Offshore Wind for Arabian Gulf Region

Road to COP28, Offshore Renewables and New
Energies MENA Perspective
Society for Underwater Technology
Middle East Conference
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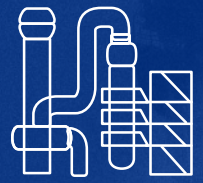
Agenda

- About Worley
- Offshore Wind Overview
- Offshore Wind in Arabian Gulf Region
- Example Scenario

WHO WE ARE

At Worley we are…

#1 hydrocarbons service provider



#1 chemicals service provider

A market leader in mining, minerals & metals

A key player in the new energy transition

Supporting innovation on a global scale

Fast adapting to the digital revolution

We are driven by a Common Purpose:

Our purpose is delivering a more sustainable world. More sustainable solutions, more sustainable communities and a more sustainable environment.

Worley Company Purpose Statement

Worley's Global Reach

49
countries

33+
languages spoken

~50,000
people

Offshore Wind

Offshore wind's potential is near limitless. Improved technology and steep cost reductions are putting more and more of that potential within our reach.

FATIH BIROL

Executive Director, IEA

The need for affordable low-carbon technologies is greater than ever

Star player of the Energy Transition

An infinite power - the world needs to harness low-carbon energy

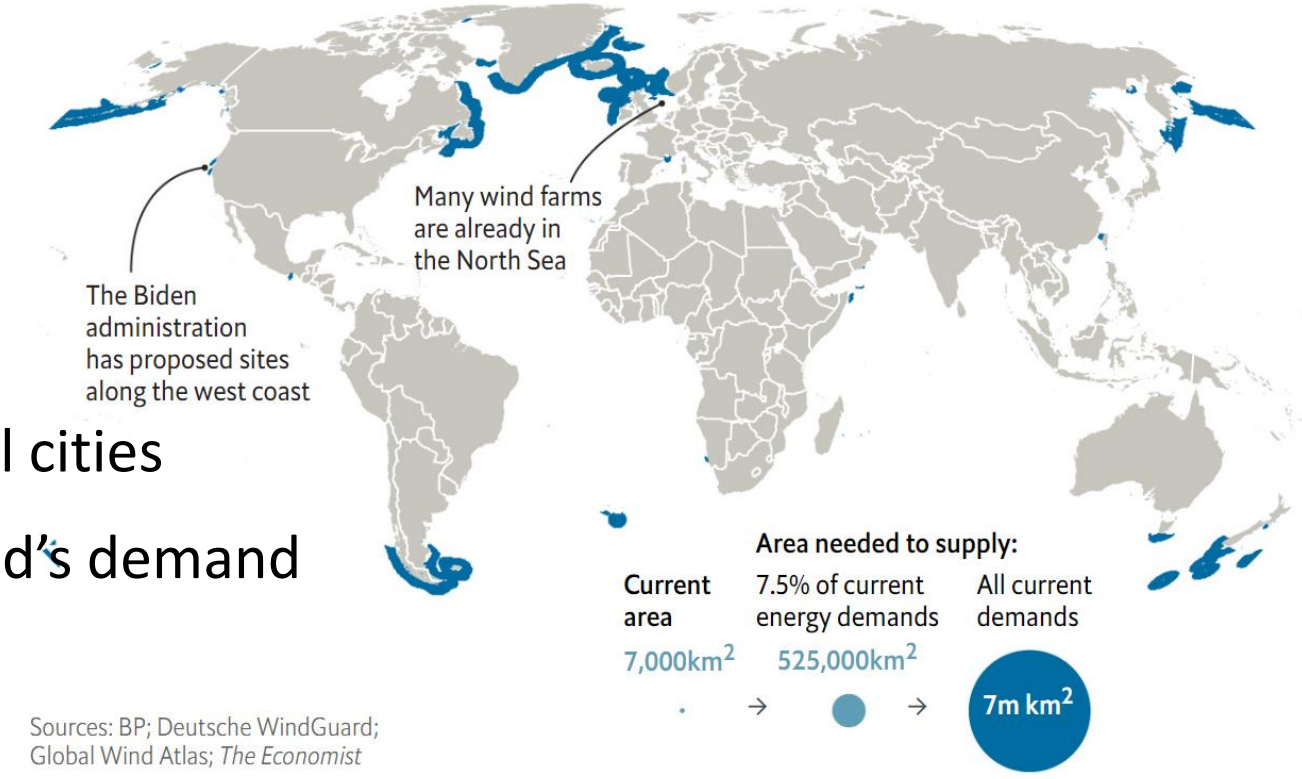
- Inexhaustible source of renewable energy
- Produced by wind turbines installed in shallow waters
- Floating wind is now challenging the evolution
- Conversion from Kinetic Energy to Electricity

Did you know?
The wind industry has enjoyed its second-best year ever, with growth in 2021 only 1.8% behind a record 2020. Almost 94GW of capacity was added, despite a second year of the COVID-19 pandemic. This is a clear sign of the incredible resilience and upward trajectory of the global wind industry.

Offshore Wind

Key Advantages

- Higher offshore wind speeds
- Higher offshore wind consistency
- Less disruptive to surrounding landscape
- High concentration of population in coastal cities
- Offshore supply capacity greater than world's demand
- Other advantages



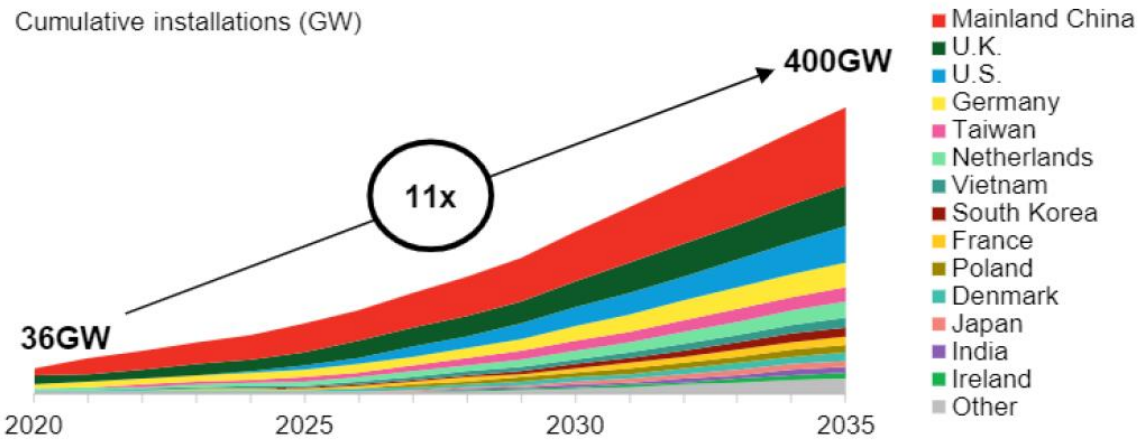
Optimal location of offshore wind farms needed to supply the world's total energy demands

Offshore Wind

Momentum

- Rapidly maturing technology
- Higher power capacity per turbine
- Regular auctions in established markets
- Key contributor to net-zero targets
- Almost **94GW** of capacity added globally in 2021 (Global Wind Energy Council Report, 2022)
- Sector to expand 11-fold to reach **400GW** by 2035 (Bloomberg, 2021)

Global cumulative offshore wind installations

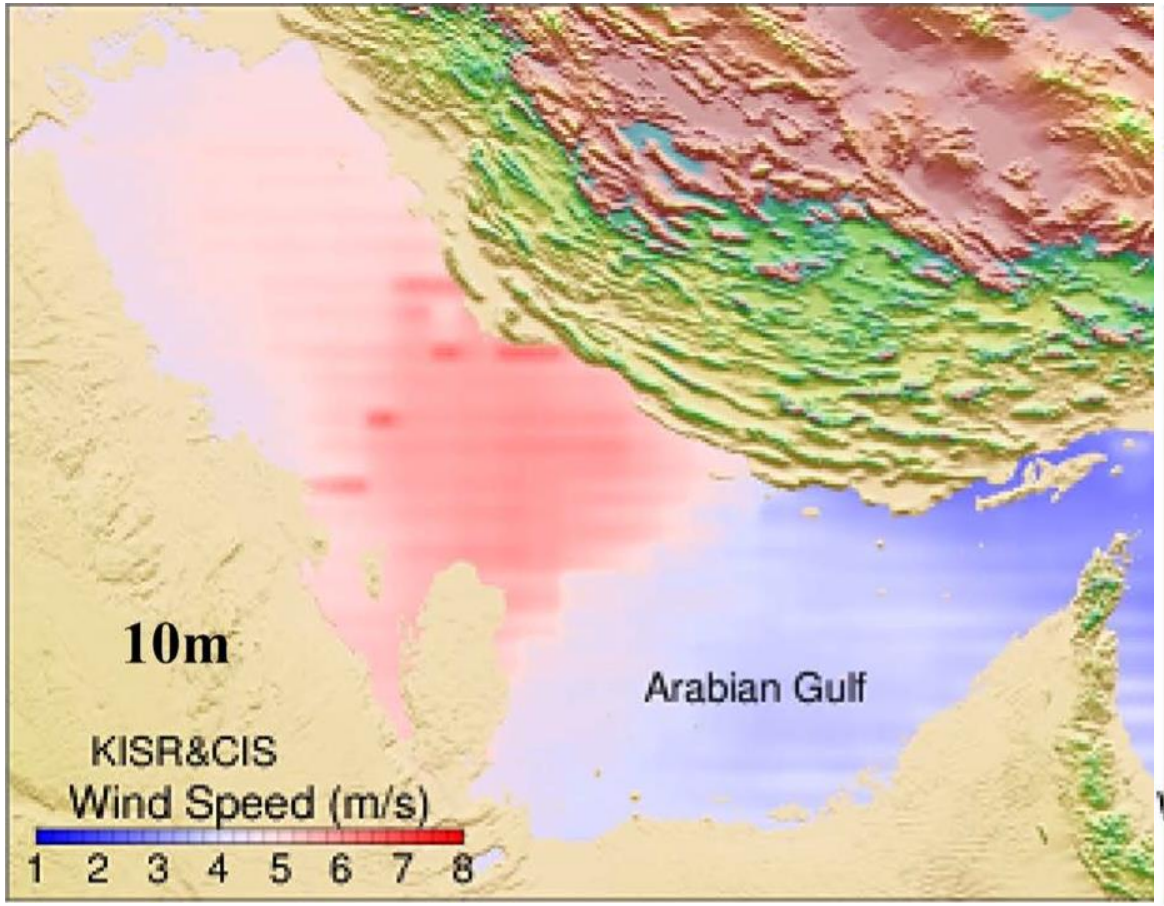


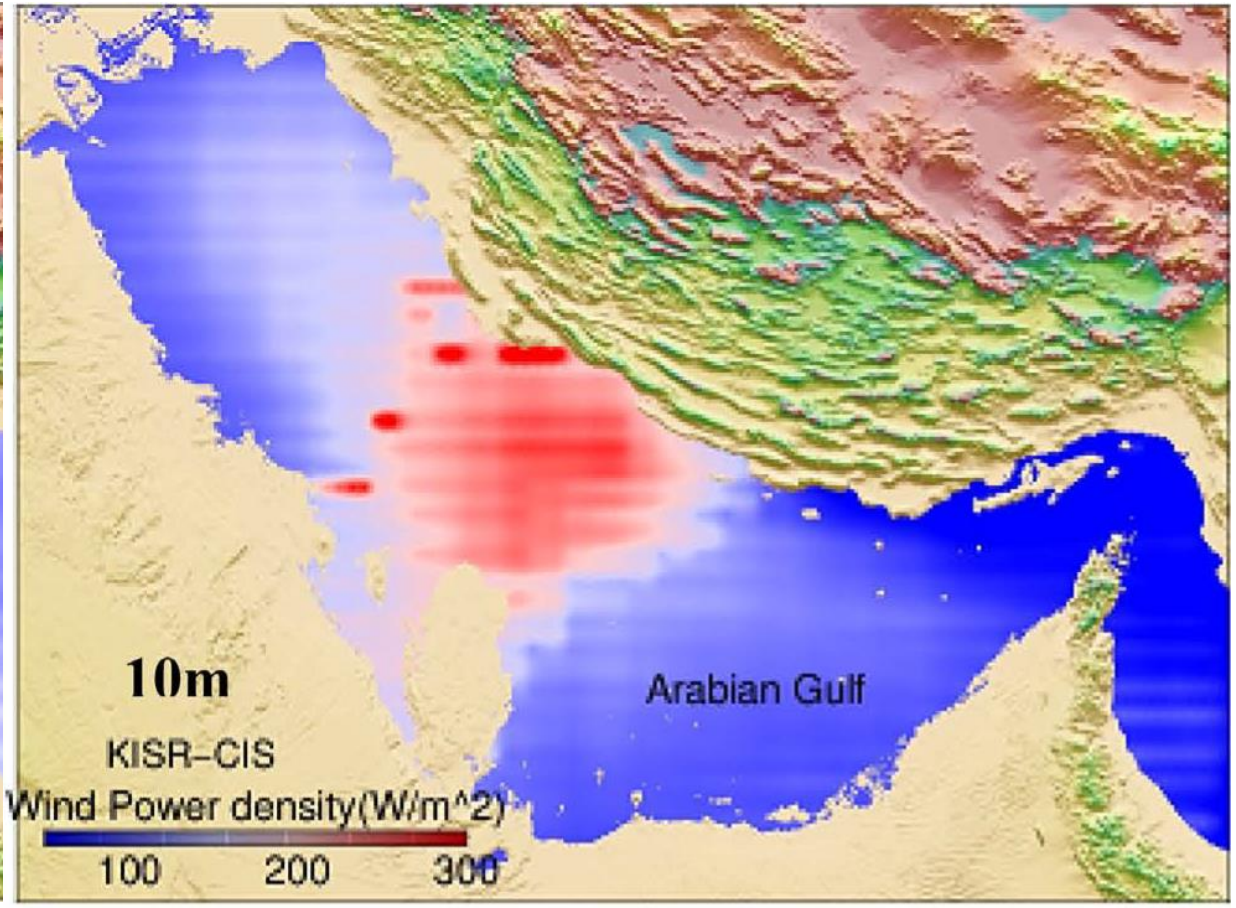
Source: BloombergNEF. Note: 'Other' – Portugal, Italy, Finland, Lithuania, Latvia, Estonia, Greece, Norway, Sweden, Spain, Brazil, Belgium. Cumulative installations to 2030 are 226GW.

Offshore Wind in Arabian Gulf

Offshore Wind Potential in Arabian Gulf

Supply Potential

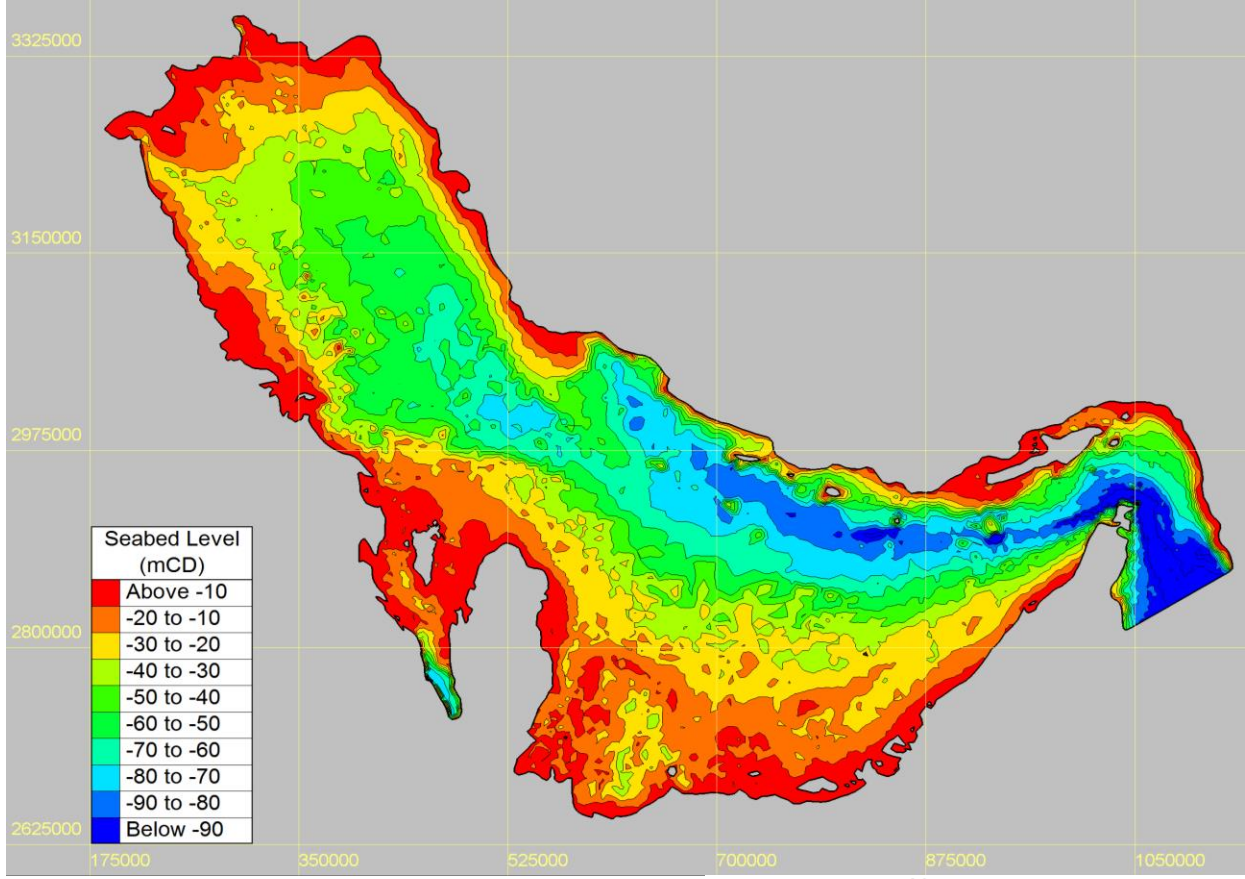


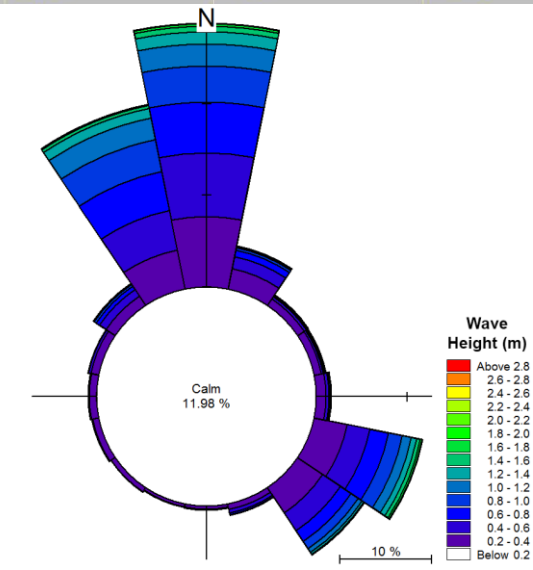


Offshore Wind Potential

Constructability

- Shallow water depths
- Sound ground conditions
- Relatively benign wave conditions
- Proximity to high energy consumption
- Custodians of Maritime area
- Availability of technical expertise

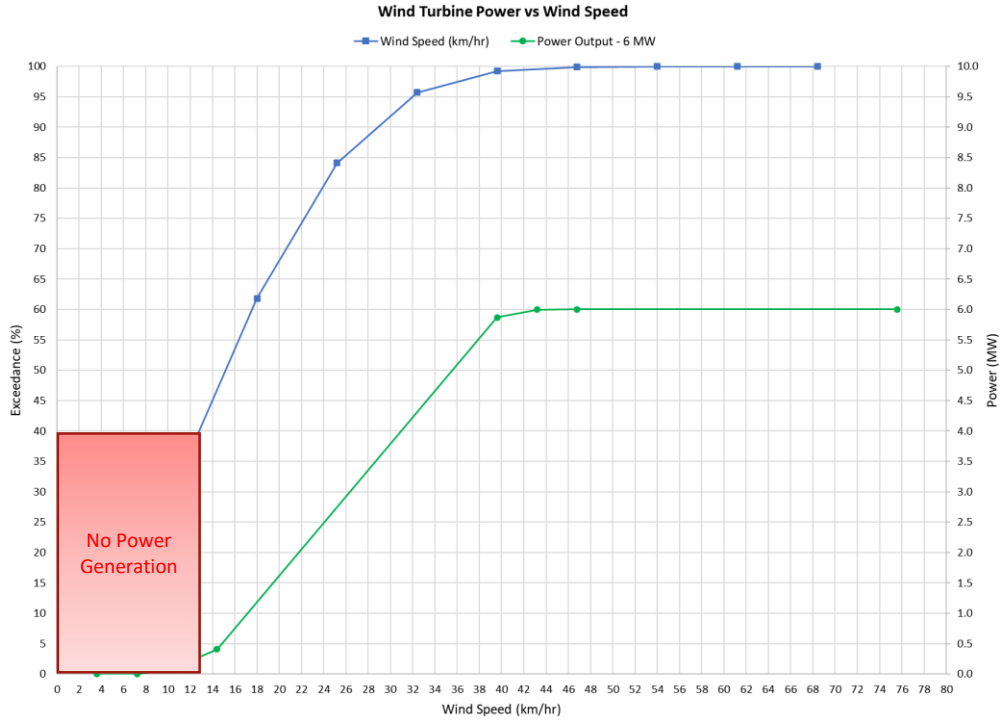


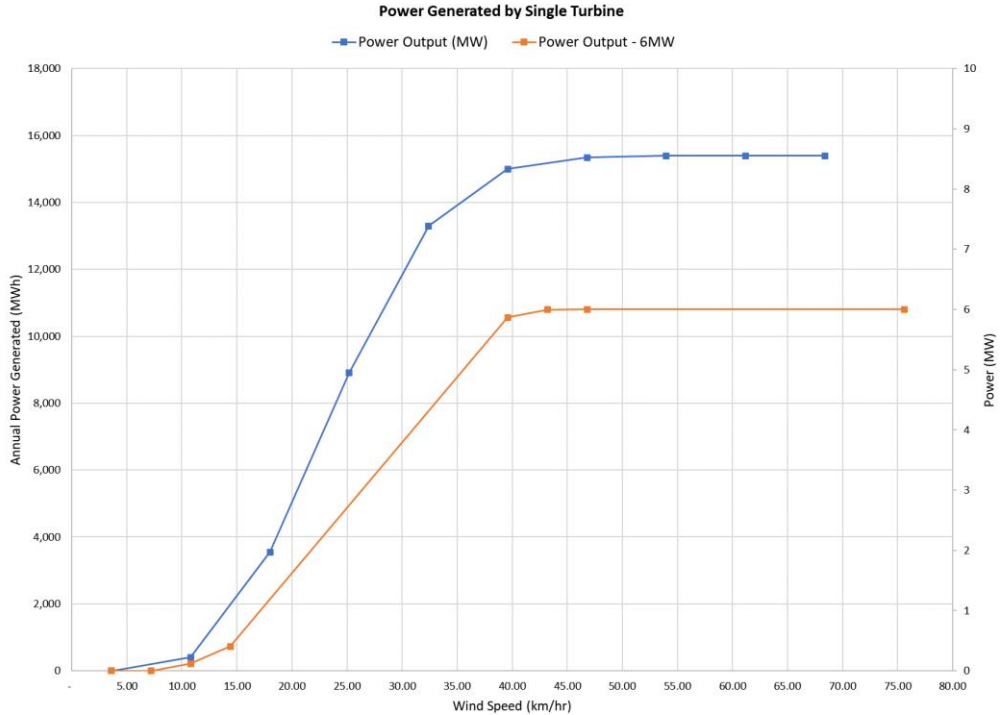


Offshore Wind Potential

Indicative Power Output Capacity

- Wind turbine produces energy when wind speed is between 13km/hr and 75km/hr
- Wind speeds below 13km/hr ~ 40% of the time
- Maximum power of 6MW at wind speed of 75km/hr
- Not viable for reliable power generation business case
- More likely to be viable for meeting net zero targets
- REMINDER: Cost of construction is considerably lower





Power curve based on the W2E Wind to Energy W2E-185/6.0 turbine (https://en.wind-turbine-models.com/powercurves)

Offshore Wind Potential

Example Scenario

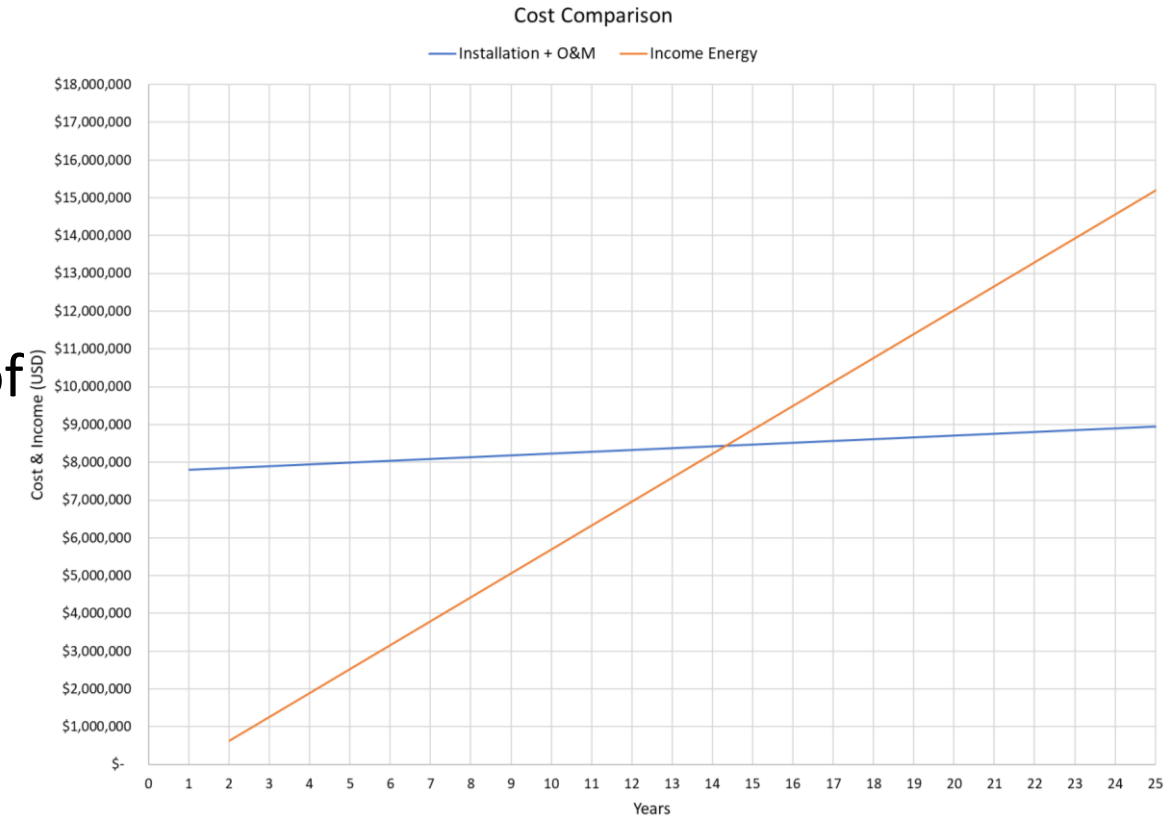
- Indicative 50 wind turbines
- Wind data offshore of KSA eastern seaboard
- Wind turbine of a maximum power of 6MW
- Yearly power output of 15,400 MWh per turbine
- Yearly power output of 770,000 MWh for 50 wind turbines
- Nearshore construction at a water depth between 2 and 5 m
- Distribution through offshore or onshore substations
- Excess power converted to hydrogen for storage

Offshore Wind Potential

Indicative Economic Case

- Indicative cost of construction = 1.3mUSD per MW
- Indicative operation & maintenance = 48kUSD/year
- Industrial power supply rate = 0.048$/kWh
- Payback period = 14 years

  (1 wind turbine of 6MW);
- Potential CAPEX reduction through economies of scale



Sources:
1.https://weatherguardwind.com/how-much-does-wind-turbine-cost-worth-it/#:~:text=%241%2C300%2C000%20USD%20per%20megawatt.,%242%2D4%20million%20dollar%20range;
2. https://www.globalpetrolprices.com/Saudi-Arabia/;

Offshore Wind in Middle East

Summary Slide

- Net Zero could drive the business case in the Gulf
- ME-SUT forum has:
  - Consultants familiar with the evaluation and design of Offshore Wind
  - Local contractors with global experience in construction and maintenance
  - Local fabrication contractors
  - Subsea cabling contractors
- Let’s make Offshore Wind a conversations with our Clients


Q&A


Worley
energy | chemicals | resources