspots. As a result, a growing need for a more granular and consistent approach to measuring emission hotspots became apparent and was recognised across the industry. This led to the establishment of the Sustainability Joint Industry Programme (SUSJIP), with Ørsted as one of the founding partners.

Scaling action through alignment

With SUSJIP, the offshore wind sector has established a platform for working together with peers to develop an industry-backed standard for lifecycle assessment of offshore wind farms. This provides a common framework for understanding and addressing emissions across projects and supply chains. Decarbonising offshore wind supply chains requires joint action from developers, suppliers and policy makers, with harmonised carbon footprinting serving as an important first step. Shared methodologies create a common language for collaboration, enabling more targeted and coordinated decarbonisation efforts across the offshore wind industry – reinforcing the principle that what can be measured can be managed.

More concretely, by applying a common carbon footprinting methodology, developers can produce carbon footprint assessments that are consistent and transparent, which allows the readers to more easily compare the results and understand the limitations of such assessments. Such analyses help send clearer signals about where decarbonisation efforts can have the greatest impact.

Ørsted's LCA model closely reflects the SUSJIP methodology, and the next step is to align it further. This alignment will further enhance comparability and transparency, while maintaining the asset-level insights needed for internal decision-making.

Ørsted Quote

"The Ørsted vision is to create a world that runs entirely on green energy. Offshore wind already today comes with a 99% lower emissions footprint than electricity from coal. But given the large investments in new offshore wind projects, it is important that we as an industry also do our part, by contributing to decarbonize our supply chains.
Industry initiatives like SUSJIP and harmonised carbon measurement are essential to create a shared foundation for action—scaling decarbonisation across offshore wind."

- Anders Enghild, Head of Sustainability, Ørsted