

# Seagreen Offshore Wind Farm project

## Harvesting wind energy to generate green electricity



The Seagreen Offshore Wind Farm project aims at generating green electricity from wind energy. Seagreen will be Scotland's largest and the world's deepest offshore wind farm when complete. The 114 Seagreen wind turbines with 1075 MW installed capacity will provide enough green energy to power more than 1.6 million homes, equivalent to two-thirds of all Scottish homes<sup>1</sup>.

<b>Starting date of the project</b>	First power is expected mid-2022 with the offshore wind farm expected to enter commercial operation in the first half of 2023.																	
<b>Project Localisation</b>	Scotland – UK. 27 km off the coast of Angus in the North Sea.																	
<b>Project objectives</b>	Contribute to decarbonize UK electricity mix																	
<b>Detailed project description</b>	<p>With its low greenhouse gas emissions, wind power is a solution to decarbonize carbon intensive electricity mix of the future. TotalEnergies, as part of its ambition to be a world-class player in the energy transition, is developing its offshore wind power portfolio worldwide. The Seagreen project contributes to TotalEnergies' target of 100 GW of installed renewable power generation capacity by 2030 and is aligned with the company's ambition to get to net-zero emissions for all businesses by 2050, together with society.</p> <p>The Seagreen Offshore Windfarm is making a significant contribution to the decarbonisation of the UK electricity generation mix and to its net zero ambition by 2050 (2045 for Scotland).</p> <p>Seagreen is also delivering significant economic benefit to Scotland and the UK. The project is powering a green, economic recovery and supporting high value green jobs in Scotland, including direct, contractor and supply chain roles.</p> <p>In 2010, the Crown Estate awarded Seagreen Wind Energy Limited (SWEL, a joint venture between TotalEnergies - 51% - and SSE Renewables - 49%) the exclusive development rights for the Firth of Forth Zone of the UK's Round 3 offshore wind farm development programme. The Zone, located at 27 km from the Angus coastline, covers an area of around 3091 km<sup>2</sup> in the outer Firth of Forth.</p> <p>SWEL works closely with stakeholders and undertook extensive surveys and assessments to develop the Seagreen offshore wind farm. 114 turbines are currently under construction for a total installed capacity of 1075 MW.</p>																	
<b>Main project's drivers for reducing the greenhouse gas emissions</b>	<table border="1"> <thead> <tr> <th data-bbox="480 1576 983 1608">Reduction levers</th> <th data-bbox="983 1576 1481 1608">Details on the aspects of the project</th> </tr> </thead> <tbody> <tr> <td data-bbox="480 1608 983 1659"><input type="checkbox"/> Energy and resource efficiency (including behaviour)</td> <td data-bbox="983 1608 1481 1659"></td> </tr> <tr> <td data-bbox="480 1659 983 1711"><input checked="" type="checkbox"/> Energy Decarbonisation</td> <td data-bbox="983 1659 1481 1711">Decarbonisation of the UK electricity generation mix.</td> </tr> <tr> <td data-bbox="480 1711 983 1762"><input type="checkbox"/> Energy efficiency improvements</td> <td data-bbox="983 1711 1481 1762"></td> </tr> <tr> <td data-bbox="480 1762 983 1814"><input type="checkbox"/> Improving efficiency in non-energy resources</td> <td data-bbox="983 1762 1481 1814"></td> </tr> <tr> <td data-bbox="480 1814 983 1865"><input type="checkbox"/> Emissions absorption: creation of carbon sinks, negative emissions (BECCS, CCU/S, ...)</td> <td data-bbox="983 1814 1481 1865"></td> </tr> <tr> <td data-bbox="480 1865 983 1917"><input type="checkbox"/> Financing low-carbon producers or disinvestment from carbon assets</td> <td data-bbox="983 1865 1481 1917"></td> </tr> <tr> <td data-bbox="480 1917 983 1924"><input type="checkbox"/> Reduction of other greenhouse gases emission</td> <td data-bbox="983 1917 1481 1924"></td> </tr> </tbody> </table>		Reduction levers	Details on the aspects of the project	<input type="checkbox"/> Energy and resource efficiency (including behaviour)		<input checked="" type="checkbox"/> Energy Decarbonisation	Decarbonisation of the UK electricity generation mix.	<input type="checkbox"/> Energy efficiency improvements		<input type="checkbox"/> Improving efficiency in non-energy resources		<input type="checkbox"/> Emissions absorption: creation of carbon sinks, negative emissions (BECCS, CCU/S, ...)		<input type="checkbox"/> Financing low-carbon producers or disinvestment from carbon assets		<input type="checkbox"/> Reduction of other greenhouse gases emission	
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<sup>1</sup> 1.62 million homes powered per annum based on Typical Domestic Consumption Values (Medium Electricity Profile Class 1, 2,900kWh per household; OFGEM, January 2020), typical 50% wind load factor, and projected installed capacity of up to 1.1GW. Two-thirds of homes in Scotland based on Household Estimates Scotland 2019 (National Records of Scotland, June 2020).

Emission scope(s) on which the project has a significant impact and quantification of GHG emission reductions per emission scope	Aspects of the project contributing to the reduction of emissions by emission category		Quantification of associated GHG emissions by emission category  Please follow the quantification methodology used in <a href="#">the Afep guidelines</a> .
	<b>Reduction of the company's carbon dependency</b>		
	<b>Scope 1</b> <i>Direct emissions generated by the company's activity.</i>		
	<b>Scope 2</b> <i>Indirect emissions associated with the company's electricity and heat consumption.</i>		
	<b>Scope 3</b> <i>Emissions induced (upstream or downstream) by the company's activities, products and/or services in its value chain.</i>		
	<b>Increase of carbon sinks</b>		
	<b>Emissions Absorption</b> <i>Carbon sinks creation, (BECCS, CCU/S, ...)</i>		
	<b>GHG emissions avoided by the company at third parties</b>		
	<b>Avoided Emissions</b> <i>Emissions avoided by the activities, products and/or services in charge of the project, or by the financing of emission reduction projects.</i>	Decarbonisation of the UK electricity generation mix.	<ul style="list-style-type: none"> <li>The annual production is estimated at 4304 GWh.</li> <li>The carbon intensity of the UK power generation from non-renewable sources is 440 tCO<sub>2</sub>e/GWh.</li> </ul> <p><b>In the operation phase, over 1.9 MtCO<sub>2</sub>e will therefore be avoided annually (all other things being equal).</b></p>
	<b>Clarification on the calculation or other remarks:</b> <ul style="list-style-type: none"> <li>The project installed capacity is 1075 MW. The typical offshore wind load factor, as advised by BEIS for 2020, is 45.7% (<a href="#">link</a>). This results in an estimated annual offshore wind farm production of 4304 GWh: <math>1075 \times 0.457 \times 8760</math> (nb of hours in a year) ÷ 1000 (to convert from MWh to GWh)</li> <li>The estimated GHG emissions from power generation from fossil fuels (coal, oil, gas and other solid fuels, including non-renewable waste) in the UK in 2020 is 440 tCO<sub>2</sub>e/GWh (<a href="#">link</a>).</li> <li>Assuming negligible GHG emissions in the operation phase of the offshore windfarm, individuals or businesses using green electricity from Seagreen instead of electricity from fossil-fuel power plants in the UK will reduce their annual scope 2 emissions by <math>4304 \times 440 = 1893.76</math> ktCO<sub>2</sub>e.</li> </ul>		
<b>Modality of verification of the quantification.</b>	<b>Calculation standard used (ADEME base, GHG protocol, etc.):</b> Data from the UK Department for Business, Energy & Industrial Strategy (BEIS) and the Digest of UK Energy Statistics (DUKES) 2021 ( <a href="#">link</a> ).  <b>Verification of the calculation (internal or external):</b> Internal verification.		
<b>Other environmental and social benefits of the project</b>	The project contributes to <i>SDG7 Affordable and clean energy</i> by increasing the generation of renewable energy, as well as <i>SDG13 Climate Action</i> as offshore wind is critical to meeting the UK's net-zero emission targets and is needed to deliver on ambitions set by the Climate Change Committee.  To ensure a low carbon footprint in its supply chain, as per <i>SDG12 Responsible Consumption and production</i> , the project has implemented several steps: inclusion of a sustainability questionnaire at the Invitation To Tender stage of procurement, signature of a Power Net Zero Pact with suppliers (including commitments to: achieve net zero emissions; protect and enhance the natural environment; transition to a circular economy; guarantee fair work and good green jobs; add value to communities), and incentive for suppliers to sign up to the Supply Chain Sustainability School ( <a href="#">link</a> ).  The project also contributes to <i>SDG8 Decent work and economic growth</i> and <i>SDG9 Industry, innovation and infrastructure</i> by delivering significant economic benefit to Scotland and the UK. The project maximizes the local supply chain content and drives economic growth and investment in local infrastructures (e.g. Montrose Harbour). Once the offshore wind farm is commissioned, the Seagreen Operations and Maintenance base in Montrose will be home to up to 120 full-time operational roles working to maintain the wind farm's turbines both from the Operations & Maintenance base and on offshore service operations vessels.		

	Finally, the project benefits <i>SDG4 Quality Education</i> by supporting STEM (science, technology, engineering and maths) skills in Dundee and Angus with a dedicated fund, and by encouraging contractors to address identified skills gaps and running local apprenticeship programmes.
<b>Project maturity level</b>	<input type="checkbox"/> Prototype laboratory test (TRL 7) <input type="checkbox"/> Real life testing (TRL 7-8) <input type="checkbox"/> Pre-commercial prototype (TRL 9) <input type="checkbox"/> Small-scale implementation <input checked="" type="checkbox"/> Medium to large scale implementation  <b>Remarks:</b> <a href="#">click here to enter the level of maturity of the project</a>
<b>Capacity and conditions of the project reproducibility, with associated climate impact mitigation potential</b>	<p>The project can be replicated in all countries depending on the following conditions: energy costs, wind resource, local permitting, local subsidies and taxation and technical feasibility.</p> <p>This project is aligned with the UK ambition to deliver 50 GW of offshore wind by 2030 and fits in TotalEnergies global offshore wind portfolio of more than 8 GW of projects under development and construction, including around 5 GW in the UK.</p>
<b>Amount of investment made (in €)</b>	3.5 G€
<b>Economic profitability of the project (ROI)</b>	<input type="checkbox"/> ST (0-3 years) <input type="checkbox"/> MT (4-10 years) <input checked="" type="checkbox"/> LT (> 10 years)  <b>Remarks:</b> <a href="#">click here to enter the information</a>
<b>Engaged partnerships</b>	<p>The project is a joint venture between TotalEnergies and SSE Renewables. In addition, the project is actively engaged in the following partnerships:</p> <ul style="list-style-type: none"> <li>• R&amp;D in collaboration with the UoS TIC (Technology &amp; Innovation Centre   University of Strathclyde) to reduce the cost of Operations &amp; Maintenance by improving wind farm performance</li> <li>• Collaboration with the Montrose Port Authority to increase the supply chain capacity through continued investment in infrastructure &amp; coordination of supply chain across wind farm developments</li> </ul>
<b>Open comments from the project owner</b>	The Seagreen project will be the world's deepest bottom-fixed offshore windfarm in the world when complete. It required the development of an innovative concept for the wind turbines foundations using suction caisson jackets.
<b>More about the project</b>	
<b>Contact the company carrying the project</b>	<a href="mailto:damien.burignat@totalenergies.com">damien.burignat@totalenergies.com</a>
<b>Project URL links</b>	<a href="https://www.seagreenwindenergy.com/">https://www.seagreenwindenergy.com/</a>
<b>Titre SEO</b>	Total's project aims at generating green electricity from wind energy.
<b>Méta Description</b>	The Seagreen Offshore Wind Farm project aims at generating green electricity from wind energy and will be Scotland's largest and the world's deepest offshore wind farm when complete.

Illustrations of the project





