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<td><strong>Docket Number:</strong></td>
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<td><strong>Document Title:</strong></td>
<td>A Project Developer Perspective on Floating Foundation Innovation</td>
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<tr>
<td><strong>Description:</strong></td>
<td>Presentation by Jeff Kehne, Magellan Wind</td>
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<td><strong>Filer:</strong></td>
<td>Raquel Kravitz</td>
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<td><strong>Organization:</strong></td>
<td>Magellan Wind</td>
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A Project Developer Perspective on Floating Foundation Innovation

3 October 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

California may be first to pose a challenge that will become 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.”

-- Henrik Stiesdal, Offshore Wind Journal (Nov. 2018)
Floating Foundations Prototypes Perform Well But Cost Cuts Are Needed

Image: WindEurope
1st Game Changer: Falling Costs for Common Systems

Source: Berkeley National Lab

Lines/markers indicate the median expert response for the **median LCOE scenario**
Shaded areas show the 1st-3rd quartiles of expert responses

Source: Berkeley National Lab
2nd Game Changer: Foundation Innovations

Surging R&D investment:

- 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)

Photos: Equinor, Principle Power, Hitachi and Ideol
Cost Reduction Through Industrialization

Mindset
• Conventional thinking
  o We have designed this structure – now, how do we build it?
• SOT approach
  o 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 without extensive welding
• Turbine mounted in harbor and towed to site, no installation vessels
• Weight 1000-1500 t for 6 MW turbine
TetraSpar Assembly and Installation
The TetraSpar Demonstrator

Stage 1 - 2016
• Concept
• Initial validation

Stage 2 - 2017
• Design
• Tank test OK

Stage 3 - 2020
• Prototype
• Full validation

Stage 4 - 2021
• Pilot project
• Release

Prototype
• Siemens SWT-3.6-130, 3.6 MW rated power, 130 m rotor diameter
• Status 30.05.19: Fabrication start June 2019, installation scheduled for April, 2020
• Foundation contractor: Welcon