MRE State of Industry

- Fixed Offshore Wind
- Floating Offshore Wind
- OTEC
- Wave Energy
- Tidal/Ocean stream



Prerequisites



Installed capacity



Five-year pipeline



LCoE



Sweyn Johnston



Caribbean resource

Fixed Offshore Wind



Mature tech, rapidly expanding market, low cost at scale, good resource, need site identification



Prerequisites

<50m water depth <50km to shore



Installed capacity 22,500MW



Five-year pipeline 44,000MW



LCoE now \$0.12 LCoE future \$0.06



<u>Caribbean resource</u> = Europe

Floating Offshore Wind



Maturing tech, rapidly expanding market, reducing costs, excellent Caribbean potential



Prerequisites 60-200m depth <50km to shore



Installed capacity44MW, 200MW pending



Five-year pipeline
4,500MW and growing



LCoE now \$0.25 LCoE future \$0.10



<u>Caribbean resource</u> = Europe

OTEC



Baseload renewable, high potential, high technology risk, ancillary benefits



Prerequisites
1km depth, 25°C temp
surface, <30km to shore



Installed capacity
>1MW (5 or 6 demos)



Five-year pipeline ~50MW



LCoE now \$0.?? LCoE future \$0.20



Caribbean resource Excellent

Wave Energy



No technology convergence, huge potential but will take time to reach maturity



Prerequisites

<50m depth, waves, <10km to shore



Installed capacity
<5MW</pre>



Five-year pipeline ~50MW

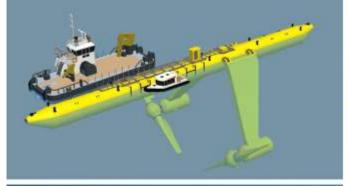


<u>LCoE now</u> \$0.50 <u>LCoE 1GW</u> \$0.09



<u>Caribbean resource</u> Extensive and regular

Tidal/ocean current









Semi-commercial tech, niche market with some potential but low in global terms



Prerequisites

>2m/s current speed <10km to shore



Installed capacity
~15MW Tide, <1MW OC</pre>



Five-year pipeline
300MW Tide, 5MW OC



LCoE now \$0.37 LCoE 100MW \$0.18 LCoE 1GW \$0.09



<u>Caribbean resource</u> <u>Limited/unquantified</u>

Thankyou and References

- Bluerise (2016). Ocean Thermal Energy Conversion OTEC. Retrieved 25 January 2017, from http://www.bluerise.nl/technology/ocean-thermal-energy-conversion/
- Equinor (2017), World's first floating wind farm has started production, Equinor press release
- Global Wind Energy Council (2018), Global Wind Energy Outlook
- Irena (2016), Floating foundations a game changer for Offshore Wind Power
- Joint Research Centre (2018), Workshop on identification of future emerging technologies in the ocean energy sector
- Ocean Energy Forum (2016). Ocean Energy Strategic Roadmap 2016 Building ocean energy for europe
- Ocean Energy Systems (2018), OTEC map, OES Website
- ORE Catapult (2018) Macroeconomic Benefits of Floating Offshore Wind in the UK.
- ORE Catapult (2019), Tidal Stream and wave Energy cost reduction and industrial benefit summary analysis
- US Department of Energy (2019), Office of Energy Efficiency and Renewable Energy, 2018 Offshore Wind Technologies Market Report
- WindEurope (2019). Offshore Wind in Europe: Key trends and statistics 2018.