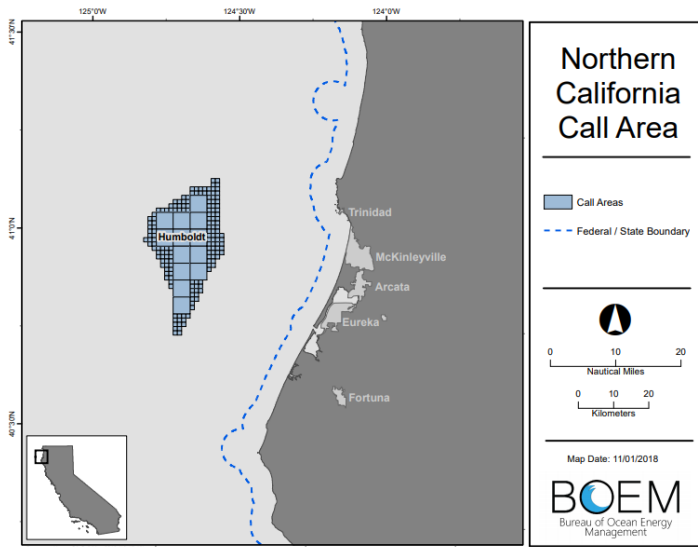


A Project Developer Perspective on Floating Foundation Innovation

**FAID, Boston
19 March 2019**



The First US Floating Wind Market

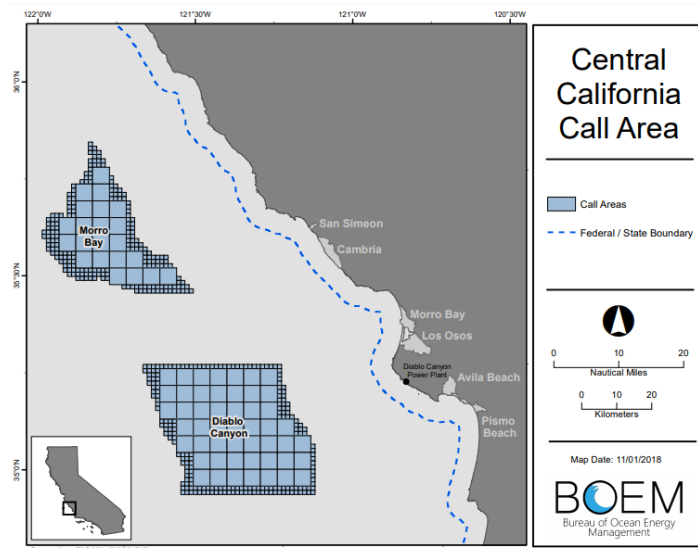


Strong fundamentals

- Enormous electricity market – world's 5th largest economy uses >250 TWh/year
- Consistent ambitions to lead on climate
- High quality offshore wind resource

Challenges

- Price-competition from solar (and low-cost land-based wind via long-distance transmission)
- Limited support for new measures to nurture emerging renewable technologies



California serves early notice of the challenge that will soon be apparent in many markets:

"For deep water floating wind farms the yardstick will not be costs compared with bottom-fixed offshore wind, the yardstick against which floating wind will have to compete is solar PV and storage."

Floating Foundations Prototypes Perform Well But Cost Cuts Are Needed

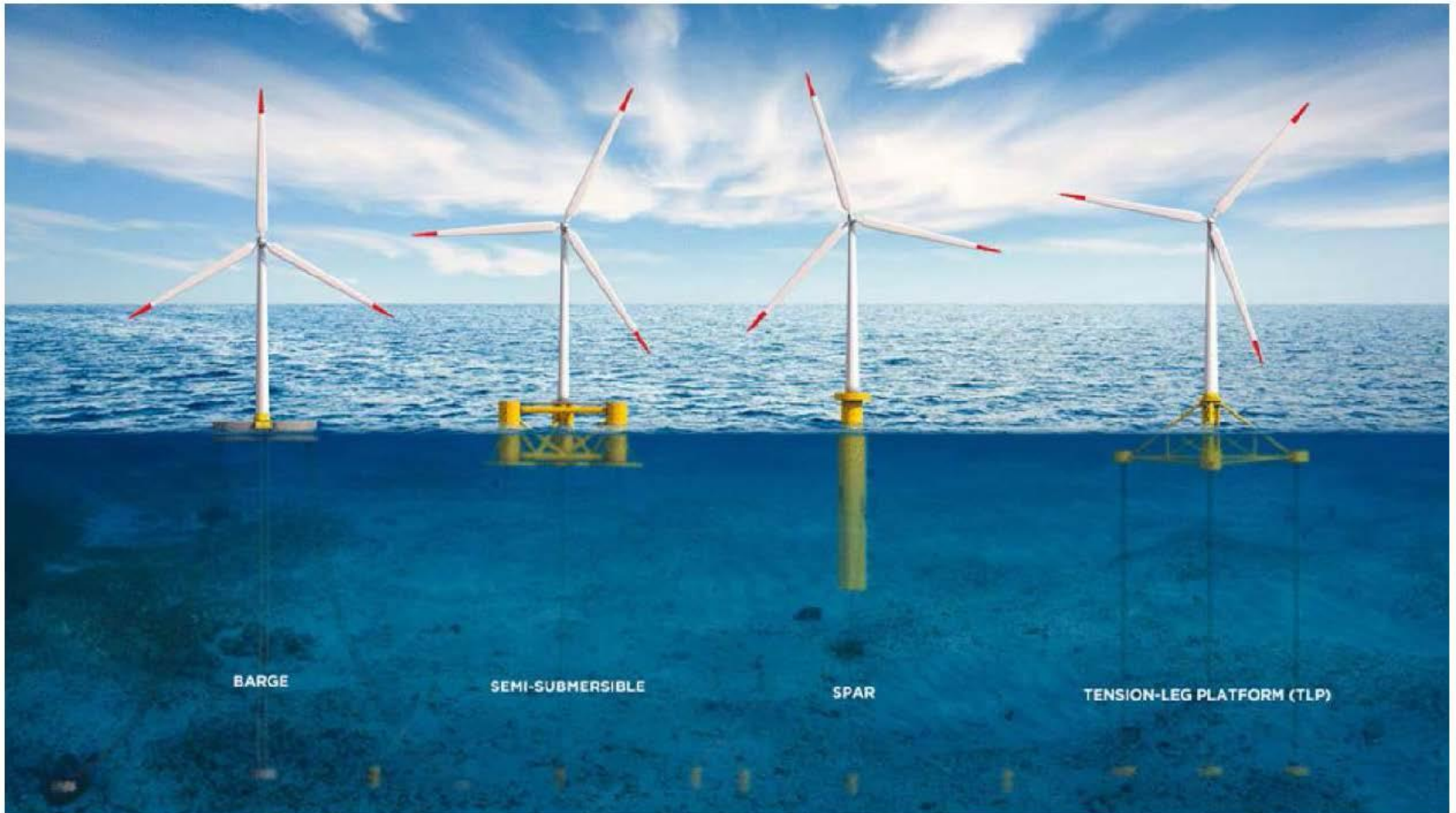
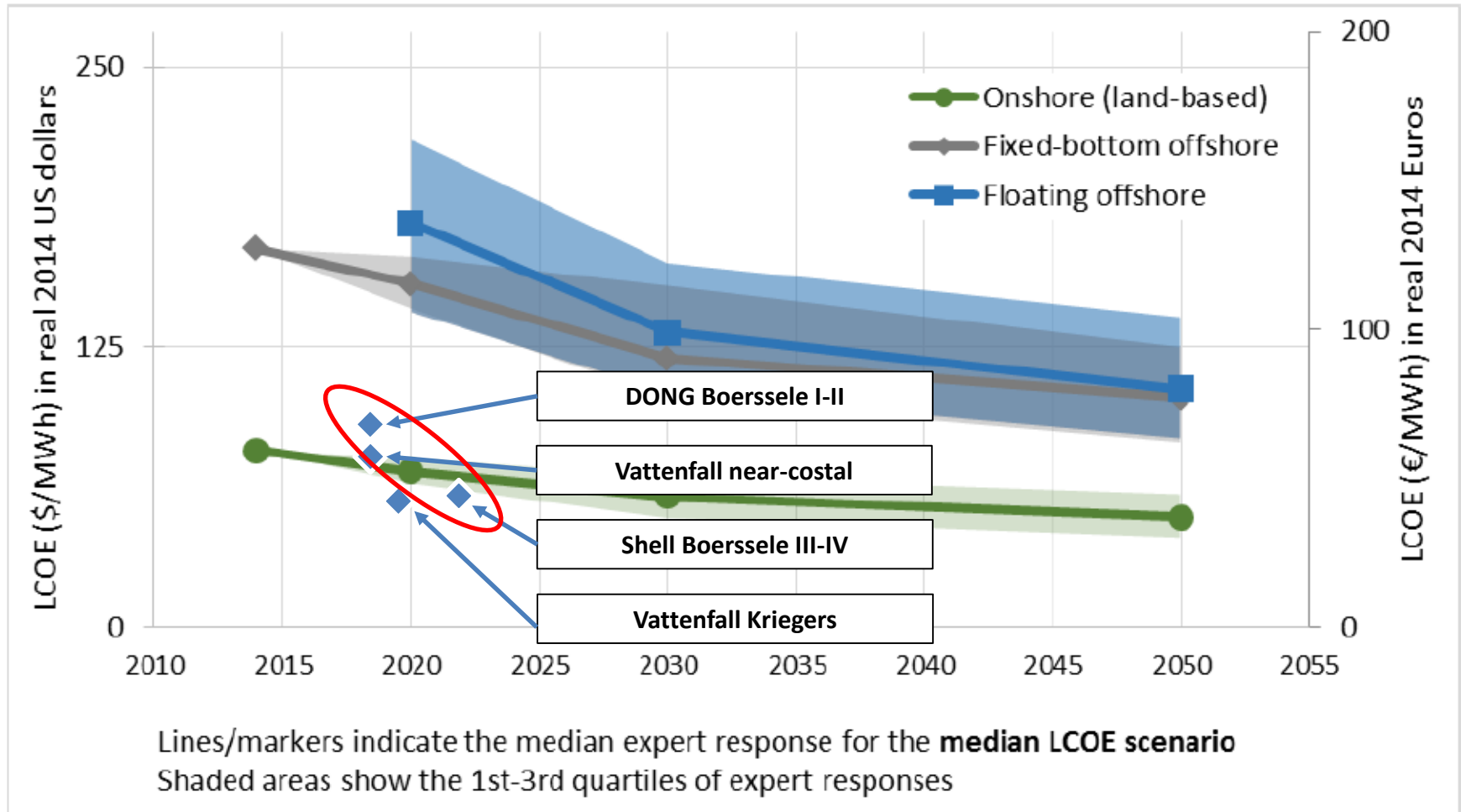


Image: WindEurope

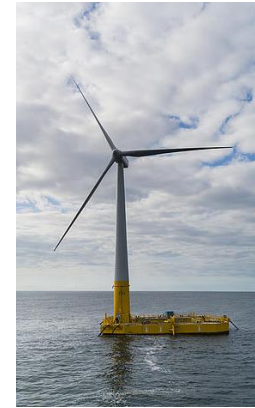
1st Game Changer: Falling Costs for Common Systems



Source: Berkeley National Lab

2nd Game Changer: Foundation Innovations

Surging R&D investment:



Evaluating rapidly advancing floating foundation technology:

- All-in costs, including materials, assembly, deployment, O&M, and decommissioning
- Design maturity when choice is required
- Scalability and fabrication logistics
- Also, in some situations, local content and environmental impacts (especially impacts of mooring systems)

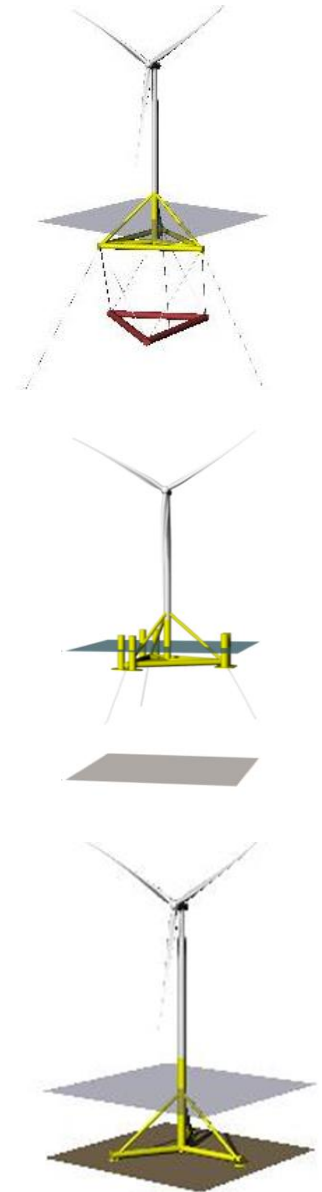
Cost Reduction Through Industrialization

Mindset

- Conventional thinking
 - We have designed this structure – now, how do we build it?
- SOT approach
 - We need to manufacture this way – now, how do we design it?

Concept

- Modular – all components factory-made, transported by road
- Components assembled at quayside with bolts (not exposed to sea water)
- Turbine mounted in harbor and towed to site, no installation vessels
- Weight 1000-1500 t for 6 MW turbine



TetraSpar Assembly and Installation

