



OCEAN ENERGY
A European Perspective
Lisbon 2010-May-14
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EU-OEA

www.eu-oea.com



● **Topics covered**

- Short about EU-OEA, European Ocean Energy Association
- Ocean Energy, what and how
- Ocean Energy Roadmap, published 5 may 2010 to the EU commission
- Offshore floating wind and potential synergies with Ocean Energy

● European Ocean Energy Association (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
- **2010 Ocean Energy events**
 - » Mar 22, Brussels – Marine Renewables: “Turning The Tide”
 - » May 6-7, Brussels – “Ocean Energy”, 1st Annual Event
 - » May 19-20 - EU Maritime Days, “OE Open House”
 - » Oct 6-8, Bilbao – ICOE 2010, Exhibit coordinator
- **2010 EU-OEA has started to gain momentum**
 - » Delivered “European Ocean Energy Roadmap, May 2010
 - » Continuous dialogue with the EU – commission and various member states
 - » Focal point for developers, and industry entering into the ocean energy area



What is Ocean Energy ?

Ocean Energy with its potential is defined as:

- Wave Energy – 45,000 TWh/year
- Ocean Currents – 400 TWh/year
- Tidal – 1,800 TWh/year
- Ocean Thermal – 33,000 TWh/year
- Osmotic – 20,000 TWh/year

Source: Ocean Energy: Prospects & Potential, Isaacs & Schmitt, with 15% utilization factor & 50% capacity factor

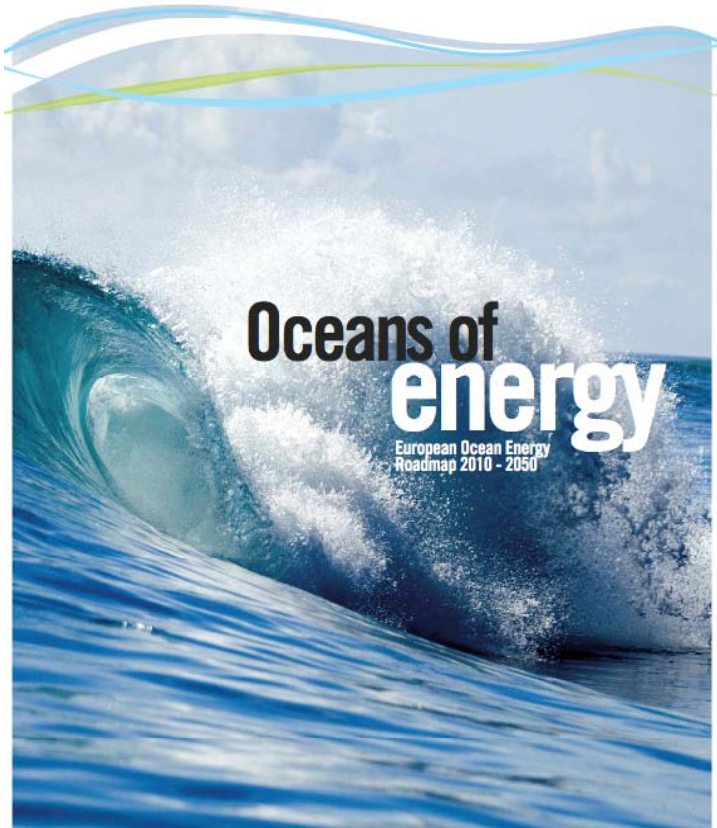
Pr definition, Offshore Floating wind is not ocean energy although it resides in the same environment and share many of the technological challenges

● Ocean Energy, How to get there ?

- Typical for the OE sector is
 - A range of different technologies
 - ☒A number of small developers poorly financed
 - Limited cooperation between the various companies
 - A huge number of patents
- What is needed?
 - **Consolidation (a massacre!)**
 - A focus on a few successful devices
 - Proper funding and backing of these. (Compare this with the wind industry)
 - **Cooperation,**
 - sharing of information.
 - Acknowledge that if it is not demonstrated successful development the sector will not get the growth potential.
 - **Interest and focus from the supply chain industry**

A Roadmap and a Coordinated industrial initiative (EII)

European Ocean Energy Roadmap 2010 – 2050



- Published to the EC may 2010
- Set key targets
- Describes
 - Energy potential
 - Opportunities for industrialization
 - Potential for green jobs
 - Requirements for R&D
- Identifies
 - Necessary actions
 - Required funding for risk reduction
 - European Industrial Initiative

Can be downloaded from EU-OEA website
<http://www.eu-oea.com>



European Ocean Energy Roadmap Key Targets

- **GENERATE > 15% of the EU energy demand**
- **CREATE > 470,000 new jobs**
- **AVOID > 136 MT/MWh OF CO₂**



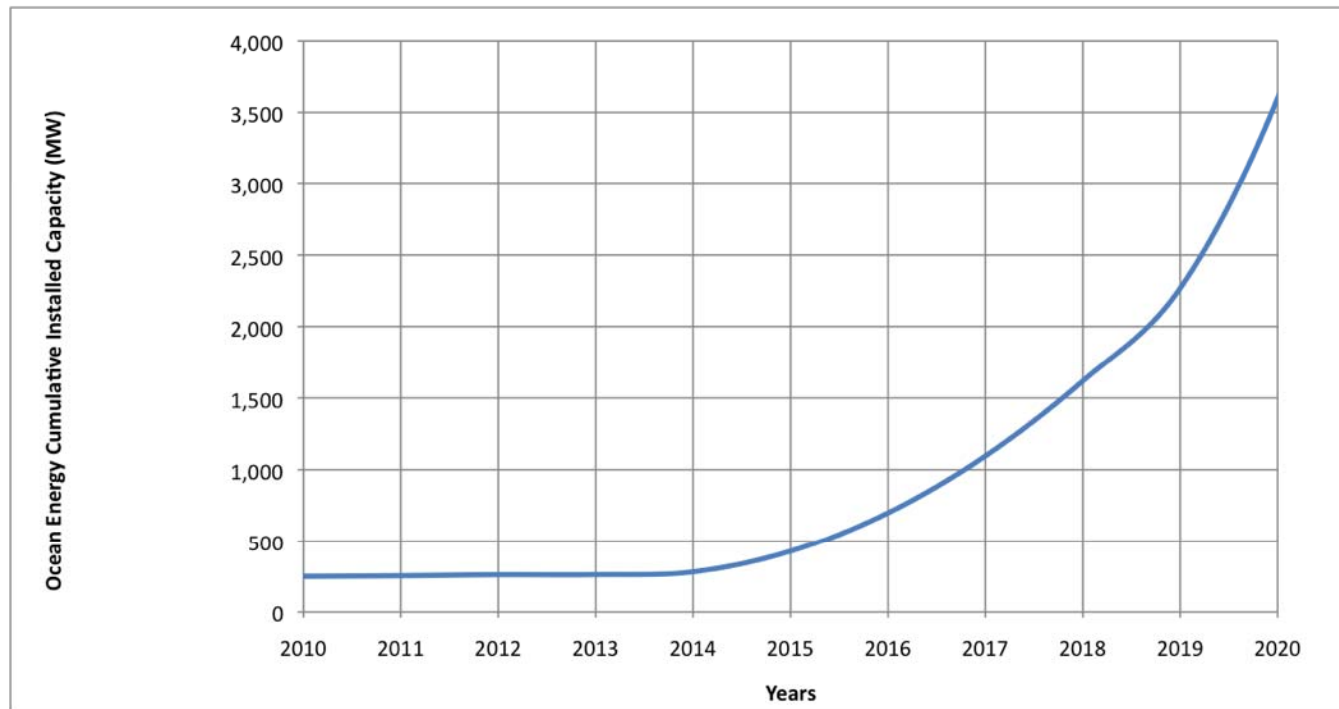
European Ocean Energy Roadmap

EU Ocean Energy Targets

- Generation Targets:
 - » 2020 - 1% of EU electricity generation
 - » 2050 – 15% of EU electricity generation
- What:
 - » 5-6 operational offshore test site; 1 offshore platform for testing; grid integration techniques; spatial planning tools
- How:
 - » demo funding to reach 240 MW of installed capacity; new manufacturing;
- Cost: 850 M€ for the 2020 time frame

European Ocean Energy Roadmap

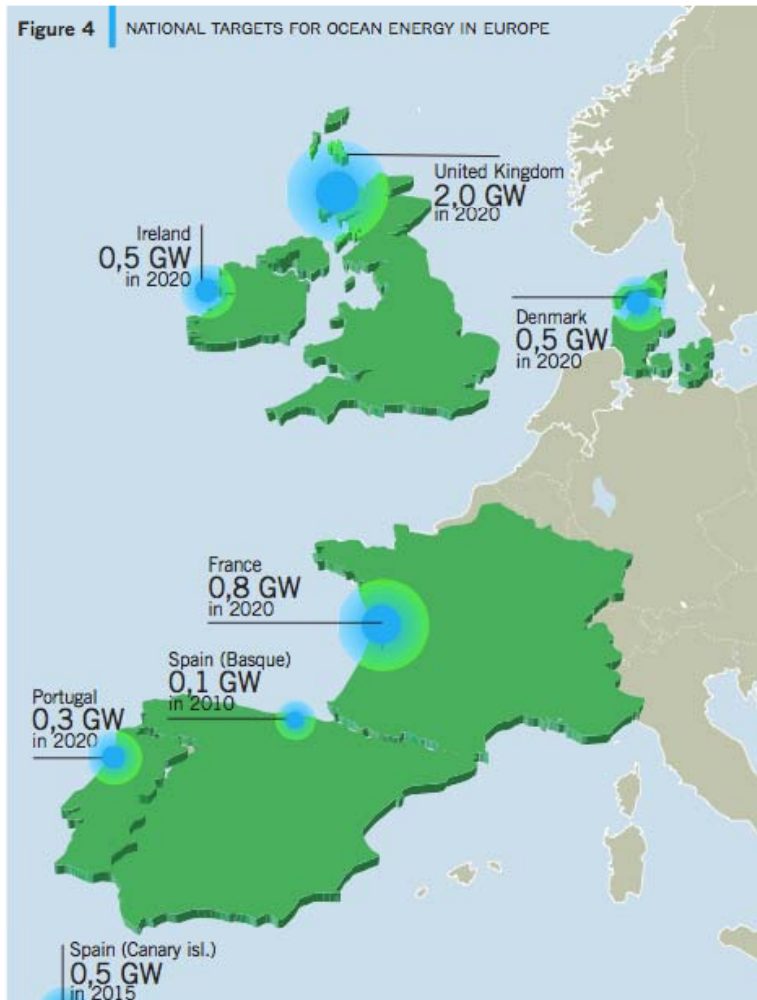
EU Ocean Energy Potential



Year	2020	2025	2030	2035	2040	2050
GW	3,6	20	54	105	166	188
TWh/yr	9	53	150	317	546	645

European Ocean Energy Roadmap

National Targets 2020



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Total projected installed capacity based on national targets is 4.9 GW installed capacity.

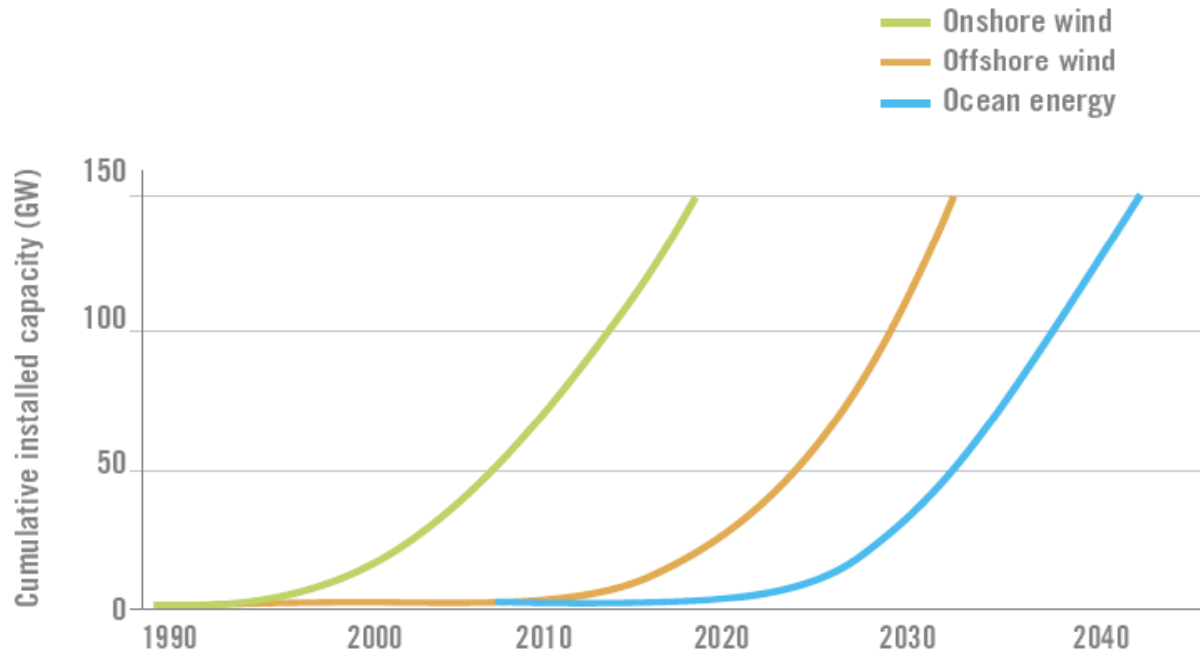
1.3 GW higher than projected in the roadmap.

National targets updated since numbers for roadmap was collected

European Ocean Energy Roadmap

OE Sector Growth Rate Projection

Figure 3 ONSHORE, OFFSHORE WIND & OCEAN ENERGY PROJECTED GROWTH



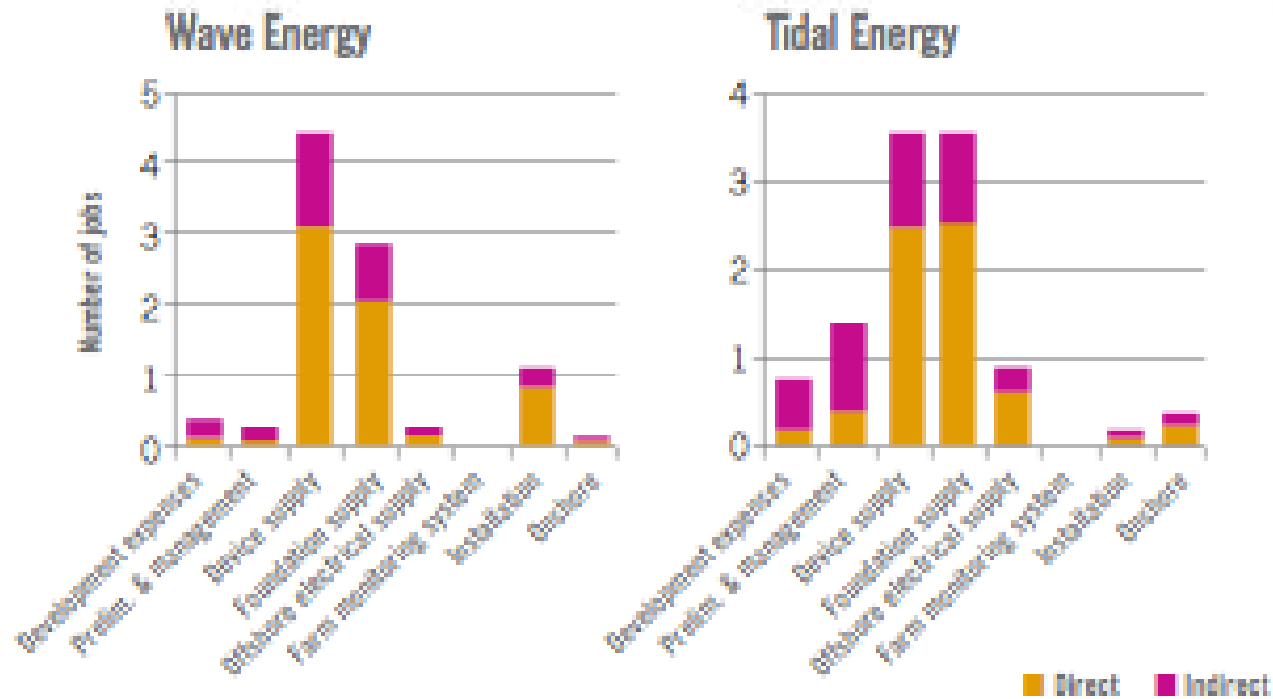
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European Ocean Energy Roadmap

Potential for Jobs

Fig. 1

JOB CREATION PER MW OF OCEAN ENERGY INSTALLED CAPACITY



**Total direct
& indirect jobs**

- 2010: 40 000

- 2050: 470 000



Comparison with Offshore Wind Growth

FIGURE 2: Offshore wind energy annual and cumulative installations 2011-2020 (MW)

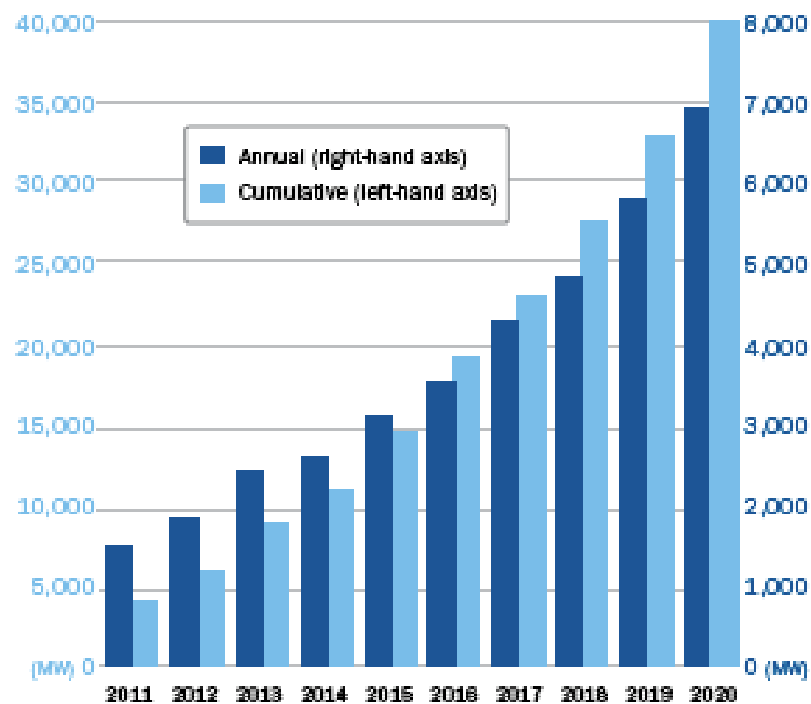
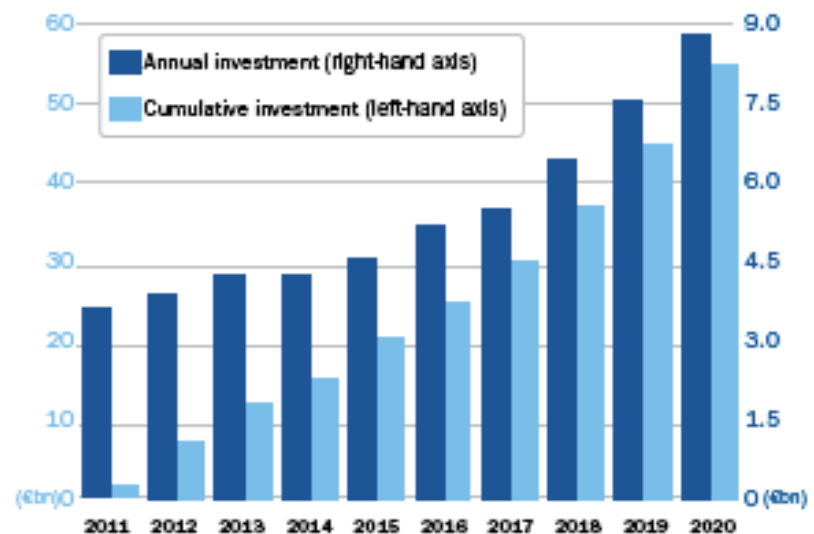
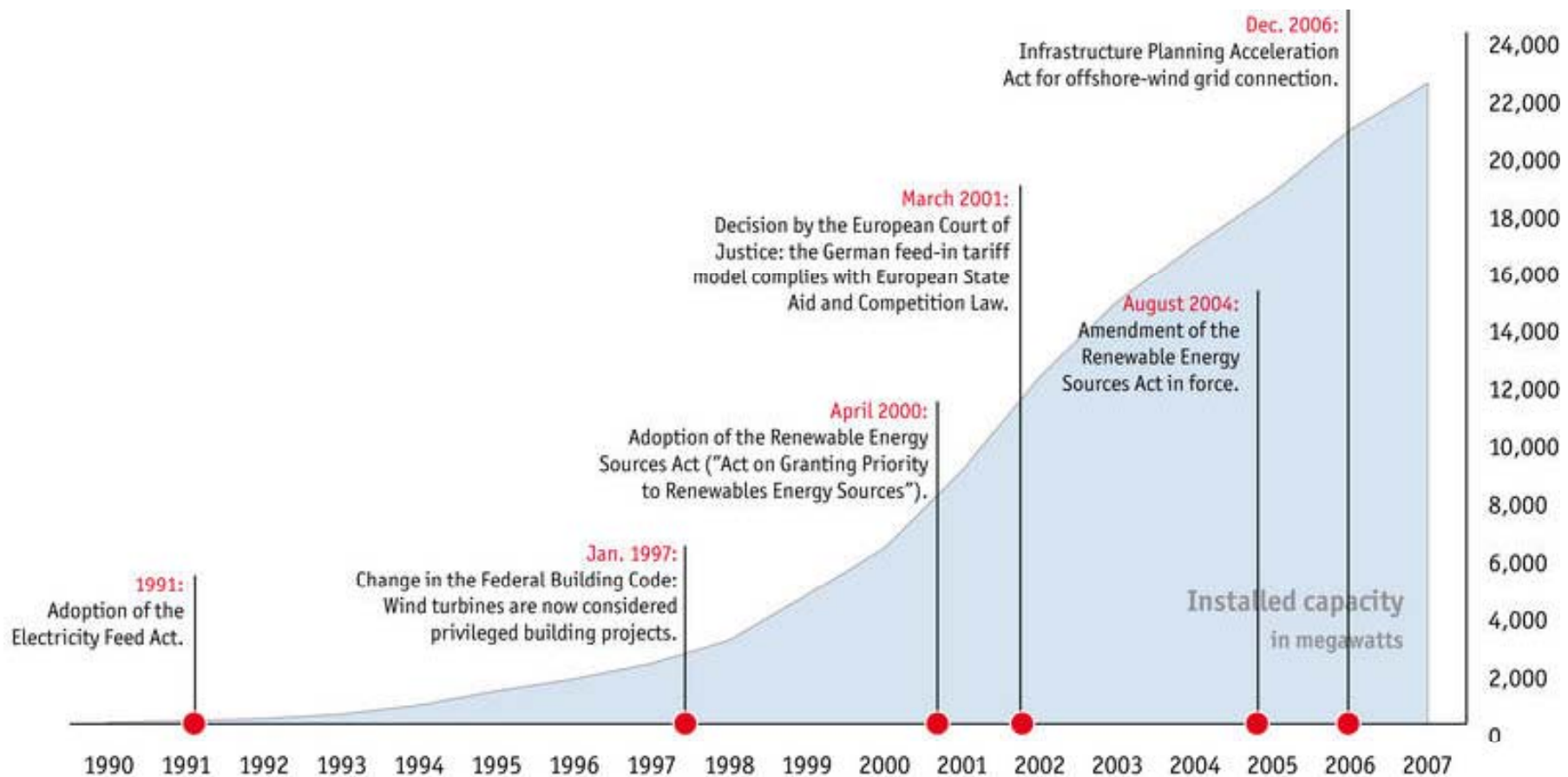


FIGURE 4: Annual and cumulative investments in offshore wind power 2011-2020 (€billion 2005)



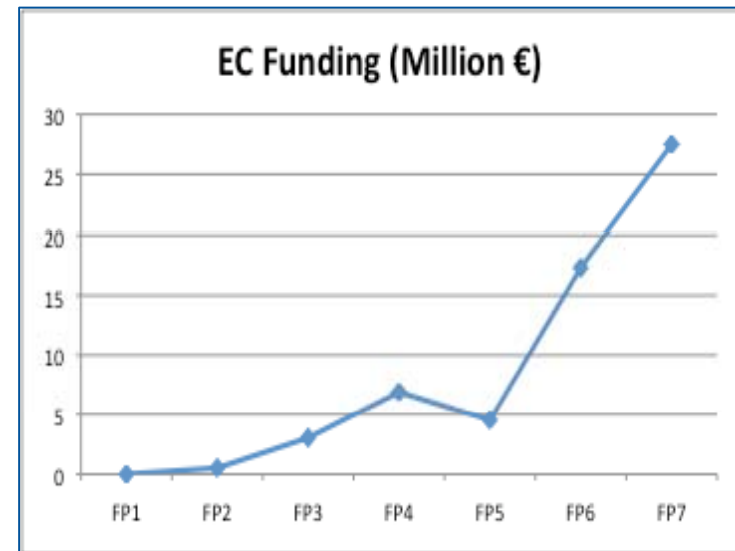
European Ocean Energy Roadmap

Policies Support Growth



EC funding for Ocean Energy

- Period - 1990-2009
- Amount - 60.85M€
- DG RTD & TREN
 - » FP 7 27,50 M€
 - » FP 6 17,30 M€
 - » FP 5 4,54 M€
 - » FP 4 (Joule III) 6,91 M€
 - » FP 3 (Joule II) 3,05 M€
 - » FP 2 (Joule I) 0,52 M€
 - » IEE 1,00 M€





Directorate-General
for Energy
and Transport



EUROPEAN
COMMISSION

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European Industrial Initiatives

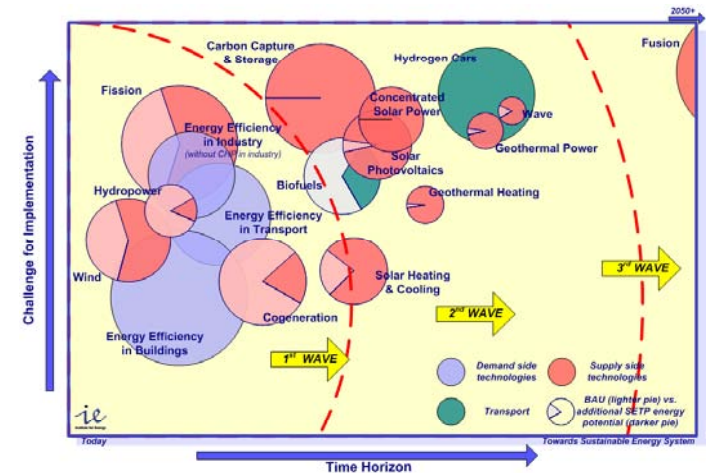
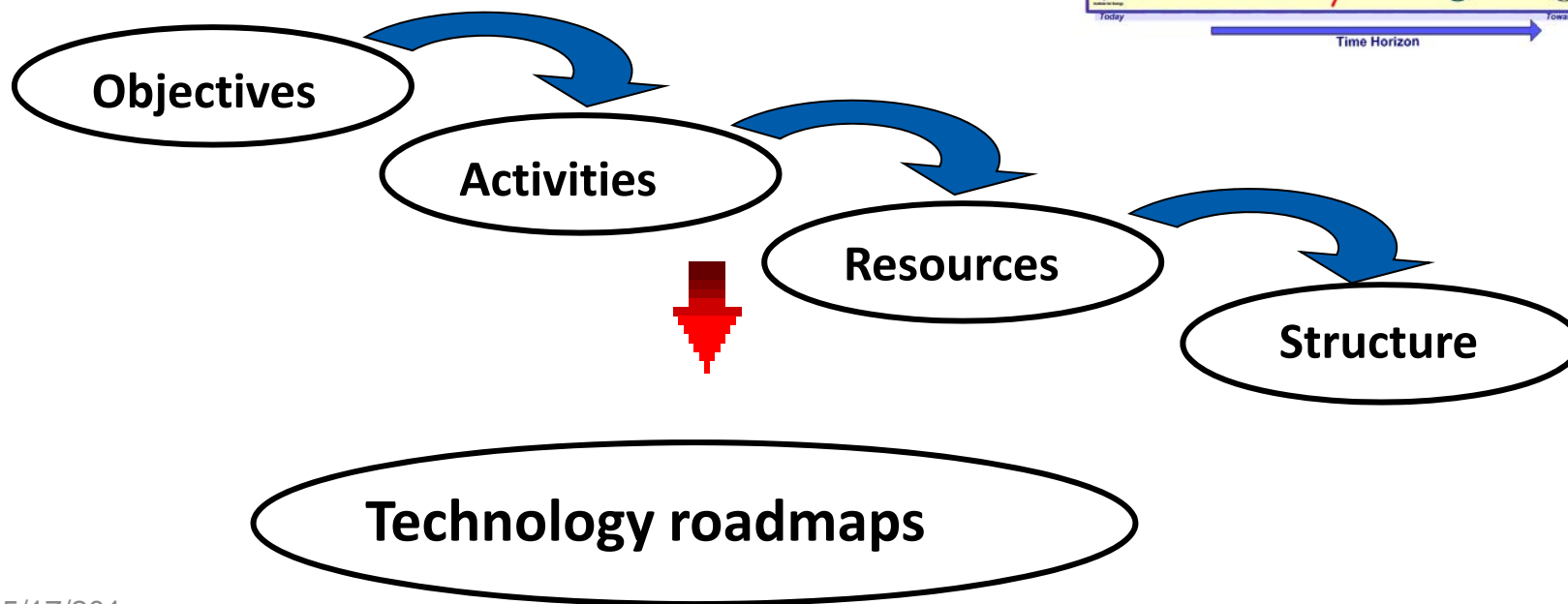
Technology Roadmaps 2010-2020

Ocean Energy 2010

From potential to targeted actions

- Technology Maps:
 - » Potential contributing to energy and climate goals
 - » EU added value and additionally;
 - » Willingness of actors to join forces
 - » Potential market penetration – 2020 / 2050

● Methodology

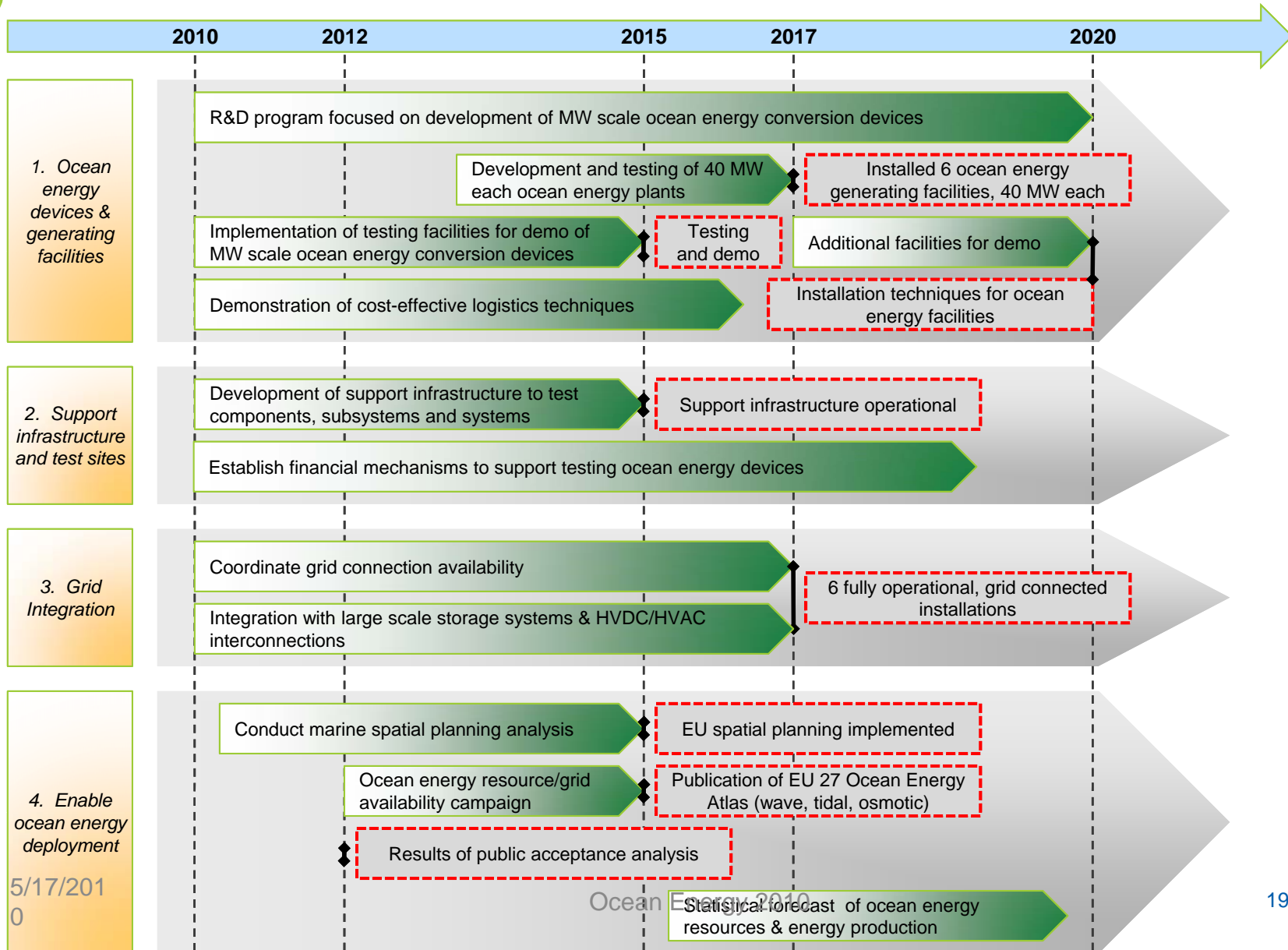


European Ocean Energy Roadmap Funding Needs

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

Ocean Energy - Technology Roadmap 2010-2020



5/17/2010

Ocean Energy 2010



European Industrial Initiative (EII)

- Led by industry
- GOALS:
 - Boost research and innovation
 - De-risk projects to allow industry to invest
 - Accelerate deployment of technology
 - Deliver progress beyond business-as-usual
 - Define & realize clear targets (quantified objective)
 - Contribute to political goals (energy & climate change)



European Industrial Initiatives

	2020 Objectives	Funding
Wind	20% of EU gen	6 bn €
Solar	15% of EU gen	16 bn €
Bioenergy	14% of EU gen	9 bn €
Smart Grid	50% of networks	2 bn €
CCS	12 plants	13 bn €
Sustainable fission	1 prototype	7 bn €
Smart-Cities	40% reduction	11 bn €
Ocean Energy	1% of EU gen	0.85 bn €

● European Ocean Energy Roadmap Conclusions

- Ocean Energy can be a contributor to EU energy needs:
 - » 2020 – 1%
 - » 2050 – 15%
- Can NOT happen at the present rate of growth
- EII can pull the critical mass together

● Ocean Energy and Offshore Floating Wind Potential for synergies



Cost of energy and areas for synergies

Cost comparisons nearshore (shallow wind) and offshore wind				
Nearshore shallow wind	2	2.2	M€/MW	Installed
Offshore floating wind presently	20	160	M€/MW	Installed
Offshore floating wind projection	2	16	M€/MW	Installed
Learning rate for neashore wind	10			
Each time the installed capacity doubled				

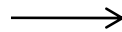
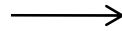
- Grid access and cable to shore, infrastructure
- Installation spreads and heavy equipment costs
- Operation and maintenance ships and crews
- Share location but different resource potentials

Floating offshore wind and wave/tidal ocean energy devices share many technical challenges and both regarding CAPEX and OPEX it makes sense to treat these devices in conjunction with each other



Start

End ?



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**Thank you for your attention
Questions ?**