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Offshore wind energy Patent insight report

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1. Introduction

1.1 The role of offshore wind energy in energy transition

Climate change is already impacting the world's largest economies as well as emerging economies and, urges the decision makers and stakeholders to adopt corrective actions urgently to tackle the global climate emergency. IRENA's World Energy Transitions Outlook 2023 edition has once again shown that the renewables based energy transition is the solution to the fight against climate change and the pace of the transition is currently off-track ¹.

Limiting global warming to 1.5°C will require cutting carbon dioxide (CO₂)

) emissions by around 37 gigatonnes

(Gt) from 2022 levels to achieve a net zero scenario in the energy sector by 2050. This will require a profound transformation of energy systems, including a massive deployment of renewable generation capacity. In 2022, IRENA's statistics show that renewables accounted for 83% of new annual generation capacity additions, with an additional 295 gigawatts (GW), reaching 40% of the total global installed capacity². Under IRENA's 1.5°C scenario, renewable generating capacity will need to reach above 33 000 GW by 2050.³

By 2050, wind (onshore and offshore) would significantly increase from the current 900 GW up to more than 10 000 GW, representing almost one-third of the total installed capacity from renewable sources. In terms of offshore wind, the global installed capacity would reach almost 2 500 GW by 2050. This entails a 40 times increase from today's level (63 GW by 2022) and makes offshore wind one of the leading technologies in the bid to achieve global climate targets within the next three decades.

¹ IRENA (2023), World Energy Transitions Outlook 2023: 1.5°C Pathway, Volume 1, International Renewable

Energy Agency, Abu Dhabi. <https://www.irena.org/Publications/2023/Jun/World-Energy-Transitions-Outlook-2023>
2 <https://www.irena.org/Publications/2023/Jul/Renewable-energy-statistics-2023>
3 IRENA (2023), World Energy Transitions Outlook 2023: 1.5°C Pathway, Volume 1, International Renewable Energy Agency, Abu Dhabi. <https://www.irena.org/Publications/2023/Jun/World-Energy-Transitions-Outlook-2023>

Yet the deployment of offshore wind comes with its own challenges. Even though the technology itself has experienced sharp cost reductions — a fall of 59% in the levelised cost of electricity (LCOE) ⁴ between 2010-2022, current commodity price inflation and higher interest rates are proving a challenging environment. In addition, aspects such as integrating this technology into the energy system via new interconnections, supply chain bottlenecks and logistical challenges, the demand for critical materials and recycling or the need for larger turbines and more robust foundations, among other factors, require further efforts, if we are to accelerate the sectors to the energy transition. Today, the offshore wind market remains smaller than the onshore wind market, with total installed capacities reaching 63 GW by 2022. Considering the current plans and targets set by countries as per IRENA's Planned Energy Scenario (PES), the global cumulative offshore wind capacity is expected to reach 275 GW by 2030 and close to 1 200 GW by 2050 respectively. This still falls behind of the 494 GW and 2 465 GW targets by 2030 and 2050 respectively in IRENA's 1.5°C Scenario.

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