Introduction to LCOE and Modelling

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Background

- Who Am I and my role in the development of Exceedence

- Scale of the renewables industry globally

- Stakeholders and drivers

- What makes a model and why

- Who needs them and why

RENEWABLE ENERGY INVESTMENTS: MAJOR MILESTONES REACHED, NEW WORLD RECORD SET

Last year set a new record for global investment in renewable energy, which rose 5 per cent to **$US 286 billion,** more than six times higher than in 2004.

(Data source: Frankfurt School-UNEP Centre / BNEF Global Trends in Renewable Energy Investment 2016)

Developing countries: **$156 billion**

Developed countries: **$130 billion**

Renewables attracted more than double the $130 billion committed to new coal and gas generation.

Energy added by source globally, 2015

Renewable	Coal	Gas	Large hydro	Nuclear
134 GW	42 GW	40 GW	22 GW	15 GW

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Global offshore market

Europe

Capacity [MW p.a.]			Investment [EUR bn p.a.]		
1,800	2,600	4,500	7.0	9.4	14.4
2013	2016	2020	2013	2016	2020

North America

Capacity [MW p.a.]			Investment [EUR bn p.a.]		
0.0	300	500	0.0	1.1	1.6
2013	2016	2020	2013	2016	2020

Asia Pacific

Capacity [MW p.a.]			Investment [EUR bn p.a.]		
400	900	1,500	1.6	3.2	4.8
2013	2016	2020	2013	2016	2020

☐ Offshore projects ☐ Plans for offshore ☐ No activity
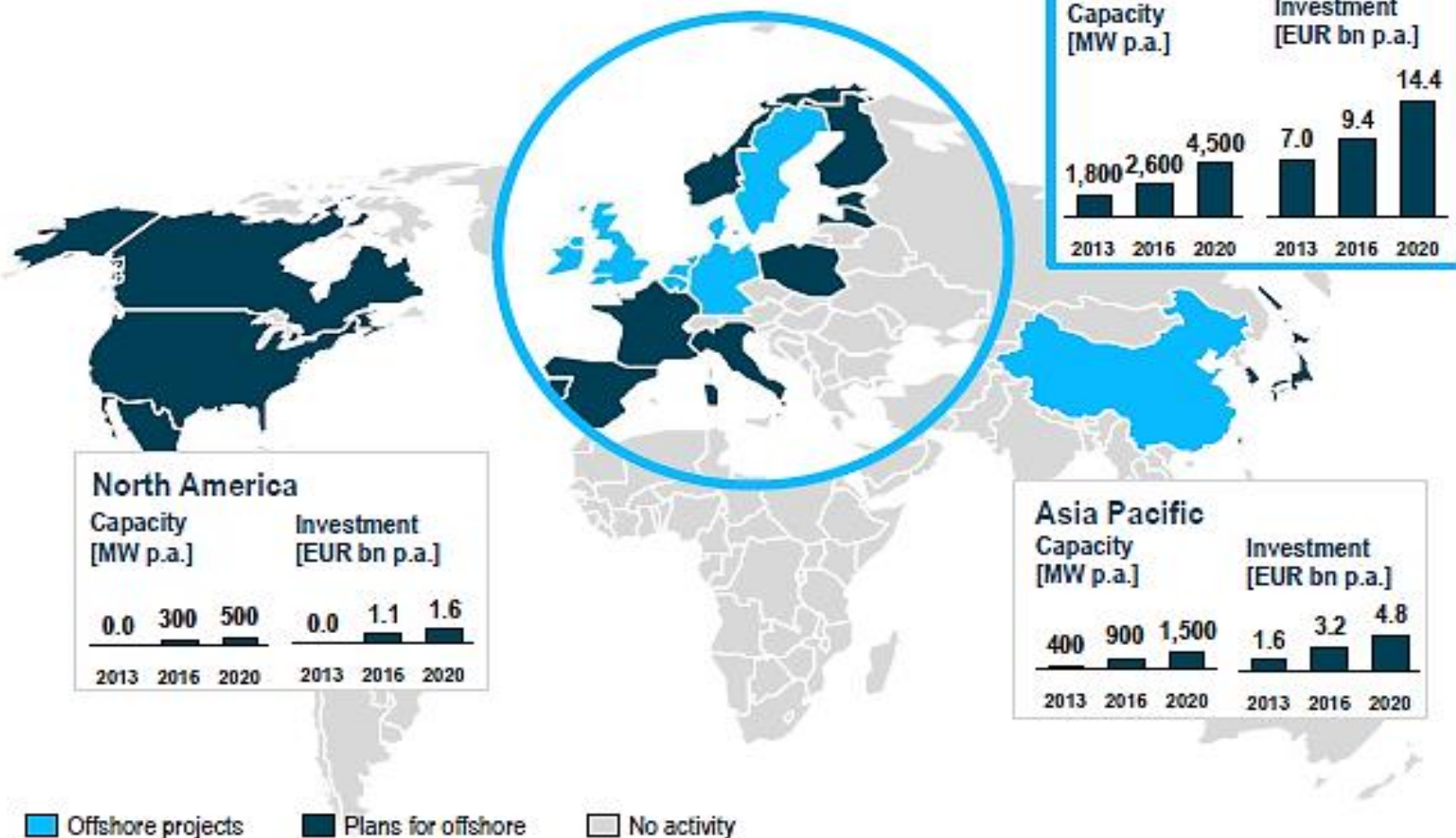
Rationale: Investment costs per MW: 2013: EUR 3.9 m, 2016: EUR 3.6 m, 2020: EUR 3.2 m

Source: EER; BTM; Global Data; Roland Berger

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OCEAN ENERGY - Volumes and Costs to Reach Industrial Roll-Out

- Ocean Energy Europe <u>provisional</u> estimate December 2015

- Prototype/Demonstration/Pre-commercial to industrial roll-out
  - Wave: 420 MW and €4.3bn
  - Tidal: 400MW and €3bn
  - €4.9bn (67%) of total cost of €7.3bn attributable to distant Pre-Commercial stage involving 600MW (300MW each)

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Stakeholders

Energy Device Developers

Energy Farm Project Developers

Electrical Utilities and Grid Operators

Teaching & Training & Research Centres

Government agencies with energy portfolio

Suppliers & OEMS

Engineering Consultancies, Lenders Engineers

Financial Services, Investments, Banks , M&A
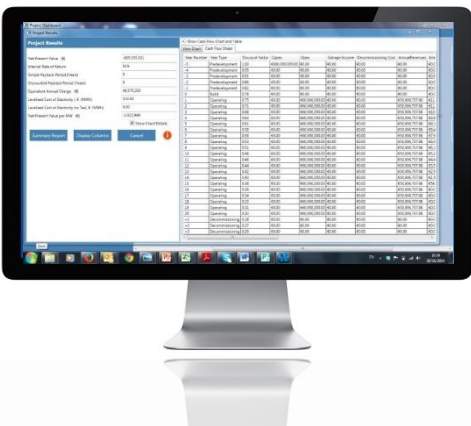
Questions to Answer with models

- Calculates Energy Output & Financial Returns
  - What is the best device at your location
  - What is the best location for your device
  - What level of FIT support is required
  - Time for the project to produce a return
  - KPIs of LCOE, NPV, NPV/MW, IRR, Annual Cash flows
- **Will I Make Money and WHEN?**
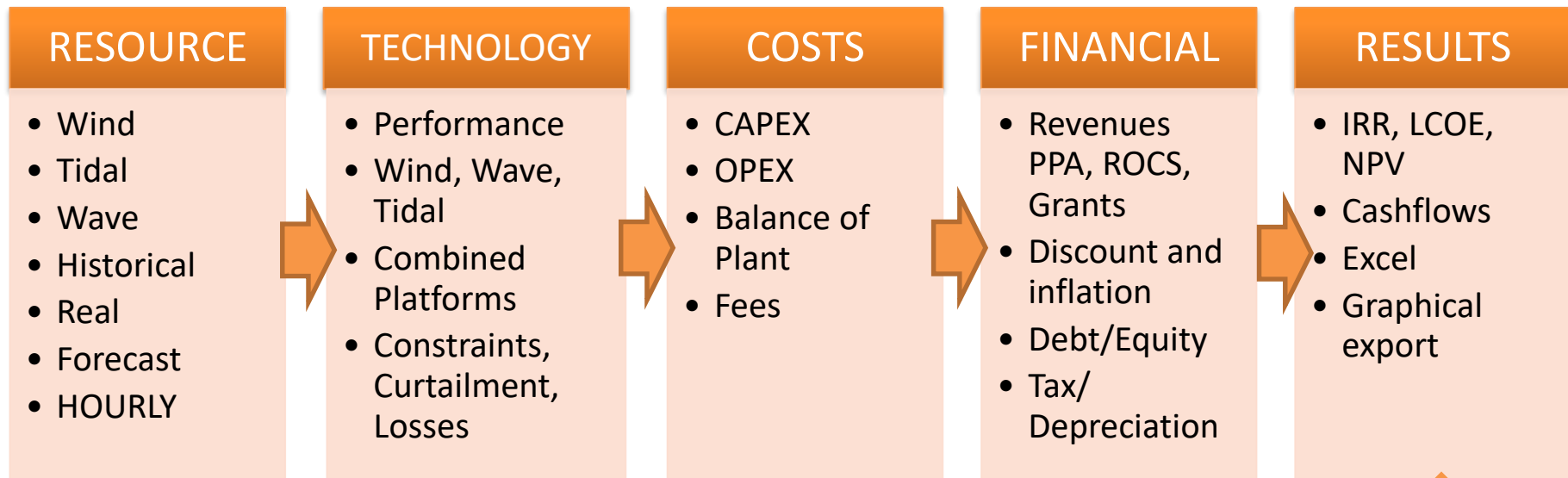
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Financial Indicators

- LCOE, IRR, ROI, NPV, NPV/MW

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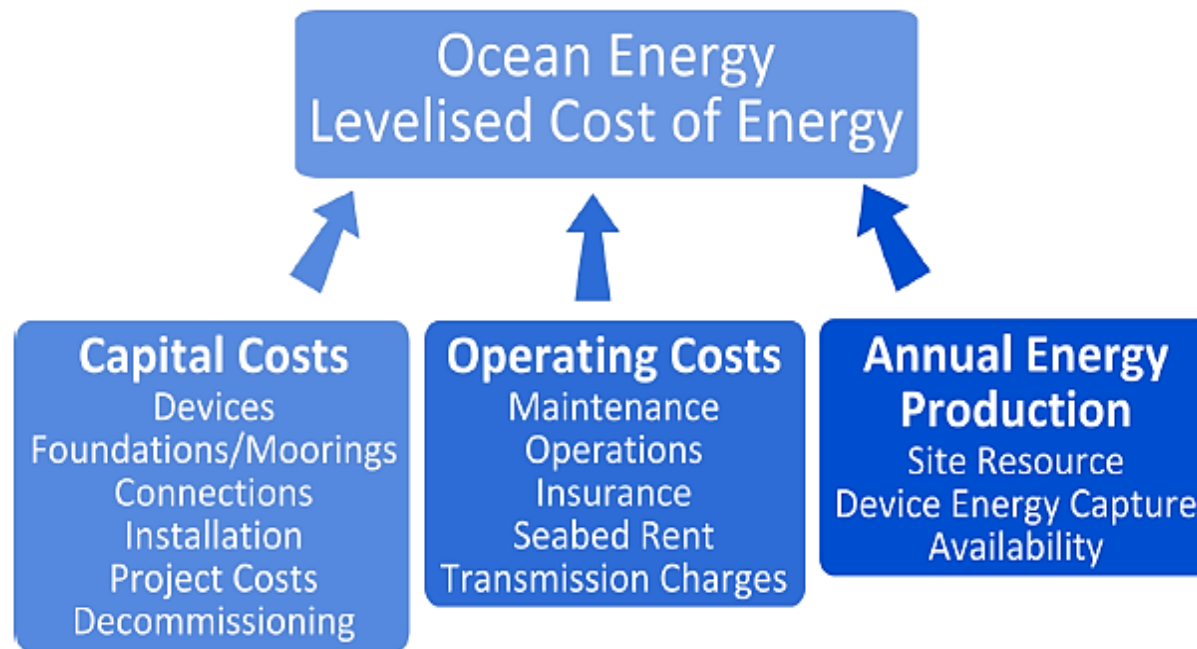
Adoption of Models

- National Funders

- European Funding

- Private Equity

- Supply Chain

Summary

- Everyone in the renewables eco-system needs to use techno-financial models
  - Decision tool
  - Benchmark technologies
  - Measure progress
  - Strategic planning
- All indicators are neccessary
- Money will NOT flow without them

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