

Coupling ocean energy with other sectors: Innovative business models and complementarities with renewable offshore technologies

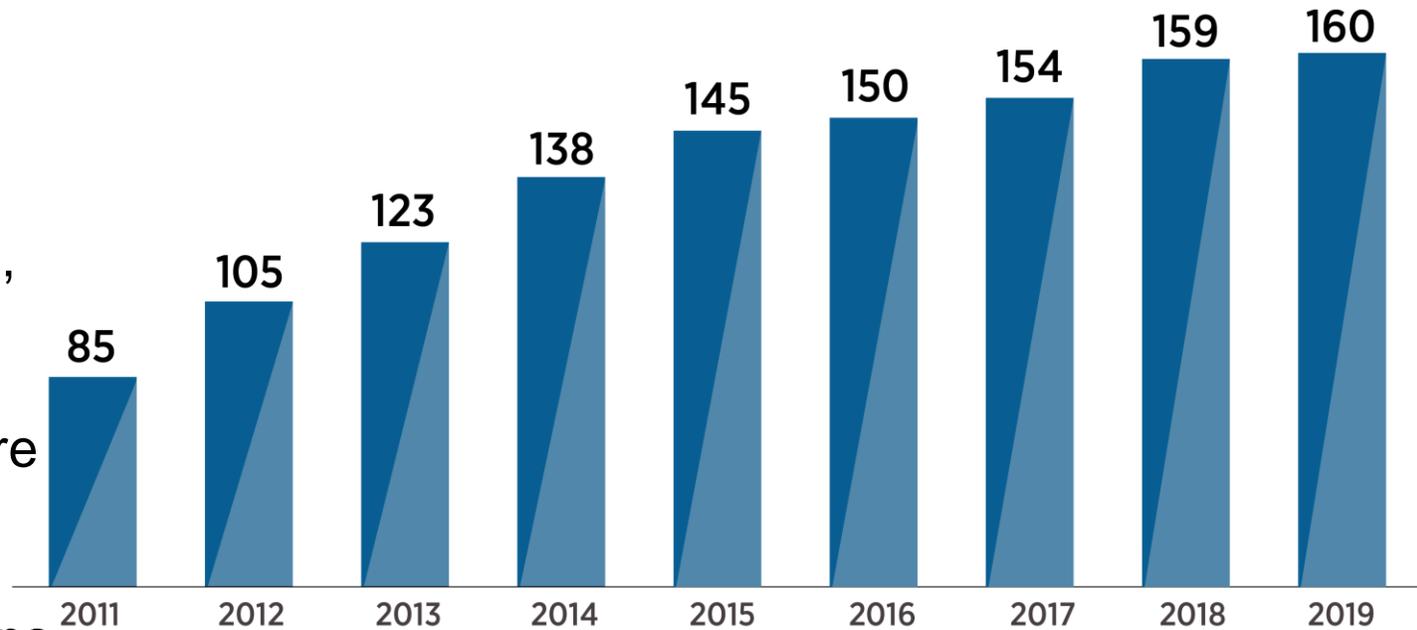


**16 - 18 October 2019
Halifax, Canada**

Mandate

To promote the widespread adoption and sustainable use of **all forms of renewable energy** worldwide

- » Intergovernmental Organization (IGO)
- » Established in 2011
- » Headquarters in Masdar City, Abu Dhabi, UAE
- » IRENA Innovation and Technology Centre – Bonn, Germany
- » Permanent Observer to the United Nations – New York, USA
- » Director-General – Francesco la Camera

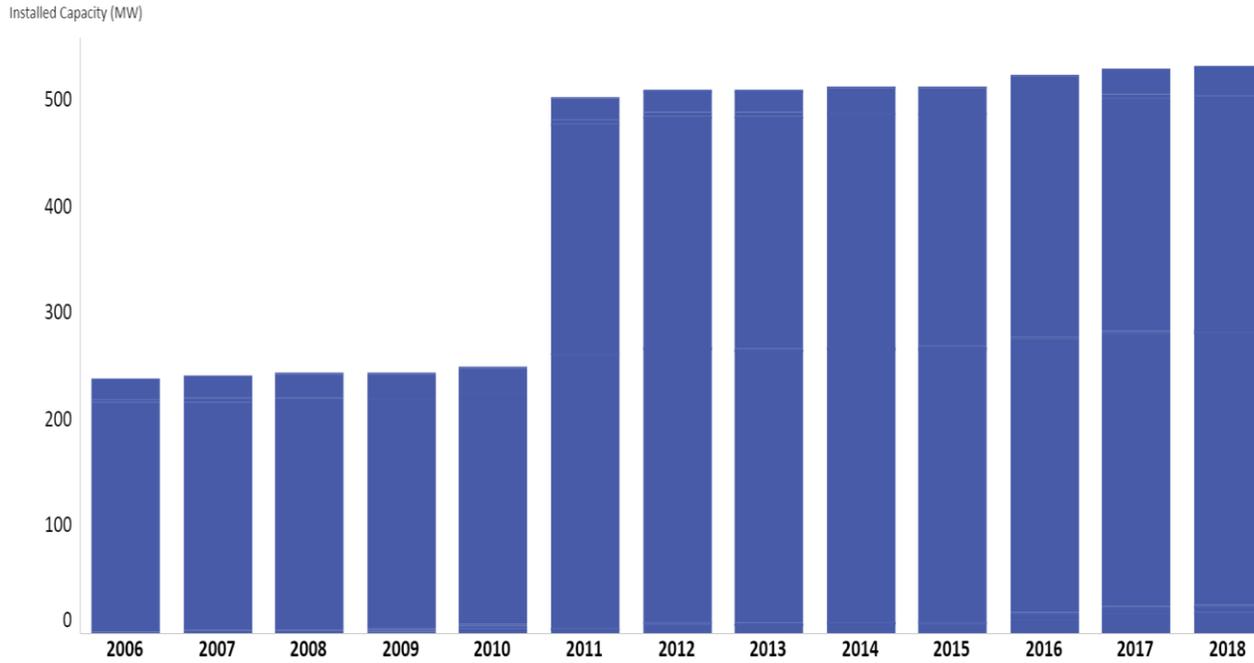


Membership

160 members + 23 in accession

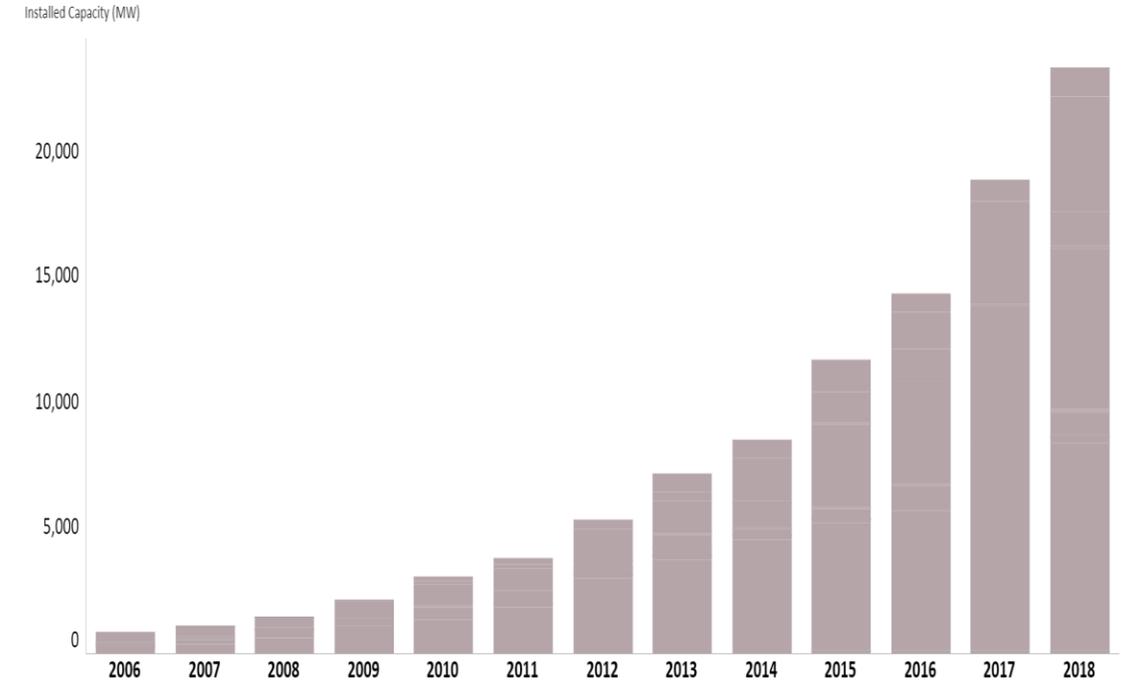
Global Offshore Renewable Energy (offshore wind + ocean energy) installed capacity

Trends in Renewable Energy
Click on the chart to explore trends in renewable energy



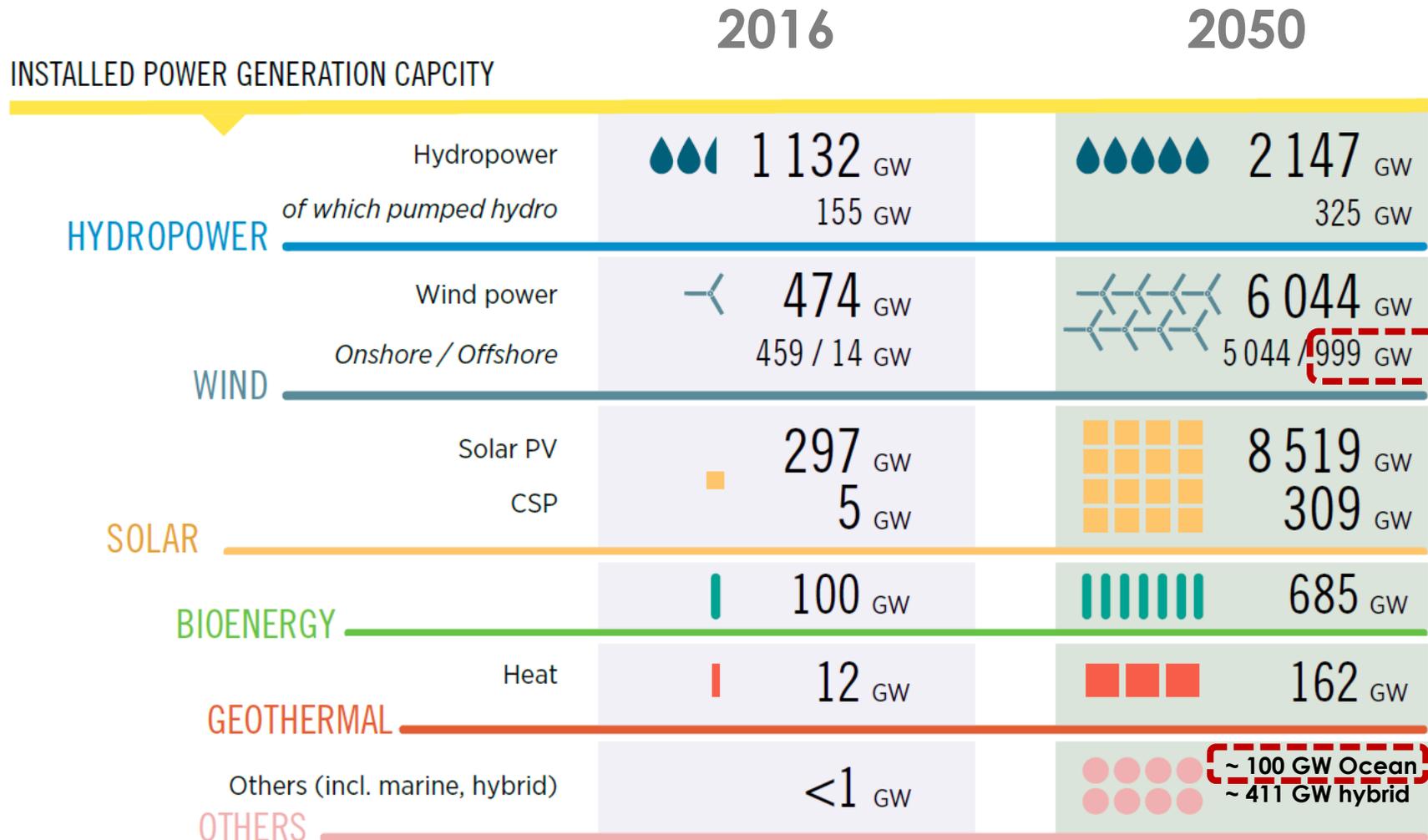
Ocean Energy

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Offshore Wind

Offshore renewable energy should contribute to at around 1100 GW of installed capacity by 2050



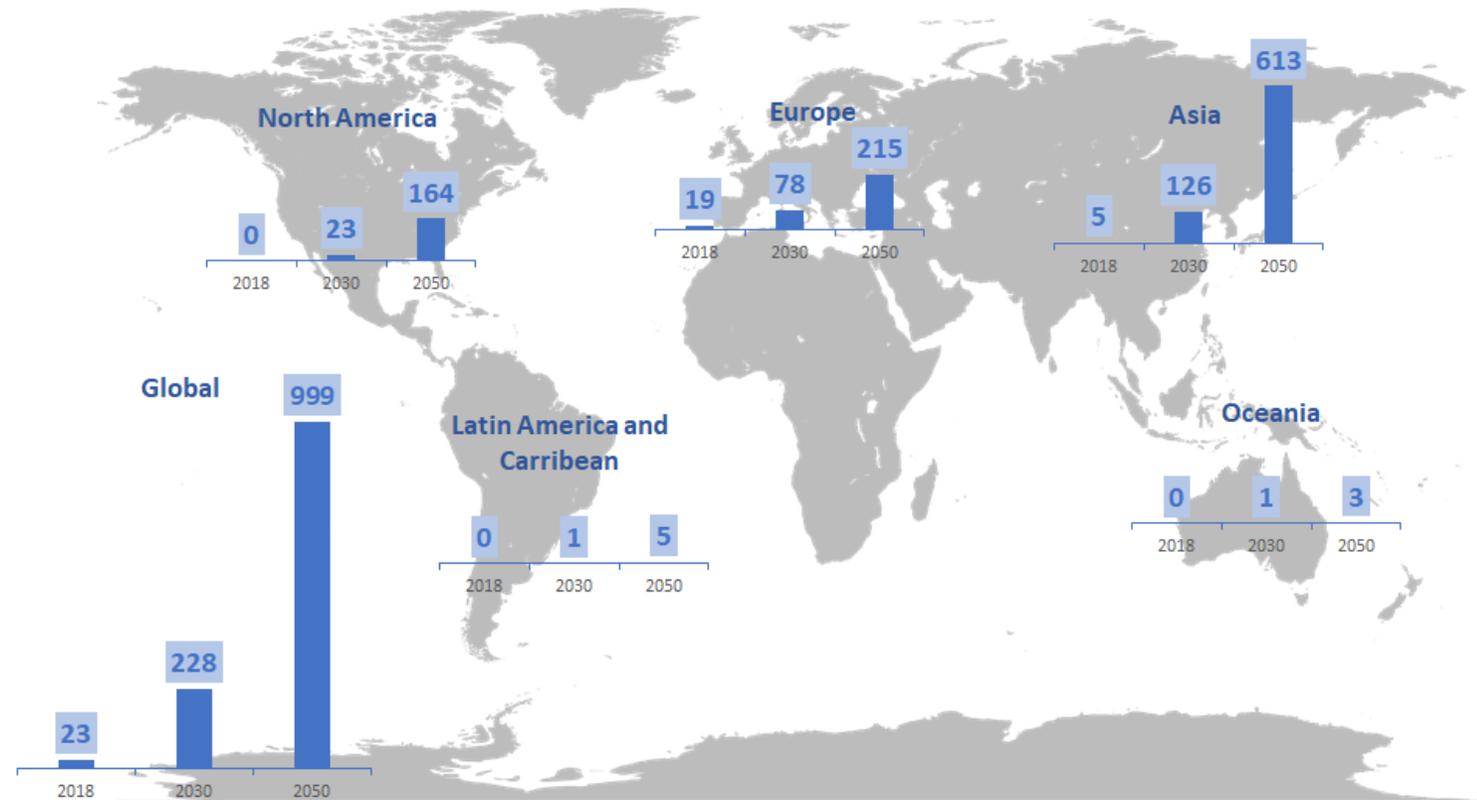
- Due to large growth in energy demand from costal areas
- 1000 GW offshore wind + 100 GW ocean energy
- Offshore renewable energy could be a major contributor to the power sector by 2050

Global offshore wind market through 2050 (REmap)

Asia to become offshore wind leader

- Global offshore wind rises to **1 TW** by 2050, from **23 GW** in 2018
 - Annual offshore wind additions grow from **4.5 GW** in 2018 to **45 GW** by 2050
 - **21%** of total wind power generation comes from offshore in 2050
- > **USD 90 billion/yr** global average annual investments needed until 2050.
- **Asia will lead the way** with >50% of capacity by 2030.
 - >60% of global offshore investments shifted to Asia.
 - Installed capacity grows from 5 GW now to 613 GW by 2050

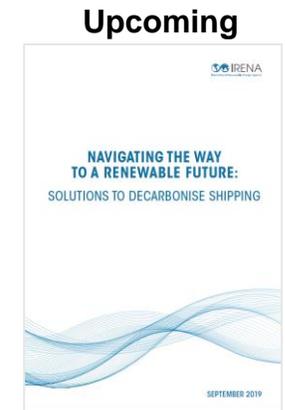
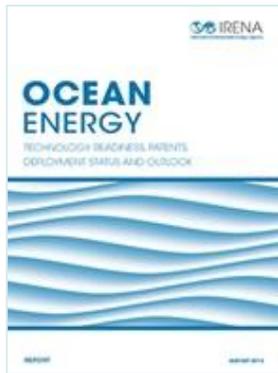
Evolution of offshore wind installed capacities (GW)



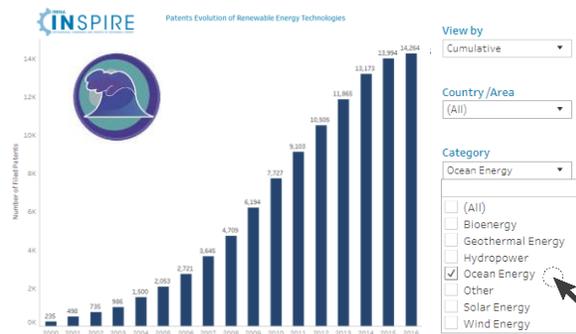
Based on IRENA's upcoming "Wind energy roadmap to 2050"

» **Ocean Energy Technologies**

- Technology Readiness, Patents, Deployment Status and Outlook
- Technology Briefs



» Ocean energy – **Patent data** based on IRENA tool INSPIRE



For more information, access: <http://inspire.irena.org/Pages/patents/Patents-Search.aspx>

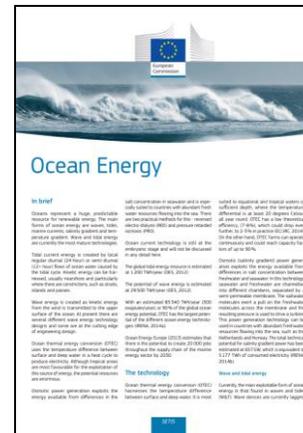
IRENA undertakes **regional analysis and workshops** in countries:

- IRENA Workshop in Ireland “Unlocking the potential of ocean energy around the globe”



Recent IRENA contributions on Ocean Energy

- ✓ Ocean energy in insular conditions workshop, Hawaii – **USA (2019)**
- ✓ Session on maritime transport – Conference of the SEARICA Intergroup on “Which next steps for Our Ocean?” Brussels – **Netherlands (2018)**
- ✓ COP23 Fiji - Bonn, **Germany (2017)**
- ✓ Ocean Energy Technology workshop, Delft University of Technology – **Netherlands (2017)**
- ✓ UN Conference Session on SIDS, New York – **USA (2017)**
- ✓ Our Ocean Conference (OOC17), **Malta (2017)**
- ✓ 1st Meeting of the Ocean & Climate Initiatives Alliance / Ocean initiatives united for the Paris Agreement implementation, Paris – **France (2017)**
- ✓ Annual Lecture on OET and intellectual property rights at University Bonn, **Germany (2017)**
- ✓ ‘Seminario Internacional de las Energias Marinas’ Buenos Aires, **Argentina (2016)**
- ✓ Briefings:



BBC Briefing - Energy 6.26 The Electricity Challenge

Wave and tidal energy resources have huge potential but the technology is judged to be too expensive

Tidal energy

- Global tidal energy resource is estimated at 1,200 TWh per year
- There are three main types of tidal power stations
 - Barrages installed across tidal estuaries
 - Artificial tidal lagoons
 - Submerged stream generators (underwater turbines)
- Two tidal barrages, La Rance in France and Sihwa in South Korea, accounted for 94% of the global tidal energy capacity in 2015
- Underwater components are vulnerable to damage from salinity and storms, and the difficulty in accessing them for repair results in operation and maintenance costs of 5.8% of capital expenditure annually, compared with 3.7% for offshore wind

Wave energy

- Global wave energy resource is estimated at 29,500 TWh per year
- Wave energy is far less advanced, with no commercial-scale wave power operations currently in operation
- The UK has deployed more wave energy devices than the rest of the world combined, and the UK is home to the European Maritime Energy Centre (EMEC), the world's only dedicated testing centre for marine power
- The UK accounts for 50% of Europe's total wave and tidal stream resource

Key Takeaways - Ocean Energy Event, Ireland



Cost scale effects-
standardisation

Ocean energy added value to
energy systems

Sector coupling

Islands vast potential and
market opportunities

Jobs success cases

Tracking TRLS, provide
updated market figures

Innovative ideas on funding
schemes



Thank you