PRINCIPLE POWER

Enabling a Paradigm Shift from California to California (and the word)

Sacramento, CA, 2017

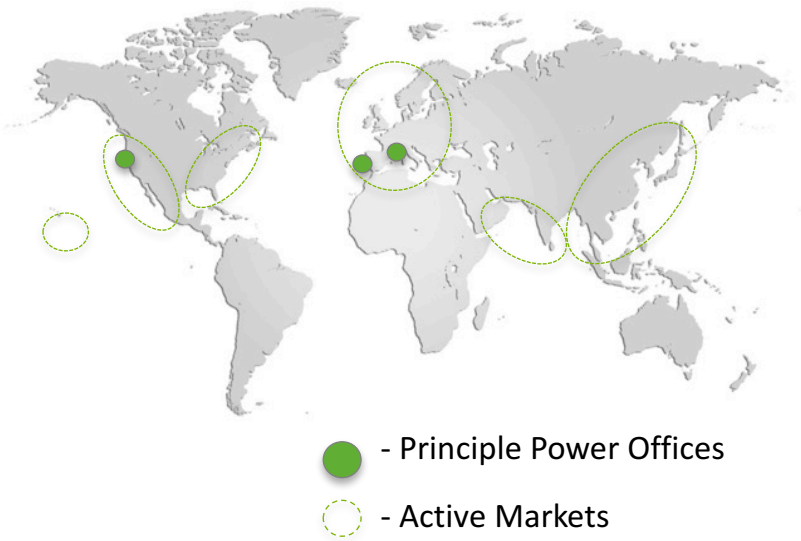
Principle Power Overview

Our Vision: ***Be the global leader in deep water wind technology***
Our Mission: ***To make the WindFloat the most competitive, safe, reliable and environmentally friendly floating technology and unlock GWs of global renewable energy potential***

Industry Challenges: Further from Shore; Deeper; Larger Turbines; Reduction of LCOE

The WindFloat, a Key part of the solution…

- Globally Patented, Proven Floating Technology: 5 years 2MW Pilot;
- Projects in Europe, US, Asia, w/ highlight for advanced 25 MW Project in Portugal and 24 MW in France
- Global presence with offices in HQ in US (Emeryville, CA) and offices in France and Portugal (>30 employees)
- Leading in Cost and Performance; LCOE competitive with currently commercial technologies
- Paradigm Shift => Reduction of Cost and Risk for the Industry



… To Bring Offshore Wind to its Global Potential

Floating Offshore Wind is an Industry Game-Changer in Two Ways

Key Industry Trends

- **Further from shore**
- **Deeper waters**
- **Larger Farms**

While… Reduction of costs and risk needed to truly globalize the Industry!

Floating wind: a game changer

Open the market for deep water exploitation (>60m)

- Open coastal markets with high power demand, high prices, high population density and deep waters
- Expanding total market for offshore wind

Substitute existing technologies in transitional waters (40-60m)

- Floating Semi-Sub technologies will be a competitive alternative to current foundations (eg. Jackets / gravity based foundations)
- Opportunity to capture market share from existing technologies

Floating Wind has now deployed 20 MW, proving itself as a key solution for the industry

Multi Megawatt prototype

Scaled model installed offshore

Under Commissioning

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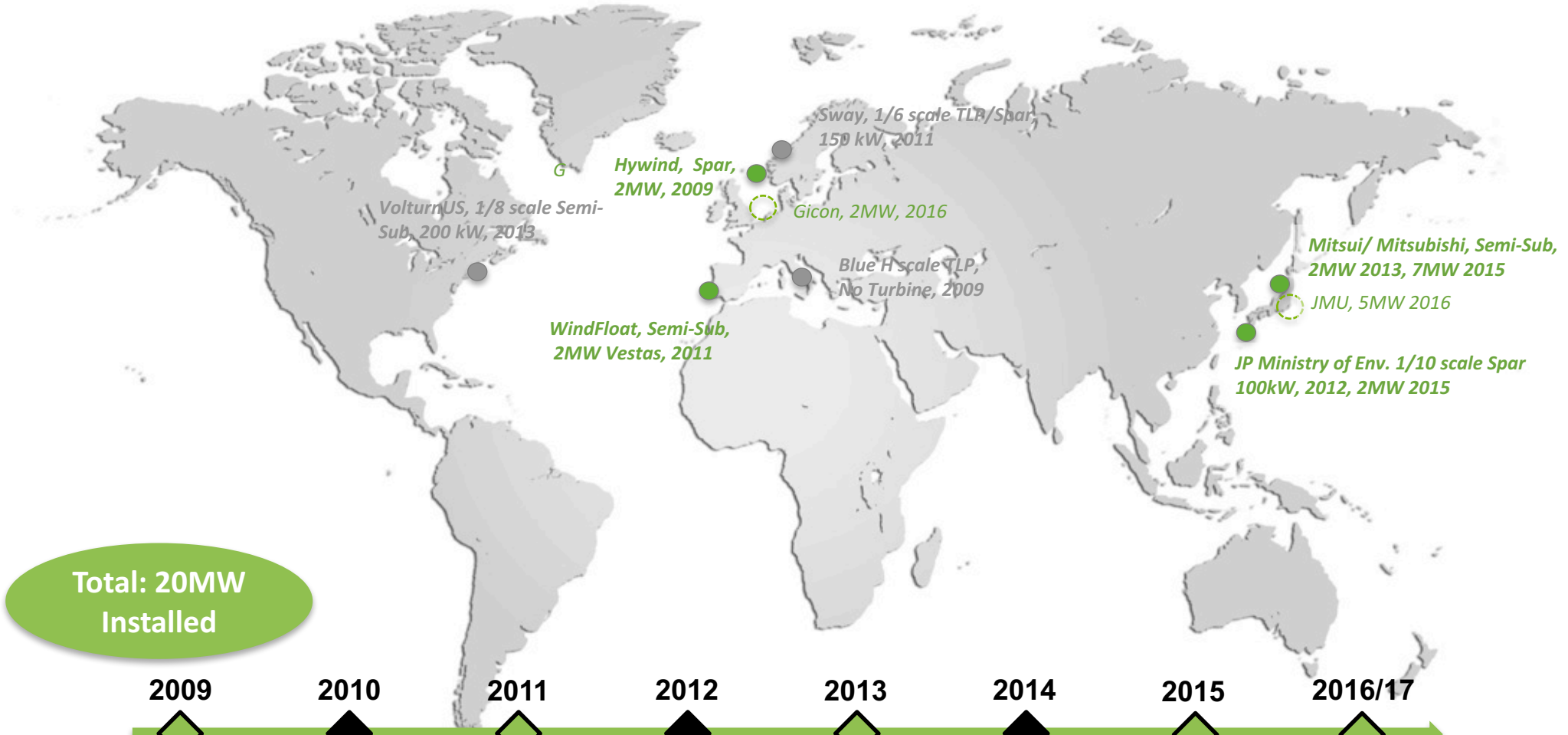

Total: 20MW Installed

2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016/17

Hywind 1
2 MW

Statoil

WindFloat 1
2 MW

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Fukushima
2 MW + 7 MW + 5 MW

MES | MHI VESTAS OFFSHORE WIND | JMU

GICON SOF
2 MW (currently delayed)

GICON®

Floating is already large market → Close to 400 MW of Demos and 7 GW of Large Scale Projects in development

Current MW Installed: 20MW

Current Floating Wind Farms (Announced) under Development

	Demo Projects	Large Scale
US	12 MW	> 2 GW in Hawaii and CA
Europe	France, 100-150 MW UK, 80 MW Portugal, 25 MW	France, 3.5 GW with commercial tenders starting to be prepared
Japan	Up to 100 MW	TBD (Target 8GW by 2030, with mostly floating)
Other Asia	Taiwan / Korea: Up to 30 MW	Taiwan/Korea: 1.5 GW

Source: Principle Power

WindFloat a Proven technology at large scale (2 MW), Operated over 5 years; Meeting Manufacturers Specification; Producing c. 17GWh of Energy; Tested in Extremes

Financing Entities are already seeing the large paradigm shift it represents in terms of Reduction of Cost and Risk

Cost

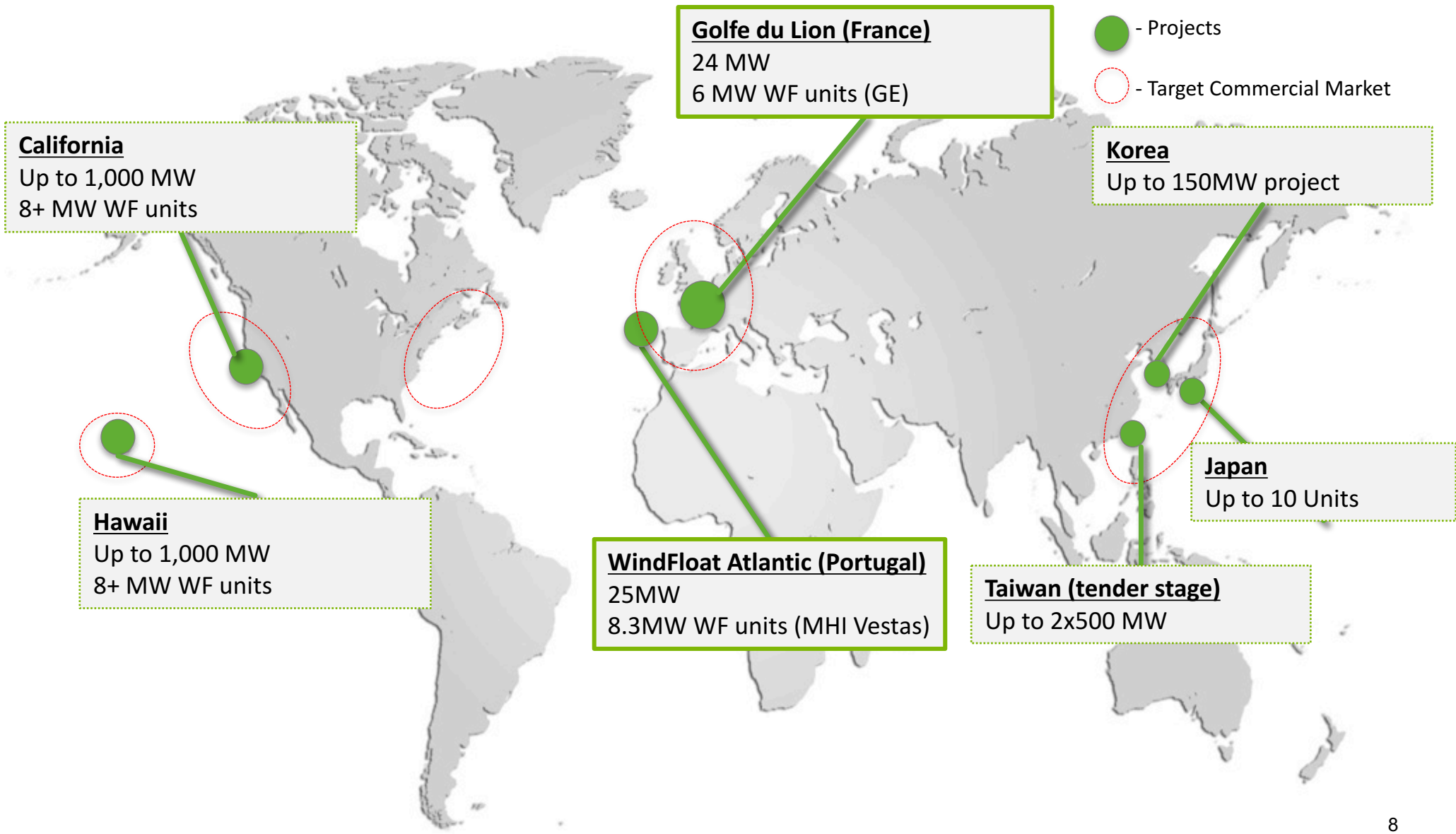
- ✓ Reduce Environmental Impact and Geotechnical Requirements
- ✓ Flexible Site Location / Water Depth independence
- ✓ Serial Production
- ✓ Quayside Commissioning and WTG Installation

Reduction of Cost & Risk

Risk

- ✓ Marine Spread / Existing Vessels
- ✓ Lower Interface Risk with offshore contractor
- ✓ Lower Weather Dependence
- ✓ Return to Shore for Unanticipated Maintenance

Already embraced by the Global Marketplace – several pre-commercial in execution and commercial projects underway



Already executing on projects in different geographies, which fully prove bankability and competitiveness

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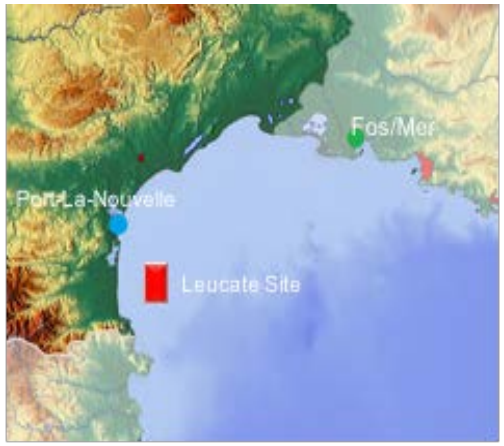
WindFloat Atlantic
25 MW, Portugal, Operational 2019

- 3x 8.3 MW MHI Vestas
- 20 km; 100 m deep
- Local Shipyard Construction
- Certified by ABS
- Feed-In Tariff
- Equity Financing complete w/ strong international sponsors
- First on-Recourse Project Finance of a Floating Wind Farm (Financial Investment decision in summer 2016)

Golfe du Lion
24 MW, France, Operational 2020

- 4x 6 MW GE
- 18 km; 70-100 m deep
- Local Shipyard Construction
- Certified by BV
- Feed-In Tariff (through competitive process)
- Very strong consortium with major energy companies and industrials
- Major innovations to advance technology to the next level of competitiveness



Ready for commercial deployment by 2020

Commercialization Path

Done

- Onshore Fabrication and Commissioning
- Demonstrated Performance
- Survivability in Extremes
- Safety
- O&M Operations
- Tow to shore for Major Maintenance
- Certification Agencies Approval in Principle

Completing

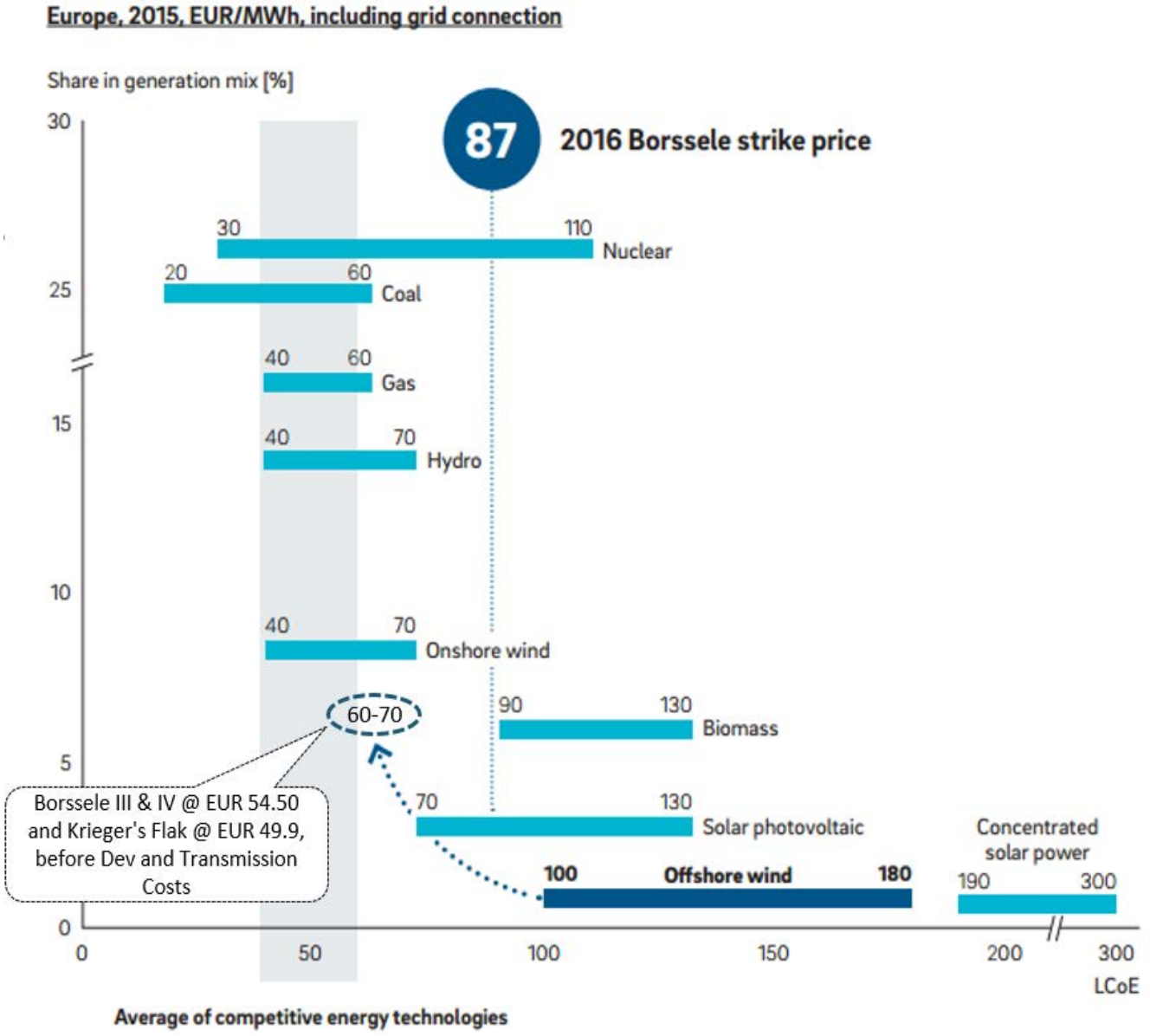
- Large Turbines (>5 MW)
- Project Arrays
- Commercial Useful Life
- Certification Agencies Full AFC approval
- Full Insurance companies endorsement
- Project Finance
- Competitive LCOE

Launched

- Securing Full Buy-In of Wind Farm Developers
- Competing with Fixed Foundations for current transitional water Projects (>40m)
- Deployment of Large Scale Wind Farms
- Accelerating Launch of New Markets (eg. Japan, Taiwan, US)

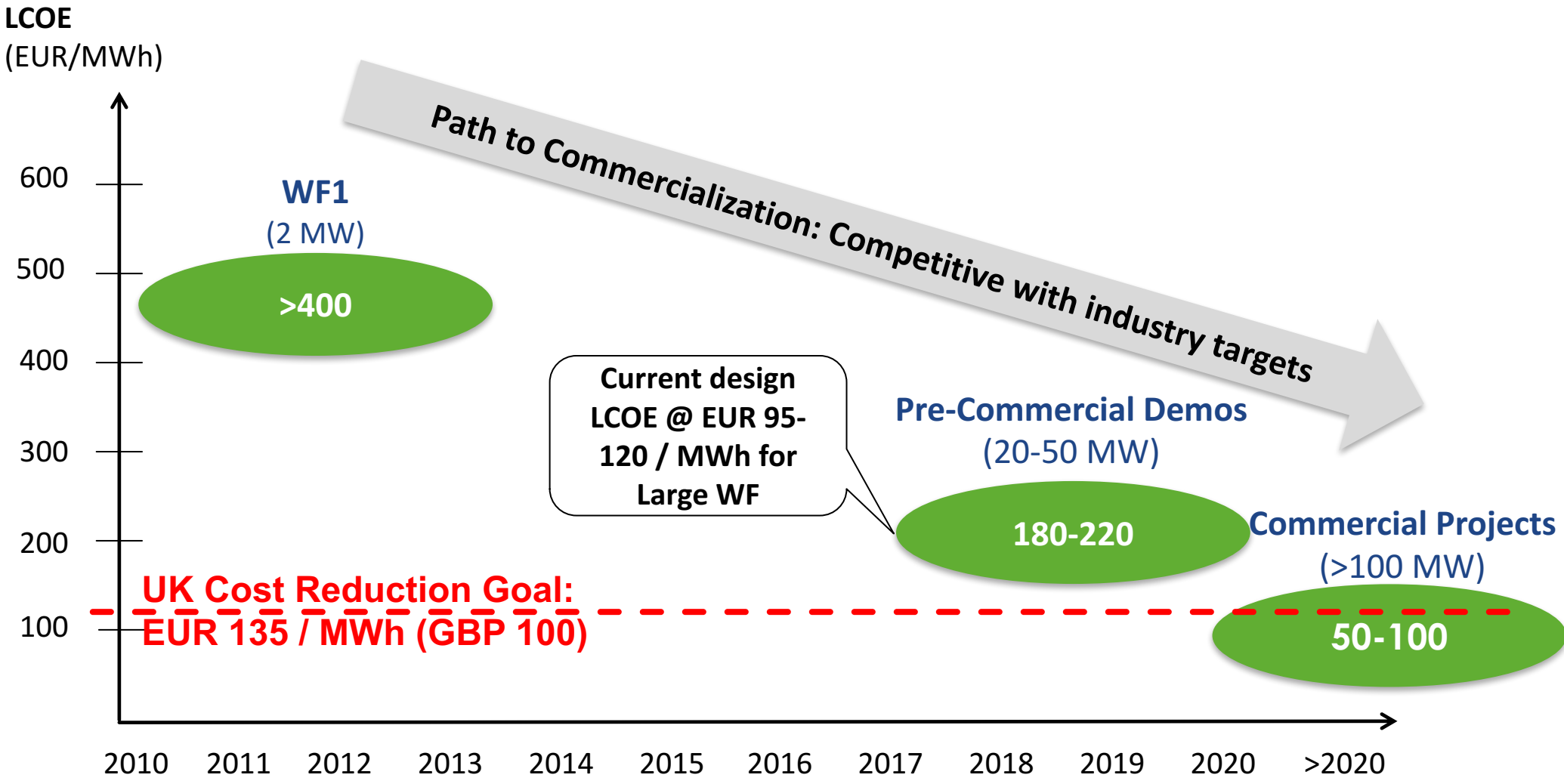
Competitive tenders driving offshore wind LCOE to convergence with other generating tech.; Floating will leverage these trends

- Evidence of progress towards reducing LCOE (e.g., Borssele), establishes offshore wind as credible large-scale RE source
- Additional deployment will accelerate cost reduction through economies of scale and learning effects
- **Commercialized floating technology will leverage this progress, resulting in even lower costs than currently projected**



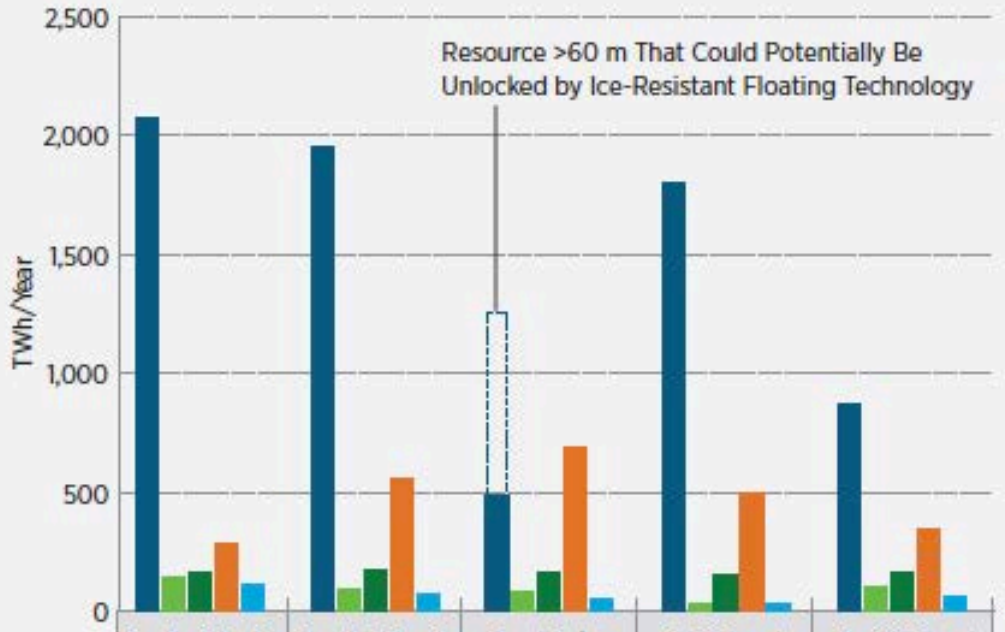
https://www.rolandberger.com/publications/publication_pdf/tab_offshore_wind.pdf

WF Commercialization Pathway is expected to reduce the LCOE to between $50-$100/MWh by the early 2020s



For California, Floating Wind represents the opportunity to tap into a major In-State Resource to achieve RPS Goals

- DOE estimates reaching approx. 68 TWh/year by 2050, although potential could be much larger
- Opportunity for major In State resource be part of the 50% RPS by 2030
- Developers increasingly active
- Deep water means floating technologies the only possible solution
- California's solar induced 'duck curve' accentuates need for diversified renewable resource development
- Challenges matching wind resource with transmission capacity



	North Atlantic	South Atlantic	Great Lakes	Gulf Coast	Pacific Coast
Technical Resource Potential	2,081	1,955	492	1,806	869
2020 Opportunity Space	145	98	80	33	106
2030 Opportunity Space	161	170	170	151	168
2050 Opportunity Space	289	555	688	502	348
2050 Wind Vision Scenario	112	75	51	34	68

Figure 2.7. Resource potential energy and opportunity space exceed requirements for the 86-GW *Wind Vision* study scenario[12] [2], [22]

Source:
US Department of Energy

Major Value proposition in terms of system balance, avoided transmission cost and economic proposition for CA => Major opportunity for serious growth of its In-State "Blue Economy"

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1 Increased In-State Capacity Value

- In-State Strong complement to Duck Curve created by Solar
- High and steady NCFs offshore

2 Avoided Transmission Costs

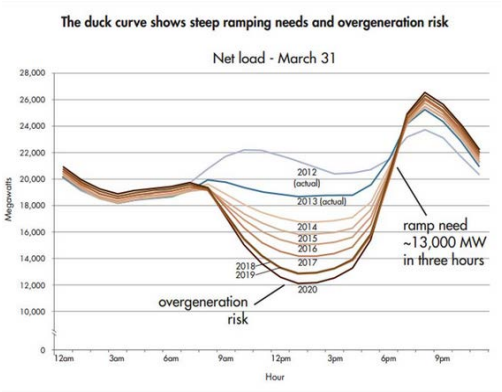
- Generation close to demand, reducing need to bring energy from 'far away'
- In-state economic alternative to built massive transmission lines to bring out of State wind into California (eg. Rockies, etc)

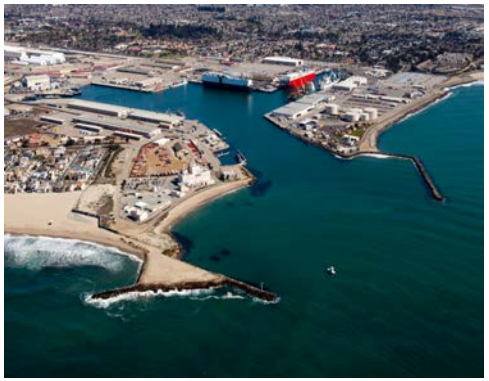
3 Economic Development Potential

- Promotes Major development of marine and ports infrastructure for both construction and operation
- Revamping of stagnant industries such as shipyards
- In-State Build Out: $20-40 B GDP impact by 2050 (NREL, 2016)

4 System Resilience

- Designed to withstand extreme events, such as earthquakes and Tsunamis
- Potentially resilient, black start generation resource in areas geologically sensitive





Key Take-Aways

1. The WindFloat, developed in California, is already proven technology, and is now proving its financial and economic viability
2. Reduction of Cost and Risk => Addressing the industry's challenges while enabling it to reach its full potential
3. Already several Projects ongoing worldwide, both in execution in the near term and in commercial pipeline globally
4. Floating Wind competitive with current offshore wind levels and on track to be competitive to deploy at large commercial scale after 2020
5. Offshore Wind can play a key role in the energy mix in California, with a steady resource close to load centers, complementing solar, avoiding transmission costs from out of state wind and In-State Economic Potential

www.principlepowerinc.com