



European Dredgers Contribution to Ocean Energy Extraction

Presentation at EuDA AGM
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European Energy Association



Content of presentation

- > What is ocean energy ?
- > The technology and can we start talking about an OE industry?
- > The **Numbers** and what do they mean ?
- > Possibilities for the dredgers industry ?



What is EU-OEA and who am I ?

EU-OEA

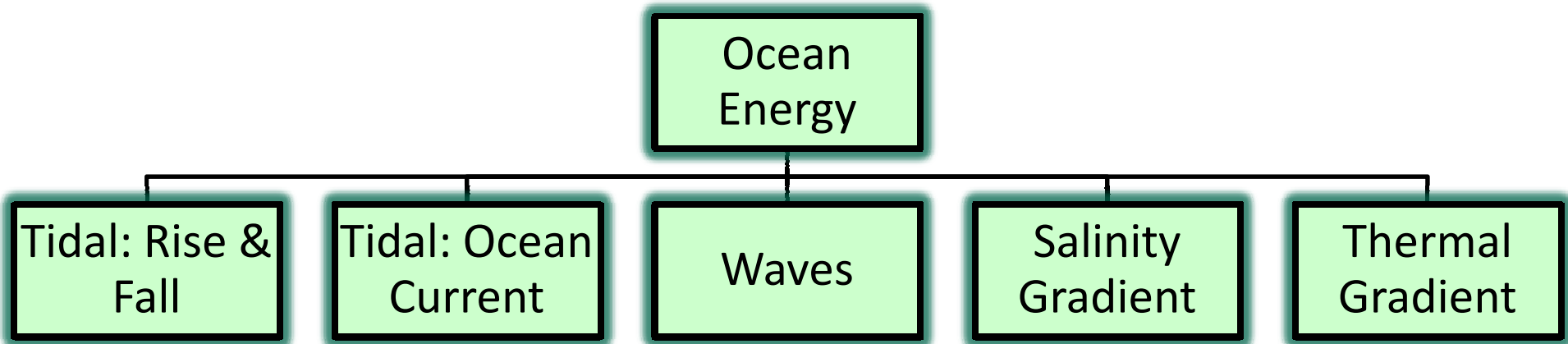
- > Started in 2006 - 60+ members strong and growing
 - > 5 Lead Sponsors (Alstom, DCNS, EDF, EVE, Statkraft)
 - > 2 Associations (WavEC, RenewableUK)
- > Goals & Objectives:
 - > To strengthen development of OE sector in EU
 - > Act as the single OE sector voice to the EC
 - > Act as the representative for our members towards the EC

Dr Karl C Strømsem

- > PhD in marine engineering from IFP (France) and NTNU (Norway)
- > Worked for 25 years in offshore oil and gas (Conoco, Technip and as consultant) with last position as Projects Director Europe in London for Noble Denton Ltd.
- > Funded two companies, one acquired by Noble Denton in 2007
- > Now working as a free consultant within international offshore oil and gas and European renewables industry and member of the board of EU-OEA.



What is Ocean Energy ?

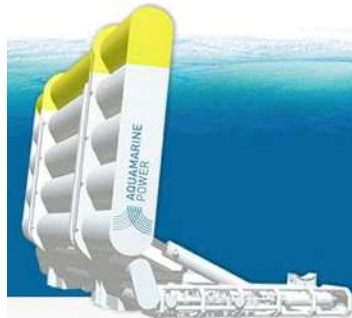




How does wave energy devices look ?



PICO Plant, Portugal
1999, 400kW



Aquamarine Power, UK
2009, 800 kW



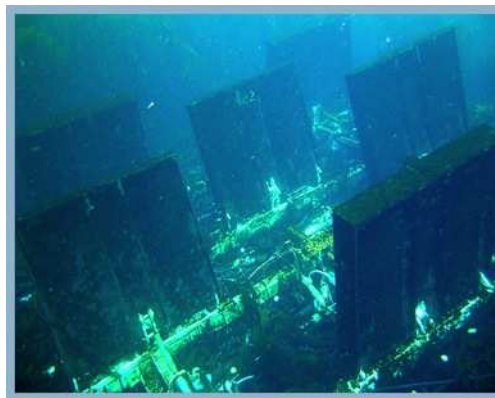
OE Buoy,
Ireland
2006, 20
kW



OceanLynx,
Australia
2005, 450 kW



AWS, Portugal
2005, 2MW



Wave Roller, Finland
2006, 13 kW



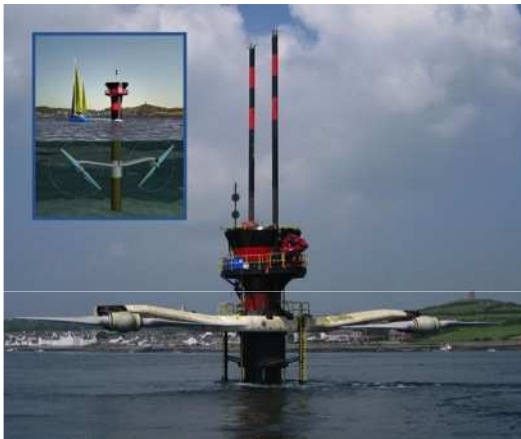
Pelamis, PT
2008, 3x750kW



WaveDragon,
Denmark
2003, 20kW



And tidal devices





Salinity Gradient

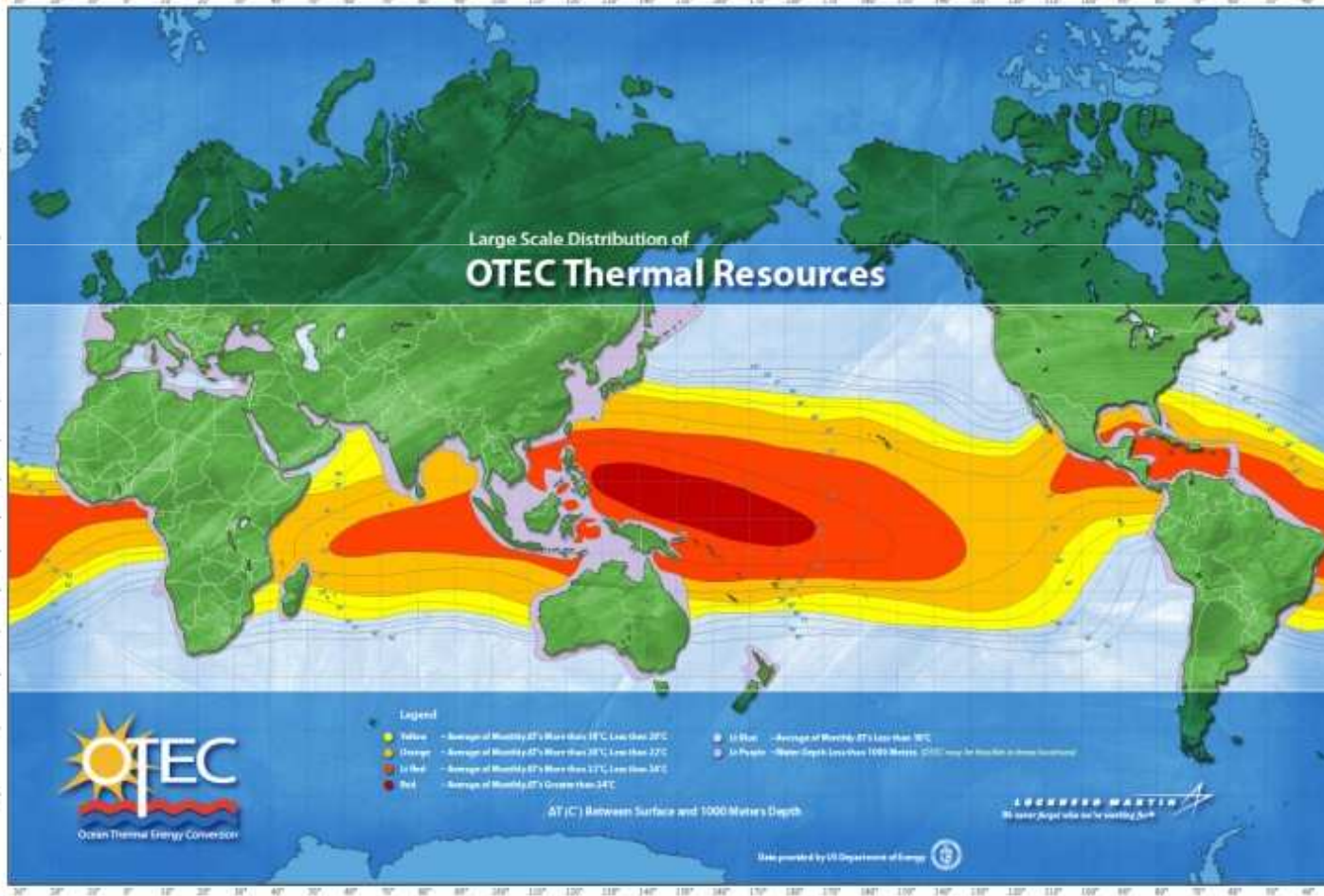
Statkraft (Norway) demo plant and are now planning for a 2.5 MW plant

Wetsus (Netherlands) building a 100 kW plant and plan for 2.5 MW plant



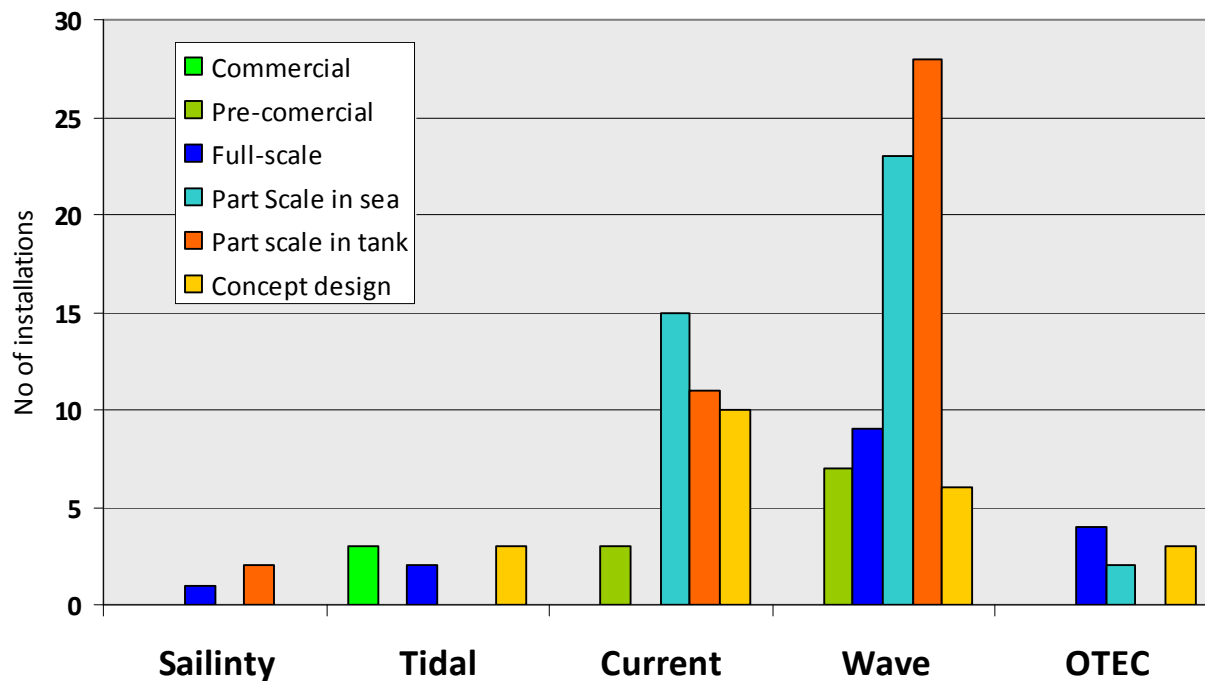


And OTEC (Ocean Thermal Energy Conversion)





How far are we from creating an industry?



Source: Powertech Labs Task Report, 2007 & IEA-OES

We see major industrial players beginning to take an interest

- Alstom
- ABB
- Voith Hydro
- Siemens

All are either investing in or working with ocean energy projects as they see a future market

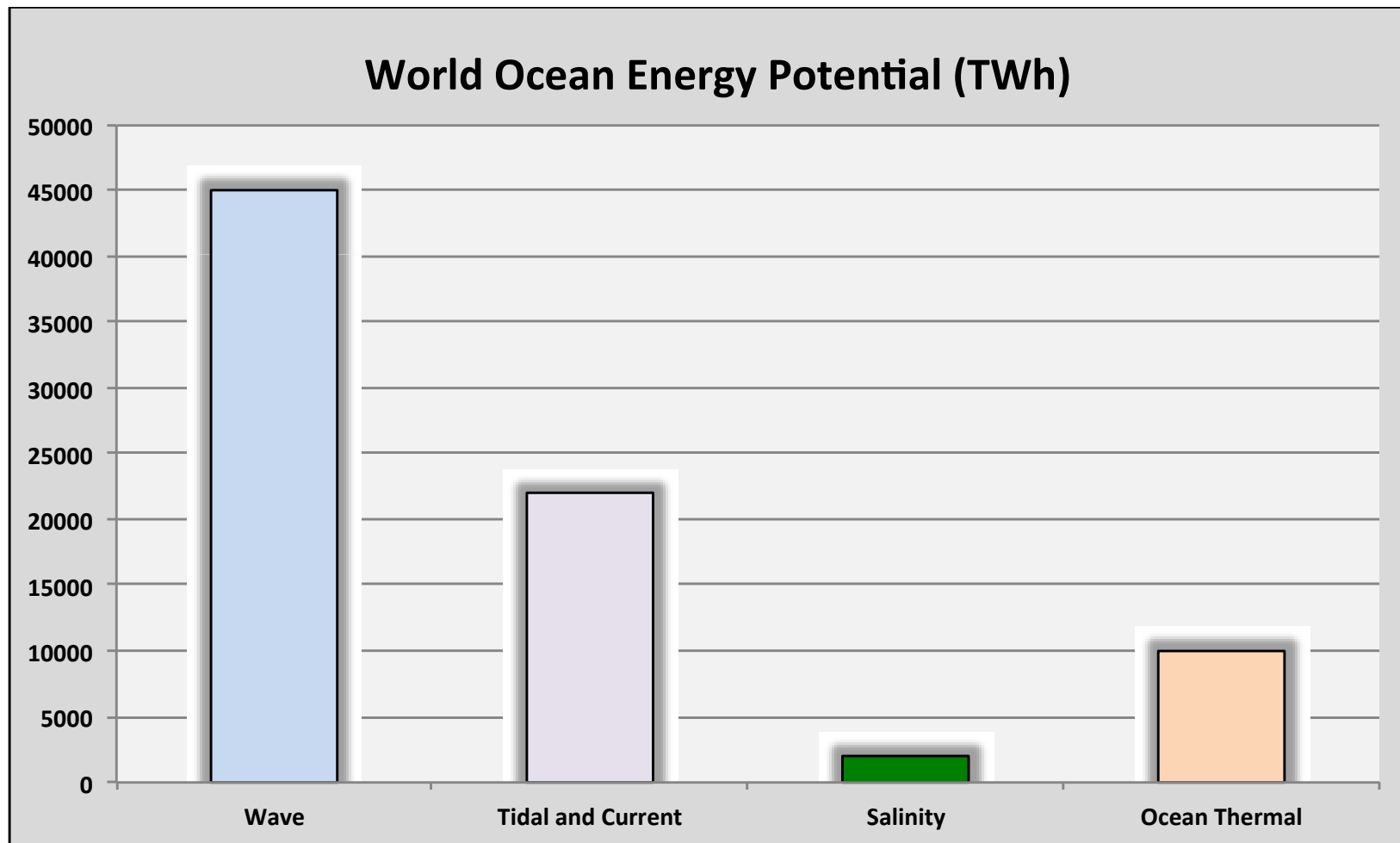


Potential

THE NUMBERS

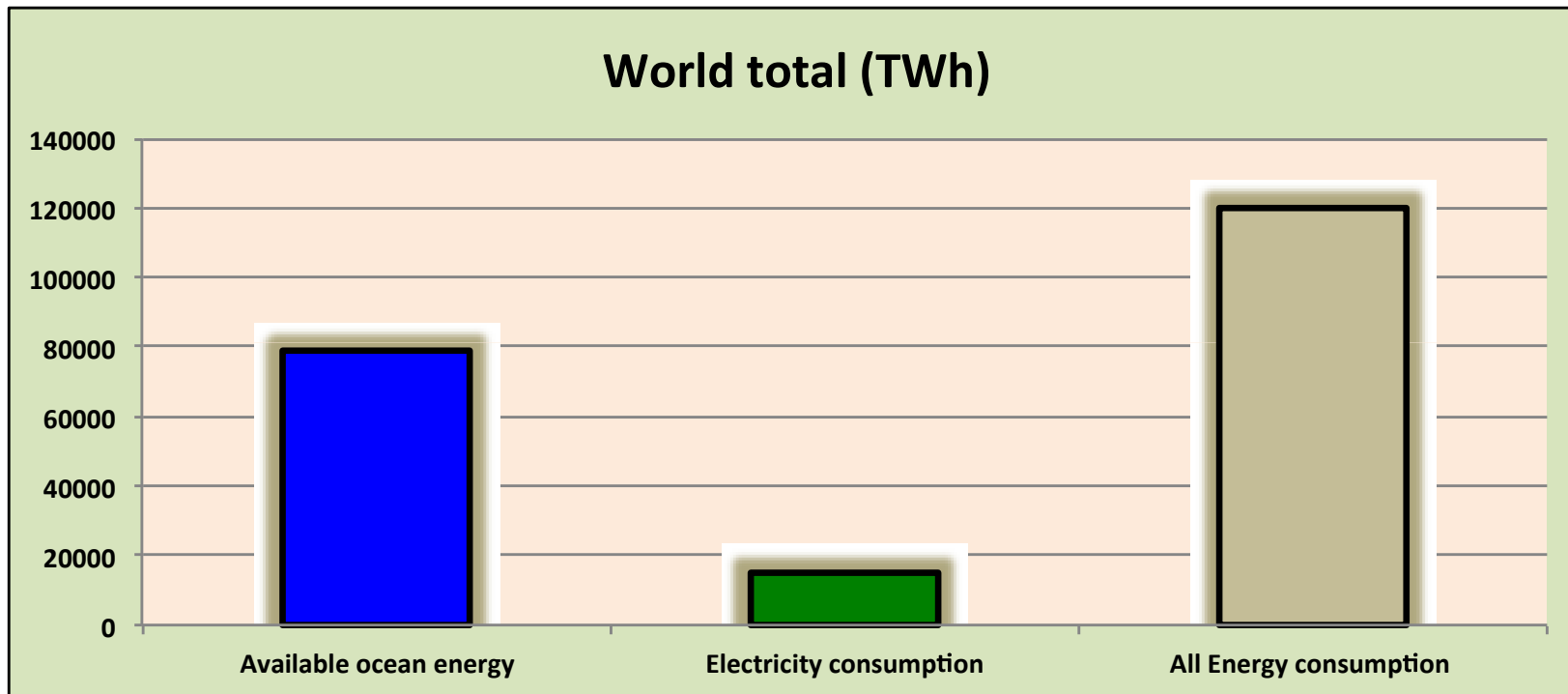


Energy potential Ocean Energy, potential





Ocean Energy in perspective



Total world consumption of energy 2009

All energy : 120 000 TWh (oil, gas, coal, nuclear, hydropower etc)

Electricity : 15 000 TWh (nuclear and generated electricity)

Total world available ocean energy approx. 80 000 TWh

Ocean energy can deliver up to 80 % of total energy consumption or more than 5 times the electricity consumption in the world.

Source: BP Statistical Review of World Energy June 2010.

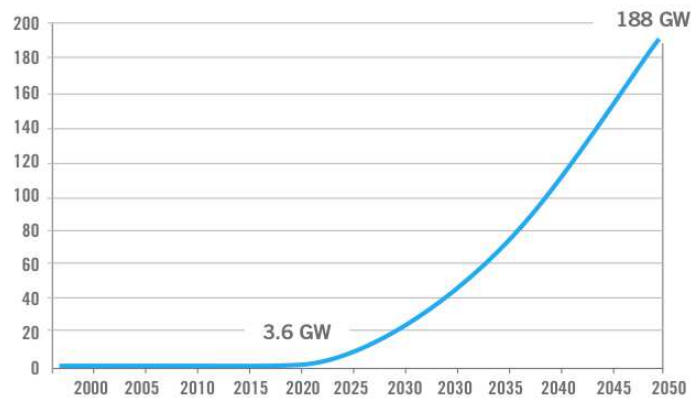


European Roadmap for Ocean Energy

Table 1 ESTIMATED BENEFITS OF DEVELOPING A WORLD LEADING EUROPEAN OCEAN ENERGY INDUSTRY

Installed Capacity / GW	Direct Jobs ¹	Total Jobs (Direct & Indirect) ²	CO ₂ avoided Mt/year ³	Investment €m. ⁴
3.6 (in 2020)	26,000	40,000	2.61	8,544
188 (in 2050)	314,213	471,320	136.3	451,104

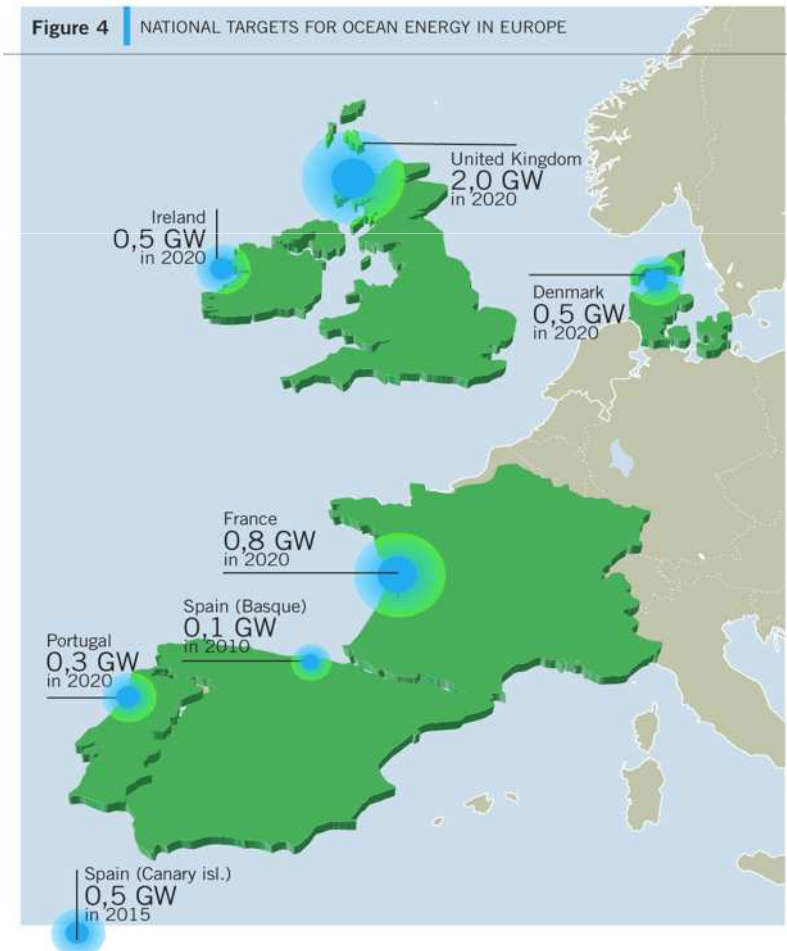
Figure 2 PROJECTED OCEAN ENERGY INSTALLED CAPACITY



2020 - 1% and
2050 - 15%
of EU electricity
generation

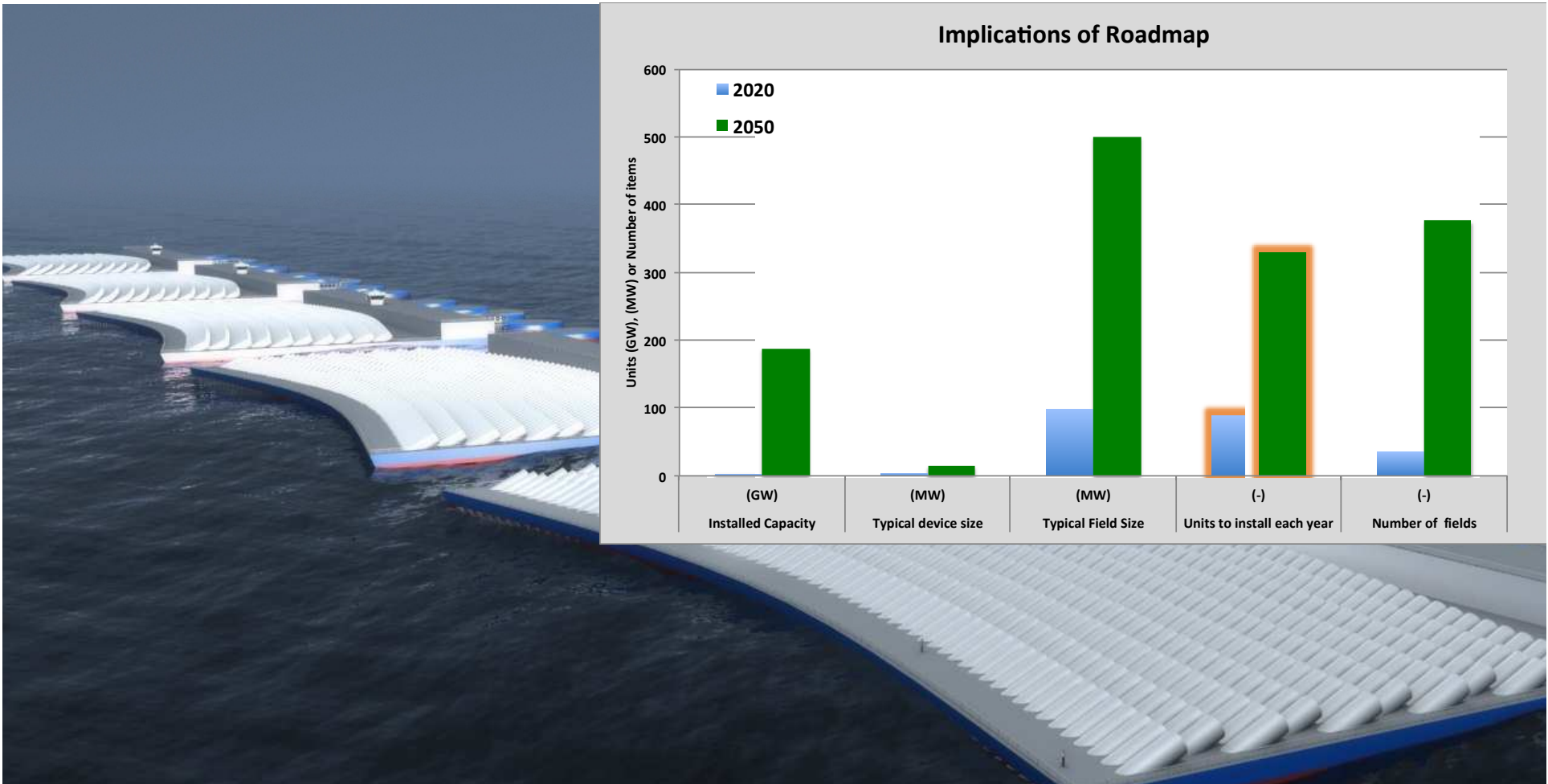
Source: EU-OEA, Ocean Energy Roadmap, 2010

Figure 4 NATIONAL TARGETS FOR OCEAN ENERGY IN EUROPE





What does this mean in number of devices and sites





What are common for all devices ?

- **Installation;** need for vessels, cranes, barges.
- **Offshore site preparations;** piles, moorings, bottom preparation, foundations
- **Cables;** installation, need for protection offshore and proper landing at shore
- **Maintenance work;** offshore which need vessels and crew.

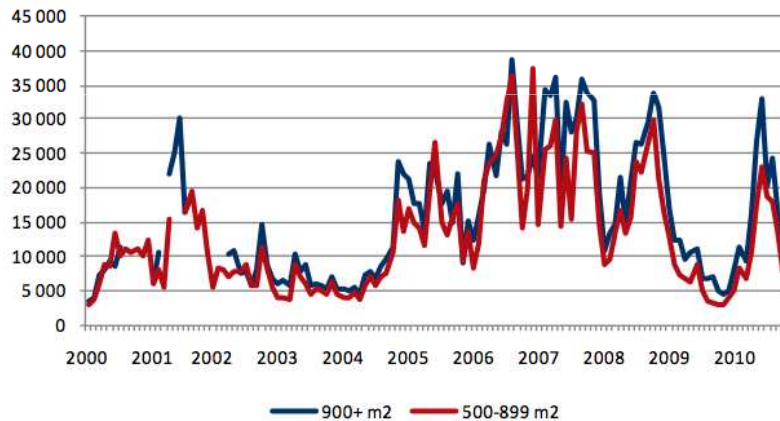


Vessels, crews and equipment!

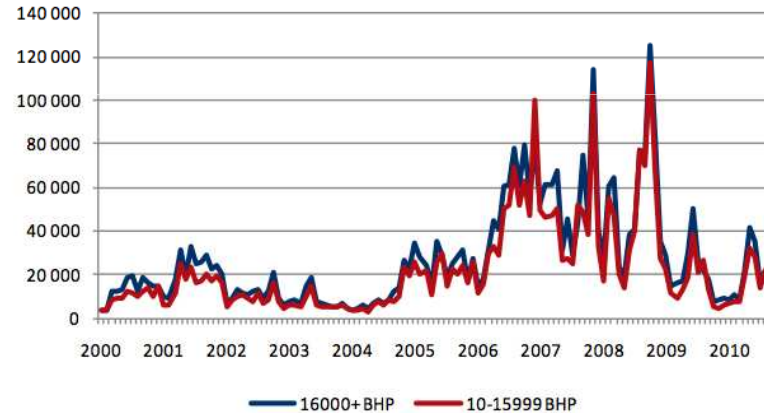


Historic AHV and PSV North Sea rates (GBP)

North Sea PSV spot rates



North Sea AHTS spot rates



AHV and PSV spot contracts 2011	
TYPE	19 - 26 OCT
Large AHTS	38,231-201,490
Medium AHTS	-
Small AHTS	65,000-65,000
Large PSV	10,000-38,231
Medium PSV	10,000-25,832
Day rates in GBP	

Sources; RS Platou and Upstream



Potential for the dredgers industry

- Ocean Energy need innovative and new solutions for installation.
- Cannot pay offshore oil and gas rates and no offshore rigs/anchor handlers, installation vessels available due to high oil and gas activity.
- The dredgers industry have vessels, know how and equipment that can be used to provide services for the ocean energy industry in several areas.

