
INTROCDUCTION IESF

02 12 2014



AGENDA

1. TECHNOLOGY

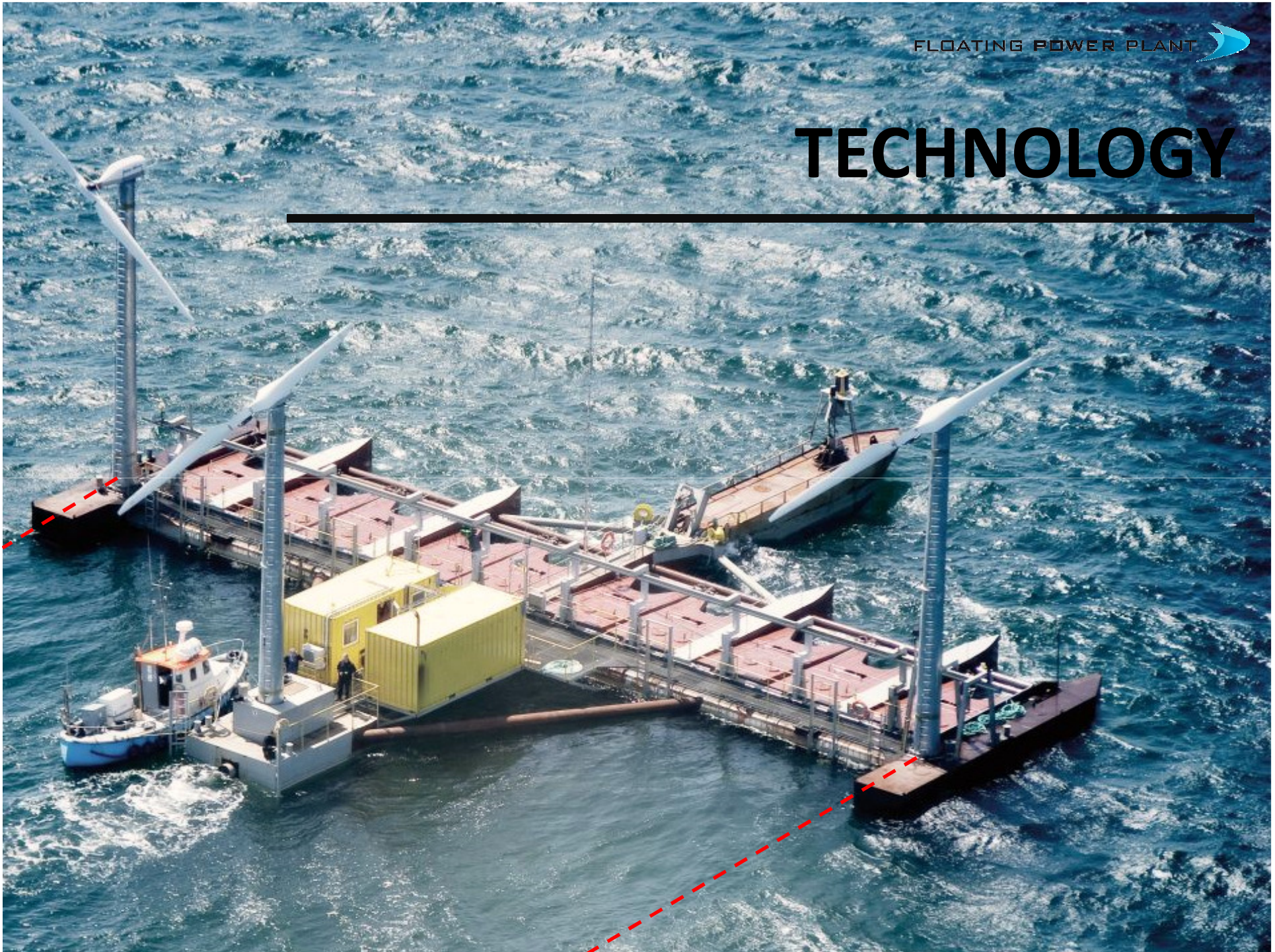
2. COMPANY AND DEVELOPMENT MODEL

3. MARKET AND BUSINESS MODEL

4. A KEY PROJECT

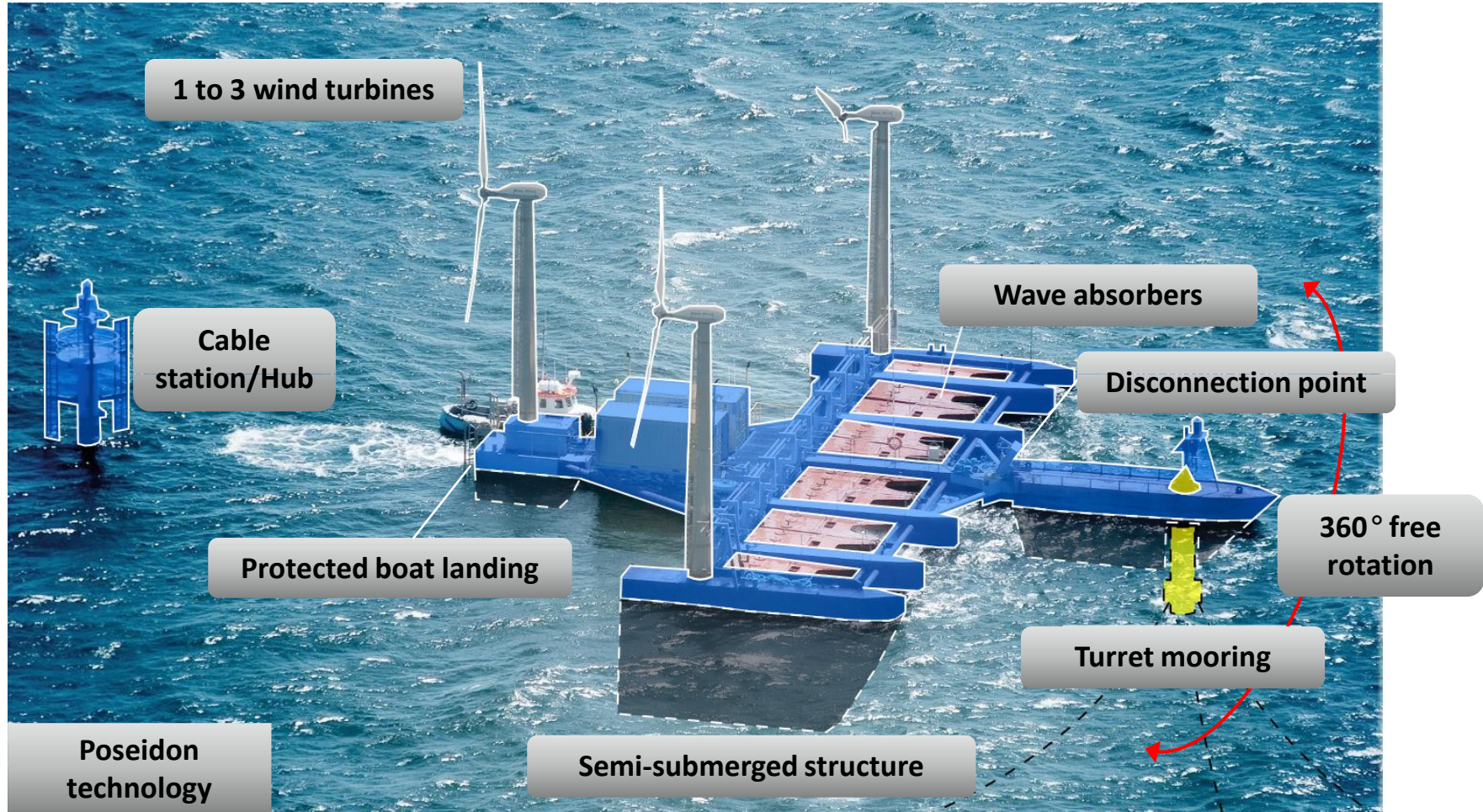
JUST ASK YOUR QUESTIONS

TECHNOLOGY



THE POSEIDON TECHNOLOGY – WIND & WAVE IN ONE

Video



All future commercial devices will facilitate only one wind turbine, whereas P37 was installed with 3 turbines. The turbines are in correct scale and are heavily instrumented to validate MW models and MW load cases.

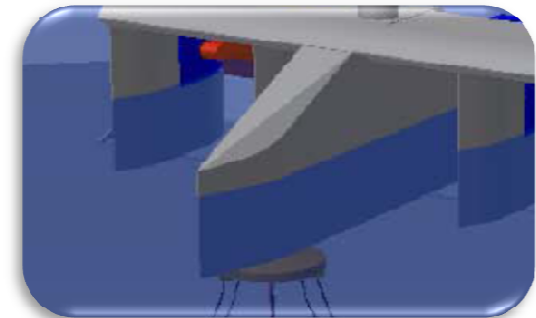
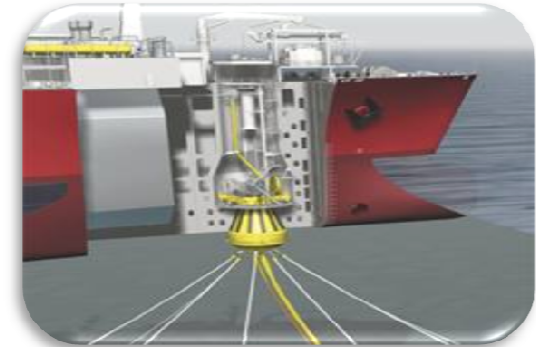


WIND & WAVE IN ONE

Floating Power Plant is a clean-tech company that develops, designs and provides a unique patented technology to harvest the limitless energy of the ocean. We have developed the world's only offshore-proven, grid-connected wind and wave power plant.

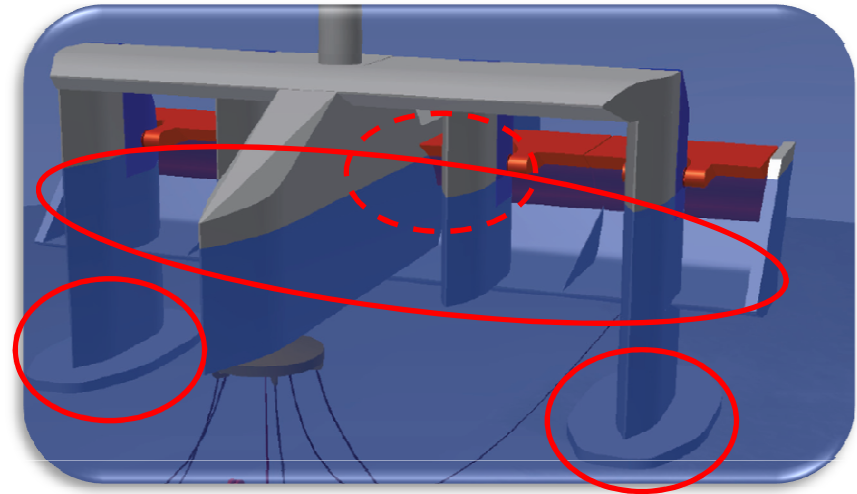
ANCHORING – HOW?

- The platform is anchored by using standard mooring technology that has been proven, and is still used, by the oil & gas industry
- The system used is a disconnectable turret mooring system with slack anchor chains
- The combination of the anchoring system and the platform design ensures that the platform vanes 360 degrees, always facing the incoming waves
- The anchoring system is the grid connection point (hub) and the platform can be disconnected and towed away



PLATFORM – HOW?

- Large triangular shaped and semi-submergible device
- 80% of the construction is below the water line
- A ballast system is in place for optimal static platform trim
- The platform is extremely stable and moves at very low frequency through a combination of:
 - Submerged multiple dampening elements front and aft
 - Energy absorption from the wave energy device
 - A passive orientation of the platform (vaning)



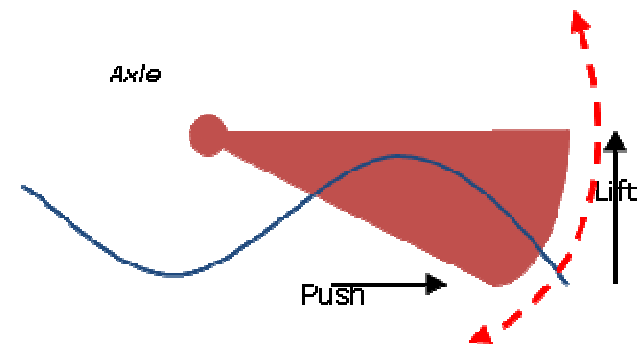
WIND ENERGY - HOW?

- The platform is build to support the latest technology from the wind industry up 5 MW turbines, providing an ultra stabile basis (extreme movements within 3-5 degrees)
- FPP’s technology is turbine “indifferent”, meaning the focus for FPP is to provide a foundation that can support the offshore turbines in the market
- The wind turbines will need an optimised pitch control system. In some cases, the turbine will also need an increased steel thickness in the bottom tower section to cope with fatigue
- The wind turbine will be installed and tested in harbour and the main seven-year overhaul will be performed in harbour as the platform can be disconnected and towed



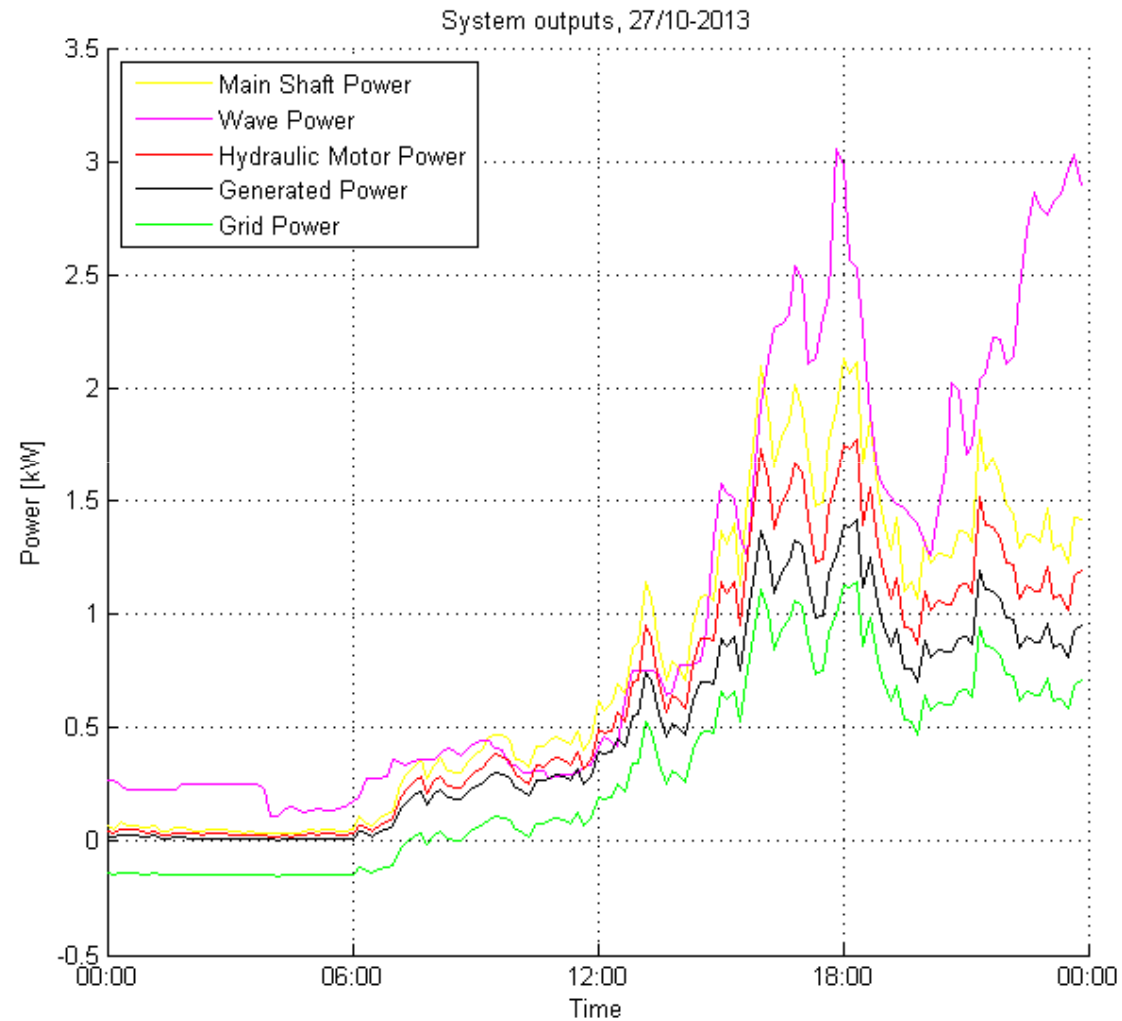
WAVE ENERGY – HOW?

- A front pivot hinged absorber (float)
- Unique shape and size
- Ballasted for different wave conditions
- Patents approved
- Unique system can absorb both the push and lift of the wave into one mechanical movement



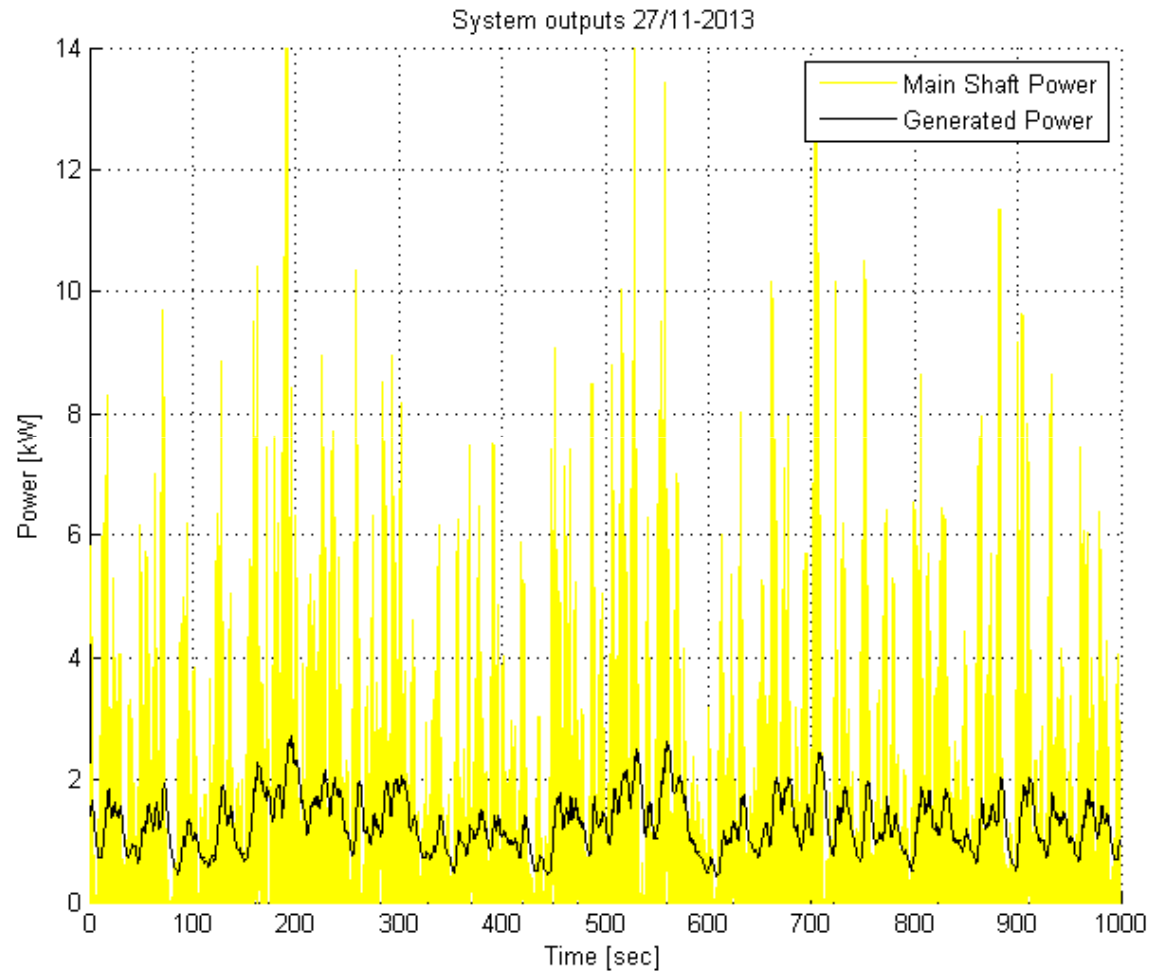
KEY RESULTS – SYSTEM EFFICIENCIES

- Power measured in each stage of the PTO
- Internal power measurements very robust
- Incoming wave power calculation less robust
- Deep water approximation used for analysis
- PTO System efficiency of 64%



KEY RESULTS – POWER QUALITY

- Supplying smoothed and grid compatible power a market demand
- **Control strategy** is crucial
- **RPM** FPP's key control parameter
- FPP has supplied joint power to the grid that is grid compatible from wind and wave



INCREASED UP TIME AND SAFE ACCESS

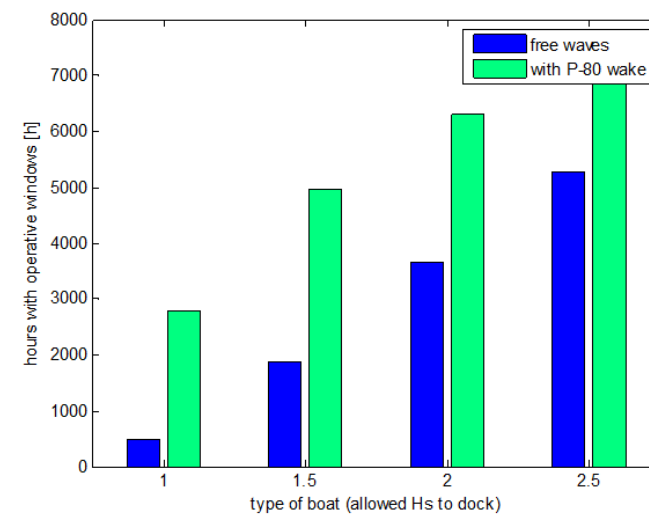
Because

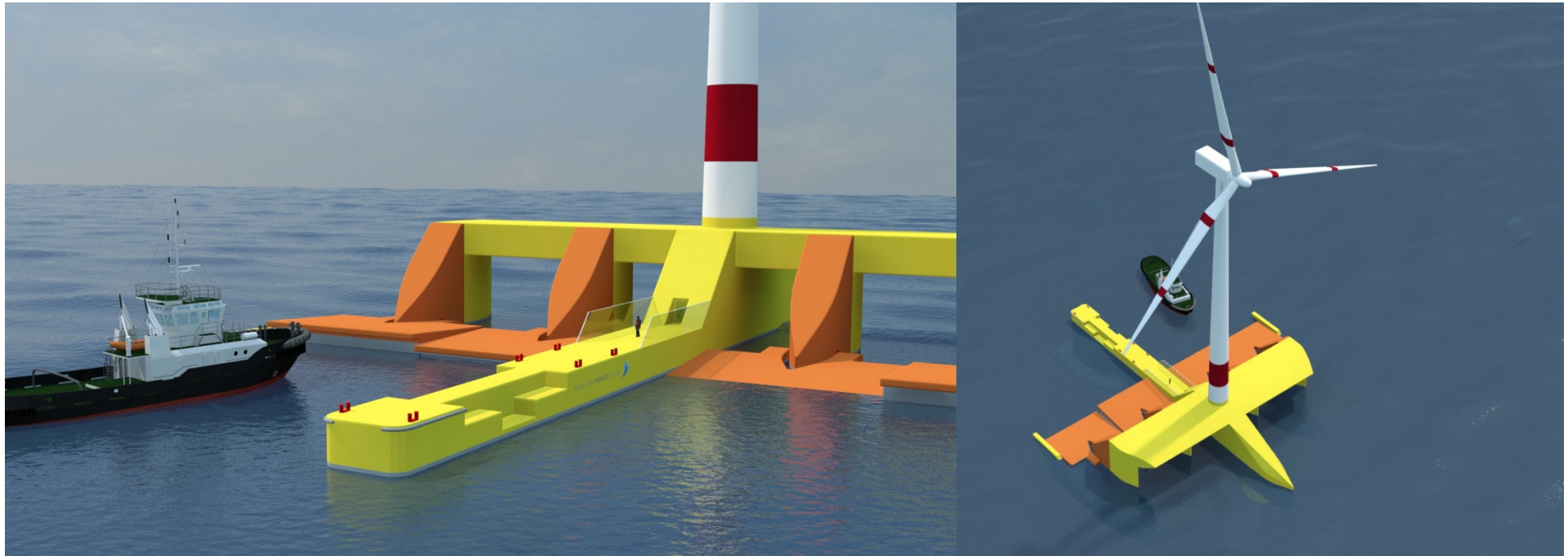
- 1) The platform turns passively into the main wave direction
- 2) The wave technology absorbs 70% of the incoming waves
- 3) It is an extremely stable and floating structure

An offshore
safe access
harbor is
created

This

- 1) Increases the O&M services window significantly
- 2) Reduces O&M cost
- 3) Increases production uptime
- 4) Is safe





P80 facts

80 meters wide

up to 2.6 MW wave power

up to 5 MW Wind

Minimum water depth 45 m

(10)-33 KV AC joint wind -

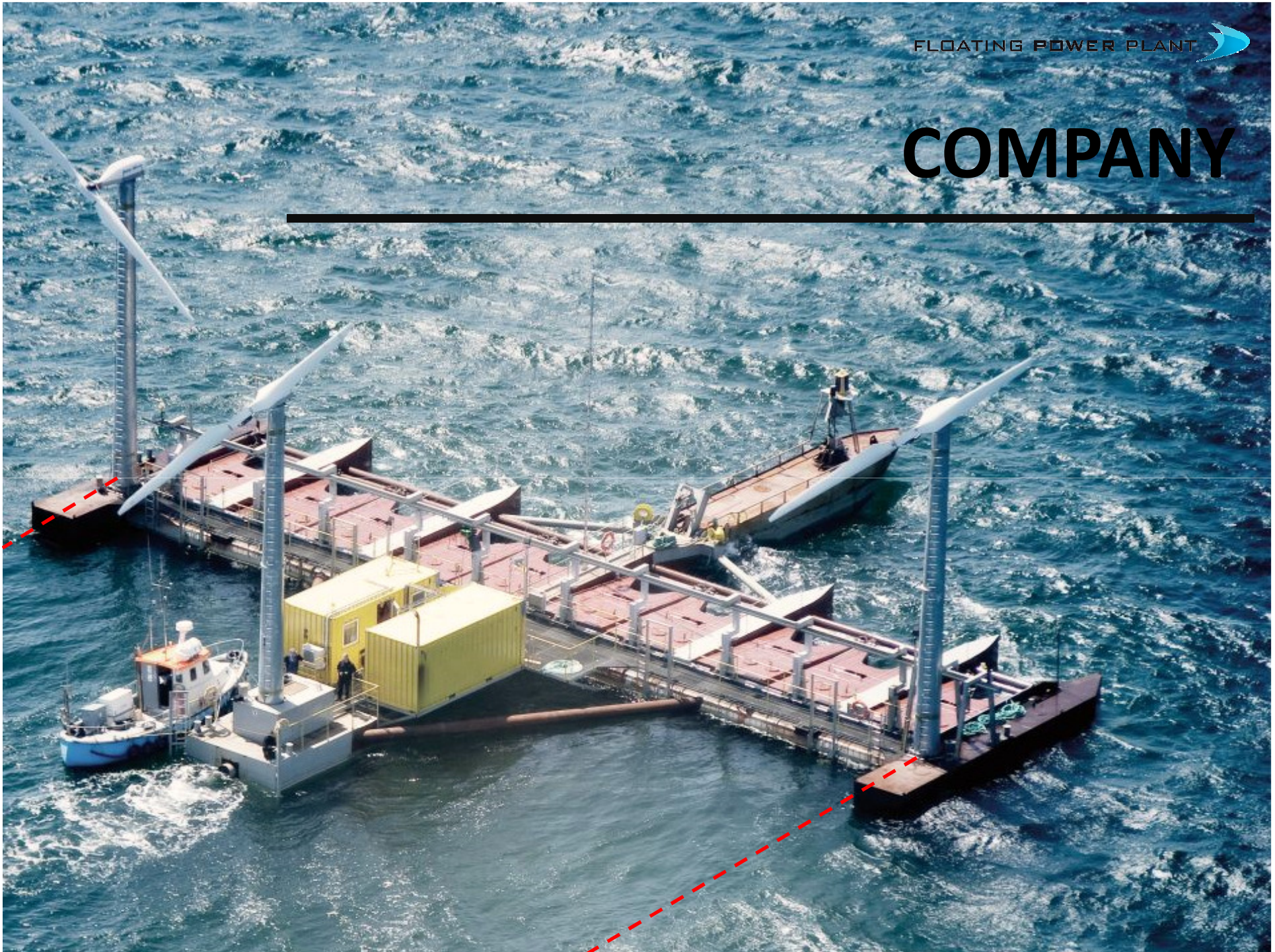
and -wave grid connection

Video



FLOATING POWER PLANT 

COMPANY



FUNDING TILL DATE AND SHAREHOLDER STRUCTURE

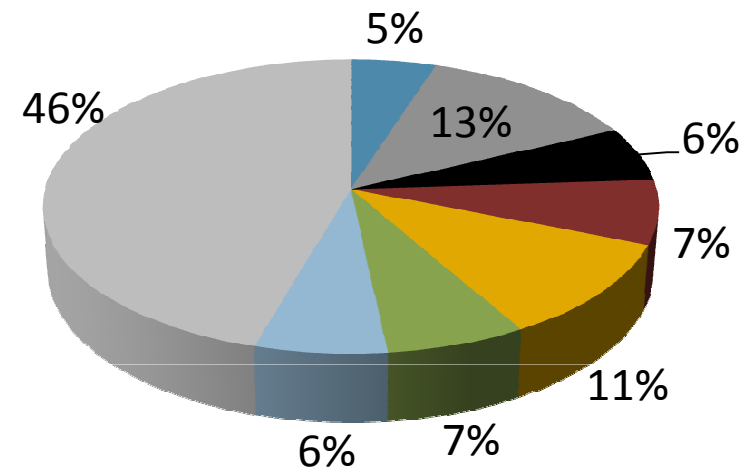
Current funding: DKK 92,2m

- DKK 70 m equity
- DKK 16,5m development loans from LOKE (Lolland Energi Holding)
- Other loans DKK 1.2m
- DKK 4,5m EU and regional funding

Current capital structure

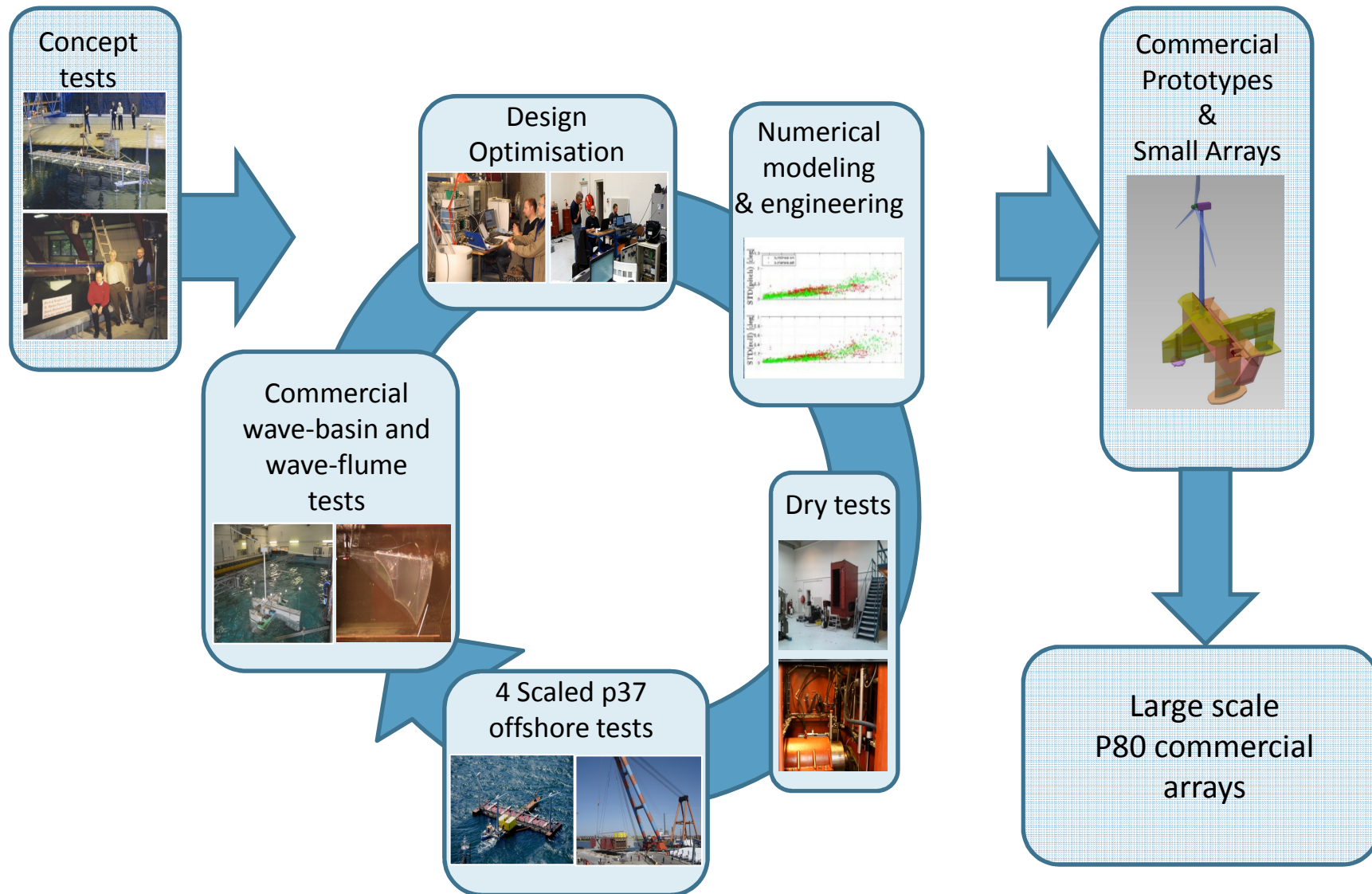
- 110 shareholders
- Total ownership by BoD and Supervisory Board: 46%
- One share class; no particular holding and voting rights

Shareholders



- DONG Energy Power A/S
- Familien Pedersen Holding ApS
- Kristianstad Holding AB
- CTF Holding ApS
- JA-Pecunia ApS
- TH. Schulz Holding A/S
- ApS af 18. juni 2002
- Others

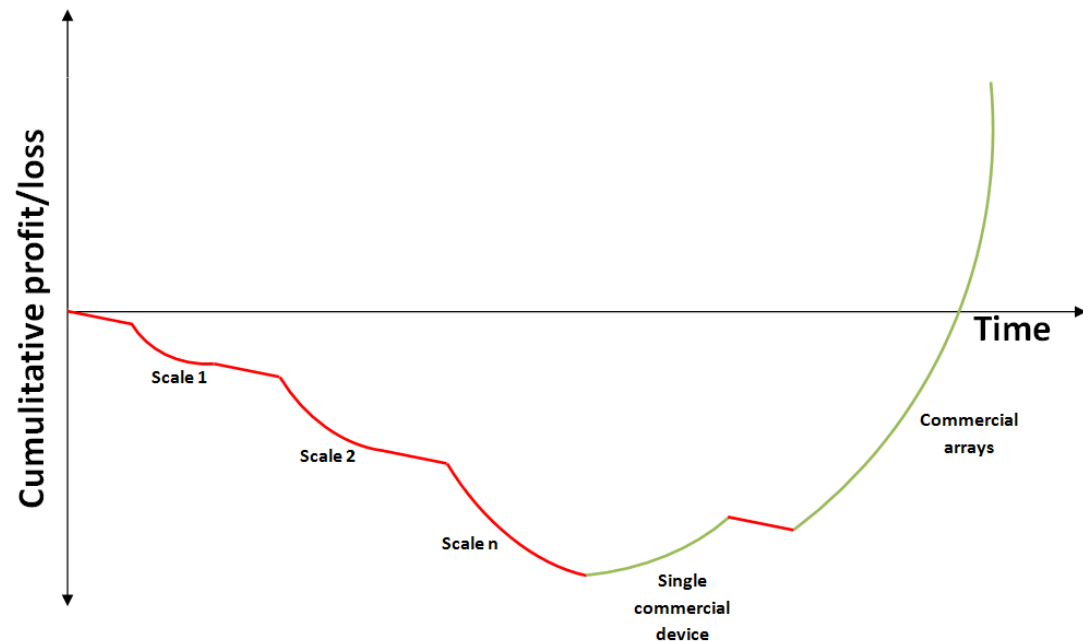
SCALED UP APPROACH – SEVERAL YEARS OF DEVELOPEMNT










KEY CHALLENGES WITH THE SCALED UP APPROACH

- Time from idea to revenue **very, very** long with lots of risks
- Small waves (small scales) have little power => no real revenue on the way
- Several valley of deaths on the way - investment capital needed for all steps
- Several technologies elements to be developed / adapted to the platform
 - Moorings
 - PTO systems
 - Control systems
 - Wave technology
 - Wind turbine pitch control , etc.
 - Platform stability and survivability
 - Numerical models
 - Design tools
 - Etc.

Try pitching that to a VC

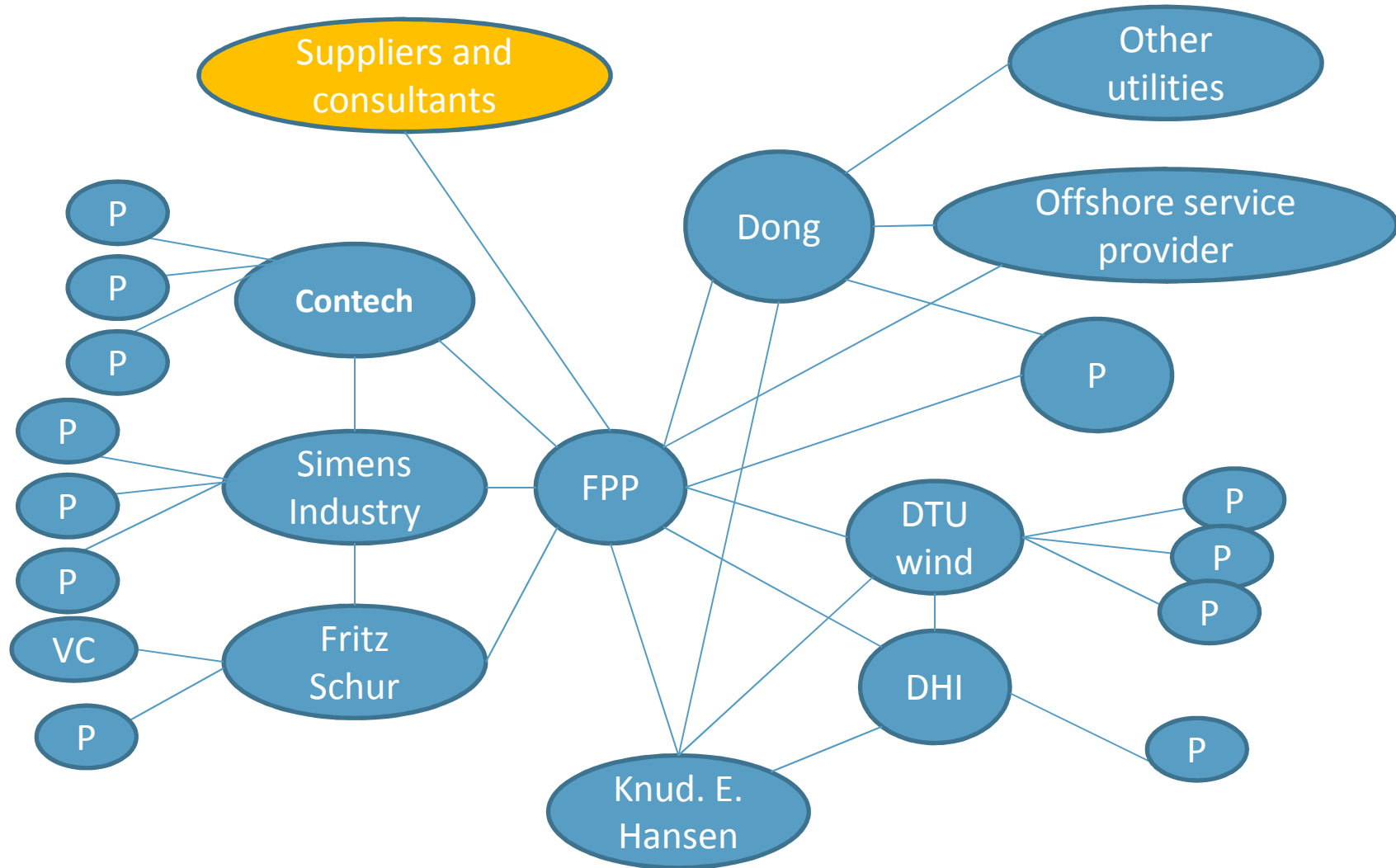


PUBLIC EXAMPLES OF FPP PARTNERS

Partner	Expertise	Role	Since
	Power generation, net-integration, control, data acquisition, ramp up	Development of energy conversion systems incl. PTO module and net integration	2008
	O&M, safety, cabling, offshore site operations, approvals, EIAs, etc.	Provides key end user information and aids in overall system design, O&M and approvals	2005
	Large scale oil hydraulics design, systems integration, control, O&M	Co-development of PTO system securing delivery of grid compatible power	2011
	Wave force theory, testing, measurements, scaling, design	Consultant on offshore measurement, wave basin and flume tests, scaling etc.	2000
	Measurements and modeling of wind turbines on floating foundations	Measurements and modeling of wind turbines on floating foundations	2007
	Advanced control and measurement systems	Platform control, DAQ, PTO development, etc.	2006
	Naval architecture, survivability, engineering, certification, procurement, construction, ramp up	Design of buoy, stability and storm safety systems, etc.	2008

Each partnership is unique - Everybody “want” something different

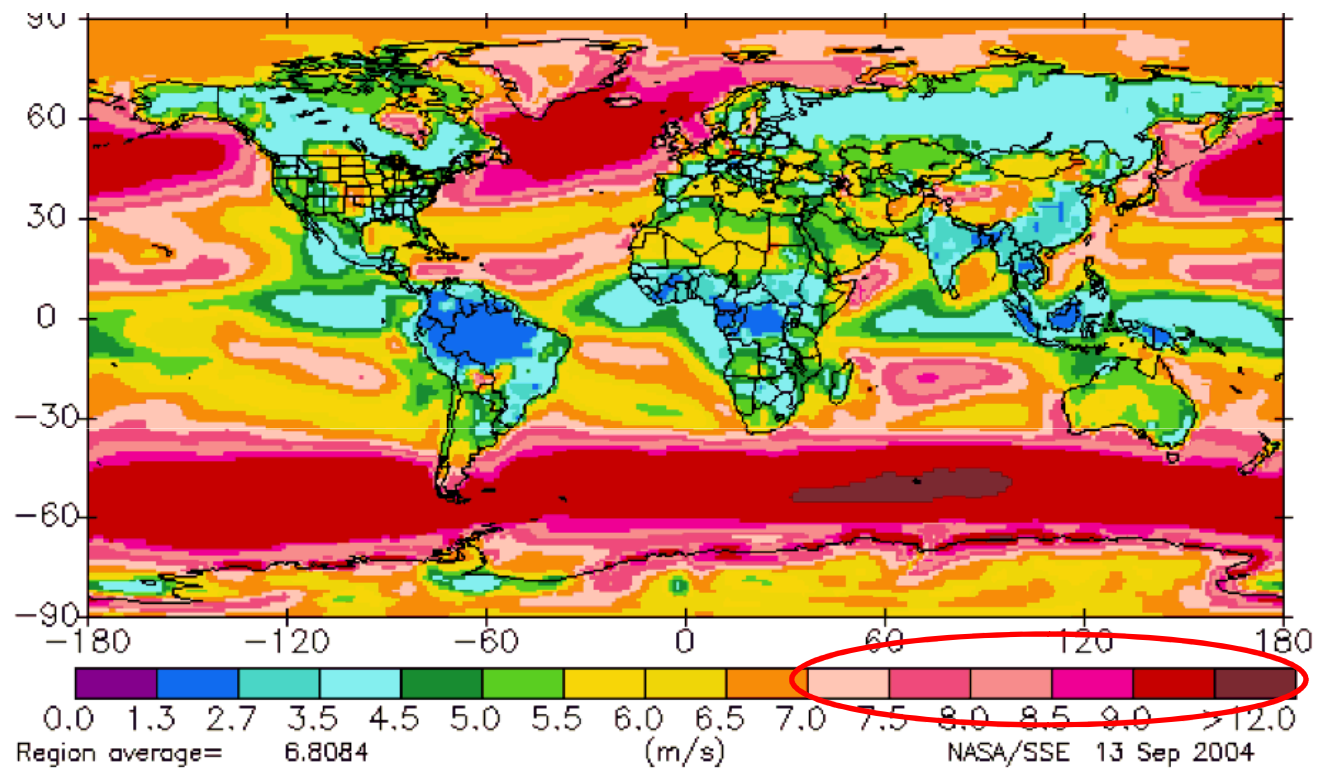
FPP SIMPLE EXAMPLE



MARKET

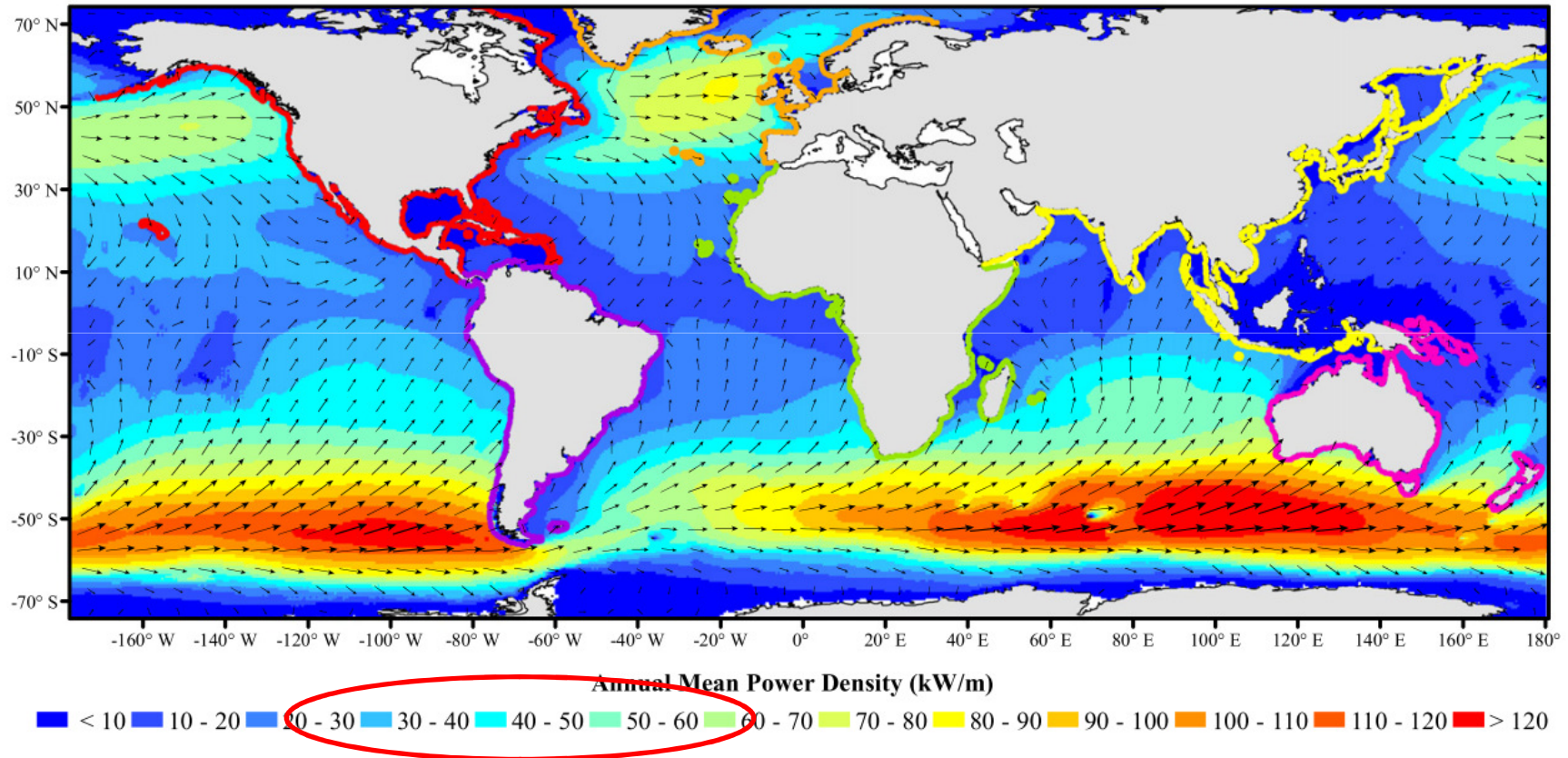


WIND MARKET



Note: the numbers on the map express the wave energy potential at the specific site – the higher the number, the greater the potential (kW/m wavefront)

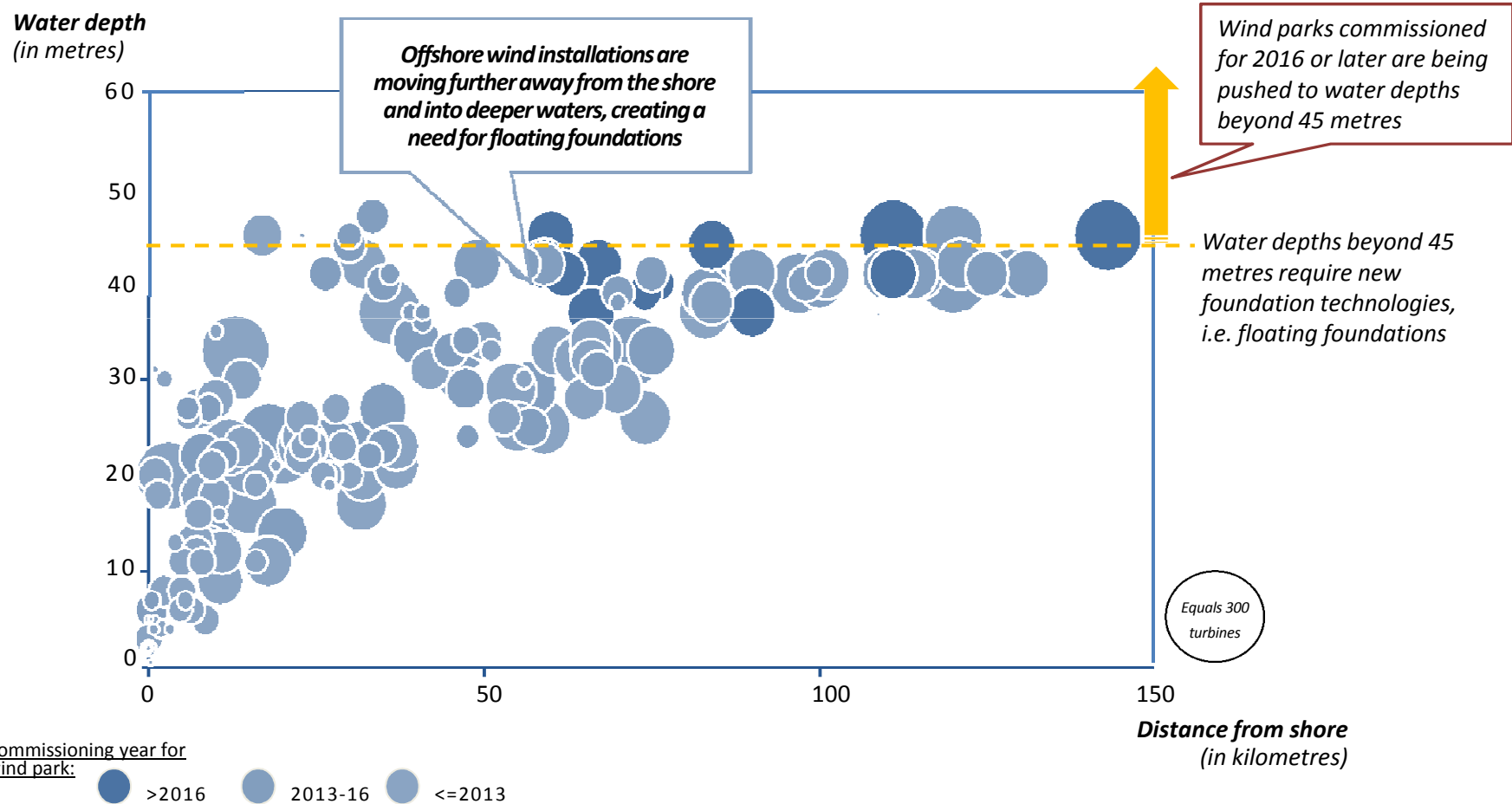
WAVE MARKET



Note: the numbers on the map express the wave energy potential at the specific site – the higher the number, the greater the potential (kW/m wavefront)

SCARCE AVAILABILITY OF WIND SITES MOVES OFFSHORE WIND TO DEEPER WATERS

Floating foundations become a necessity for offshore wind as it moves further away from the shore. Just to optimise several of the UK's round 3 projects, floating foundations are required



Source: 4C Offshore; WTG Partners

THE MARKET SEGMENT

- Water depths over 45 m
- Where normal foundations become cost ineffective
- Here FPP is cost leader



FLOATING POWER PLANT



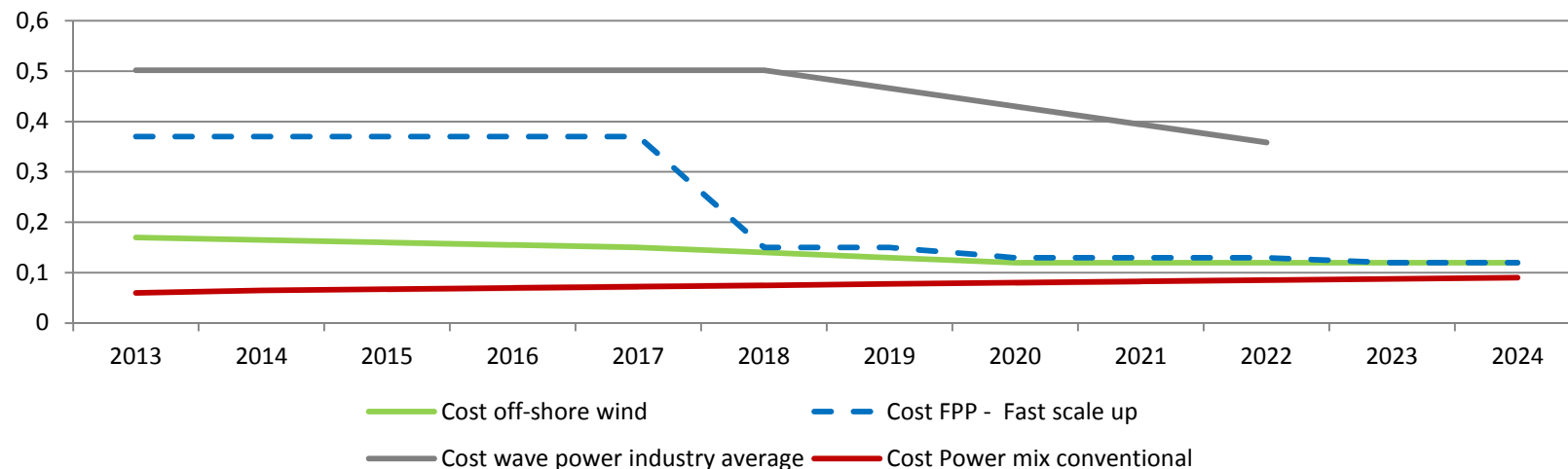
BUSINESS MODELS AND COMMERCIALISATION



FPP IS COST OF ENERGY LEADER

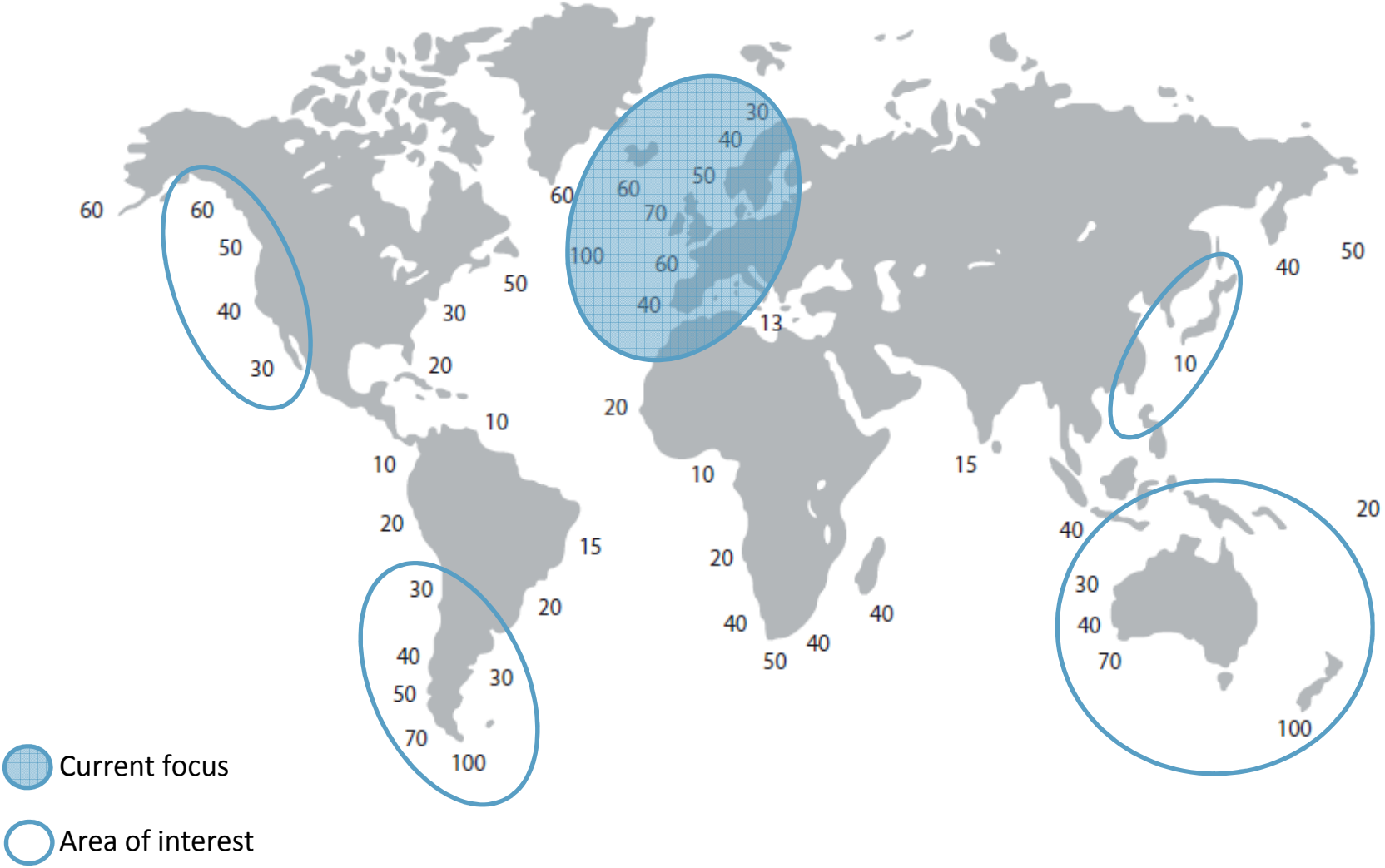
- FPP’s technology can match the cost improvement expected for offshore wind.
- Driving down the cost for offshore wind is key for the fundamentals
 - Target cost level for key countries supporting offshore wind: **0.12 €/kWh** (100€/MWh) at water depths below 45 m
- Levelized cost of energy for FPP’s four generations of development goes from a Generation 1 (a single unit commercial prototype and a small wind turbine at a benign and protected site) to a Generation 4 device in a large array (a 100 device array at a high energetic site).
- This reduction in LCOE development makes FPP the only technology in the deep water market segment that matches offshore wind on traditional foundations
- **Potential for further cost reductions through larger scale**

Power generation costs based on P80
(in €/kWh)



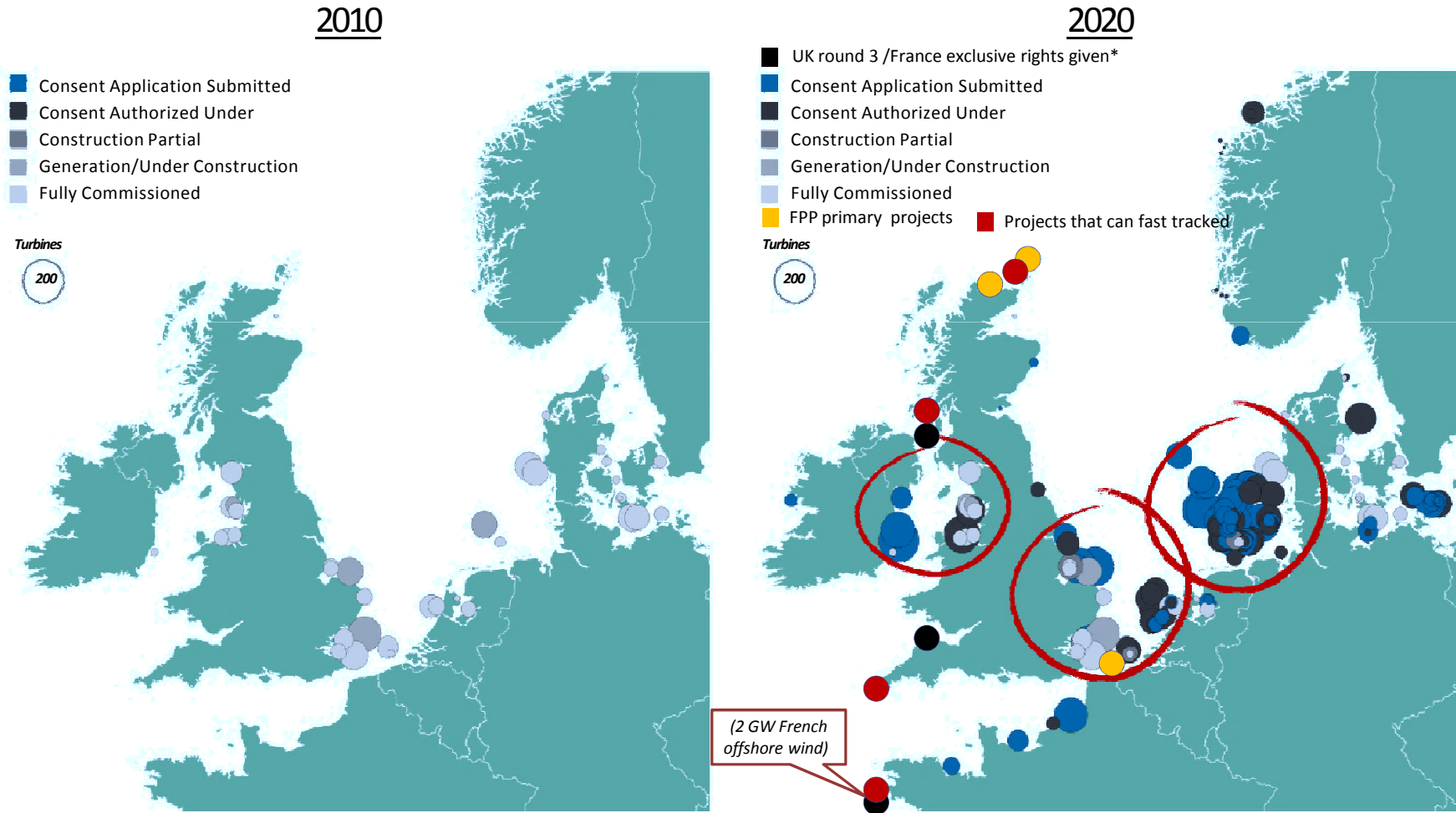
Note: FPP has based its method of LCOE calculations on the framework applied by The Crown Estate, which is similar to the general offshore wind industry. The method includes cost of capital (WACC) which the Crown Estate fixes at 10% for offshore wind, however FPP applies a WACC of 12%
 The wave energy cost curve and wind energy cost curve source is renewable UK.
 Cost Power mix conventional: Fraunhofer, ISE

FPPS CURRENT FOCUS



FPP PROJECTS AND LOCATIONS FOR OFFSHORE WIND

- ~150 new wind parks currently planned/consented creates scarce availability of wind sites near shore
- Political support pushes parks further offshore away from public view and shipping lanes



Source: 4C Offshore

*In order to optimise array extension floating wind technologies are required due to water depth

SUMMARY OF TECHNOLOGY VALUE PROPOSITION

Key characteristics of FPP's technical value proposition

- 1 Unique combination of wind and wave energy allows FPP to reduce energy costs and improve power quality
- 2 An extremely stable floating foundation which supports large MW wind turbines from all manufacturers
- 3 An efficient and robust wave energy technology
- 4 A protected offshore harbour for safe access to conduct O&M
- 5 A platform that can be easily disconnected and towed to harbour for large O&M activities, reducing O&M costs
- 6 Power utilisation of wave energy creates a more predictable and stable renewable energy source, securing improved base load characteristics and predictability in planning.
- 7 Technology that has been developed in cooperation with leading technology providers, such as Siemens Industry and others, ensuring a best-in-class product development process
- 8 A technology which has been proven through rigorous offshore testing

ADDITIONAL INFORMATION



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