Ocean energy supply chain study: Assessment of Irish companies' capability to supply products and services to the marine energy sector

Offshore Renewable Energy Conference, Ballina
September 3 2012

Marine Renewables development addresses twin challenges for Europe and Ireland

Climate Change
Energy Security

And for Ireland – Exports and jobs

Ireland's Offshore Renewable Resource

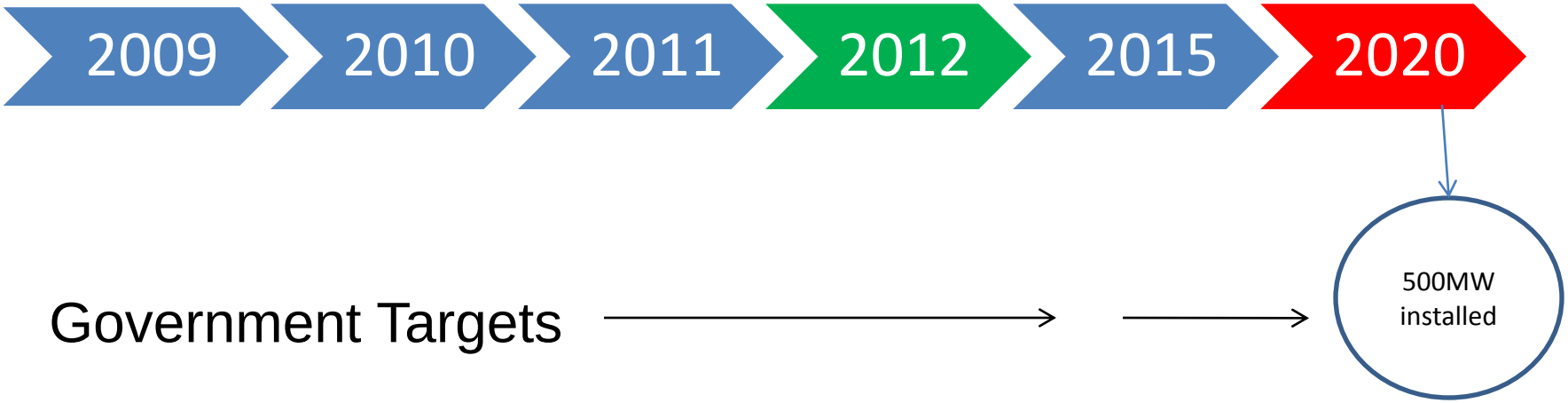
OE Development Roadmap

Support Pilot projects, new concepts

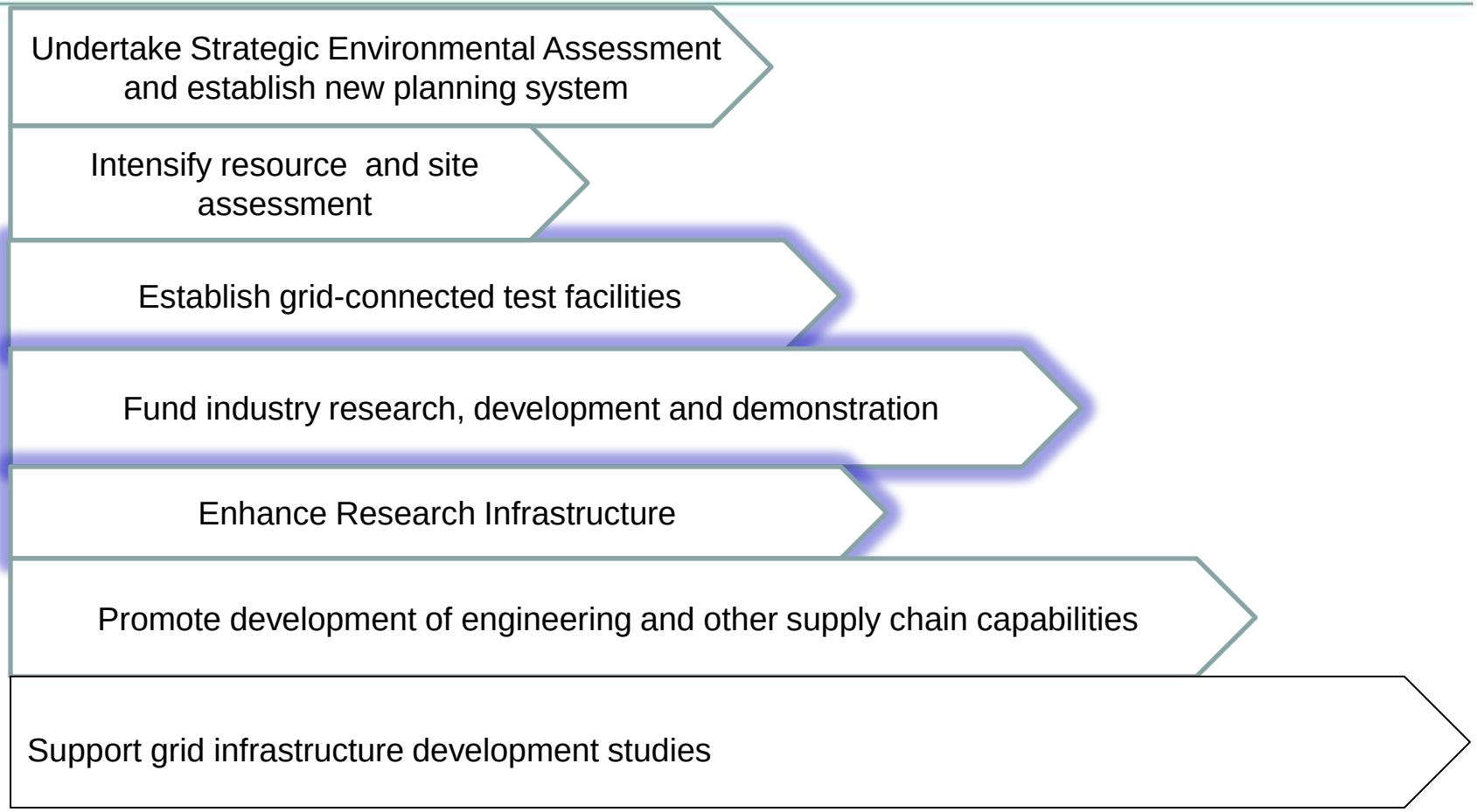
Full scale demonstrators

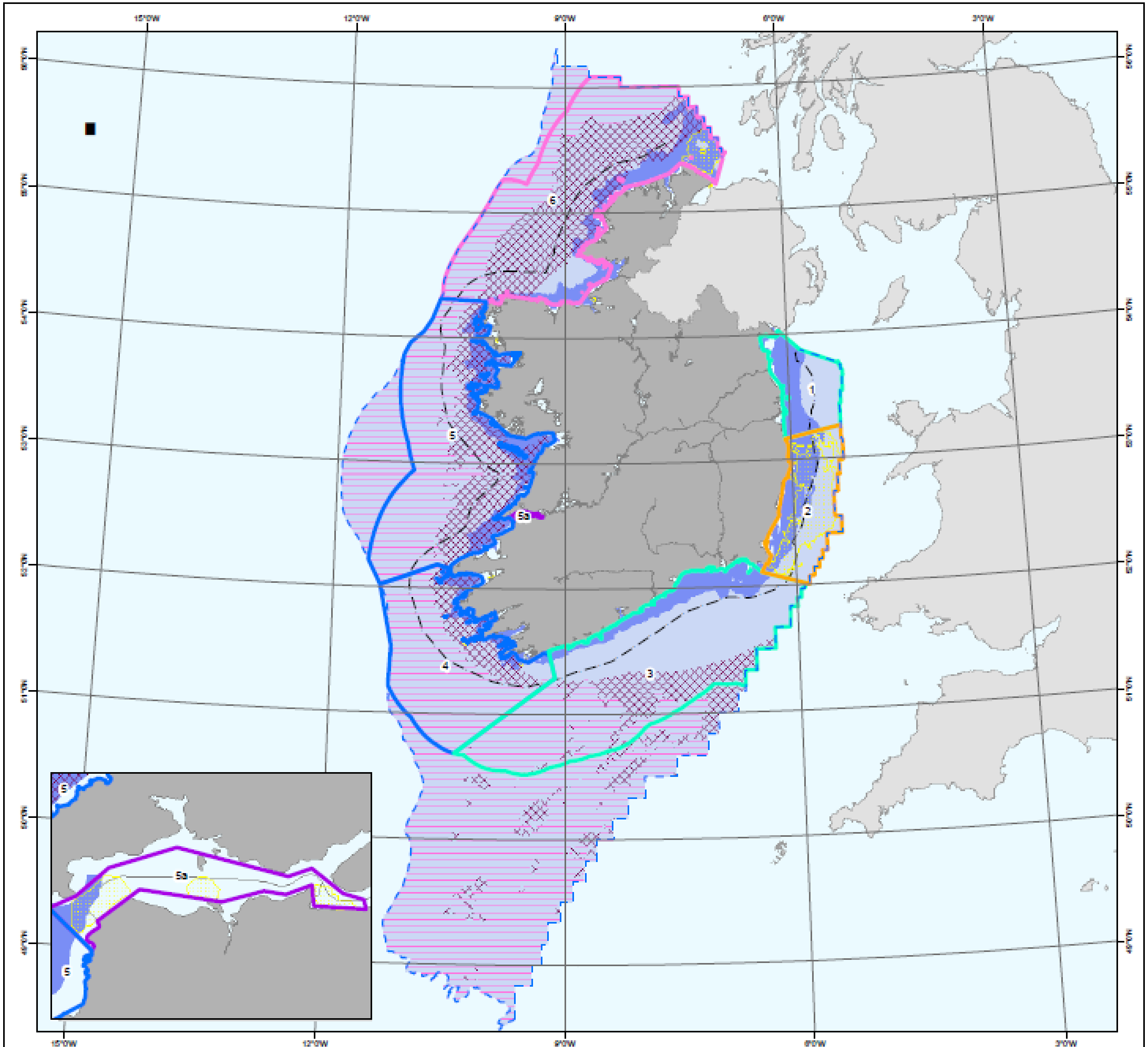
Small-scale arrays 10MW/20 devices

Arrays of 100s MW



OE Programme Actions





Strategic Environmental Assessment of Wave, Tidal and Offshore Wind Development in Irish Waters

Figure 11.4: Assessment Zones - All Resource

Legend

Background

- Ireland
- United Kingdom
- Study area
- 12nm limit

Assessment Zones

- Wind
- Tidal
- Wind and Wave
- Wind and Tidal
- Wind, Wave and Tidal

Tidal Technical Resource

- >1.2m/s Peak Spring Current Speed & Water Depth 20m to 80m

Wave Technical Resource

- >=20kW/mWC Wave Power & Water Depth 10m to 100m
- >=20kW/mWC Wave Power & Water Depth 100m to 200m

Wind Technical Resource

- >=7m/s Wind Speed & Water Depth 10m to 60m
- >=7m/s Wind Speed & Water Depth 60m to 200m

Note 1: Assessment Zones extend from the coast (Mean High Water) to a distance of 100km, within the boundary of the Irish Exclusive Economic Zone only

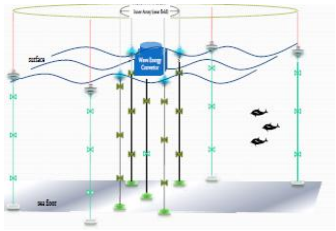
Note 2: Not to be used for navigation

0 35 70 140 210 280 km

Date	Friday, August 13, 2010 11:02:40	
Projection	WGS_1984_UTM_Zone_29N	
Spheroid	WGS_1984	
Datum	D_WGS_1984	
Data Source	Marine Institute, SEI, Petroleum Affairs Division, GEBCO, UKHO	
File Reference	J:\P1304\Mxd\Assessment Zones\.mxd 11.4 Assessment Zone_All	
Checked	Produced By	Anna Place
	Reviewed By	Sam Franklin

Research Infrastructure and Test Sites

Mayo Wave Test Site
Full-scale grid-connected



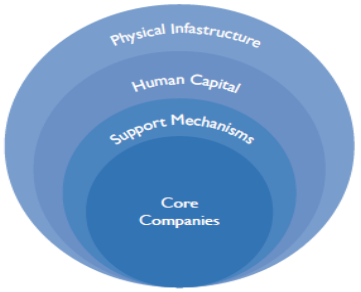
Phase 2

IBM Acoustic
Monitoring project

Phase 1

Galway- SmartBay
Wave Energy ¼ scale non-grid connected test site

Strangford
QUB Tidal Test facility



e 4. MERC3 Cluster Development Components

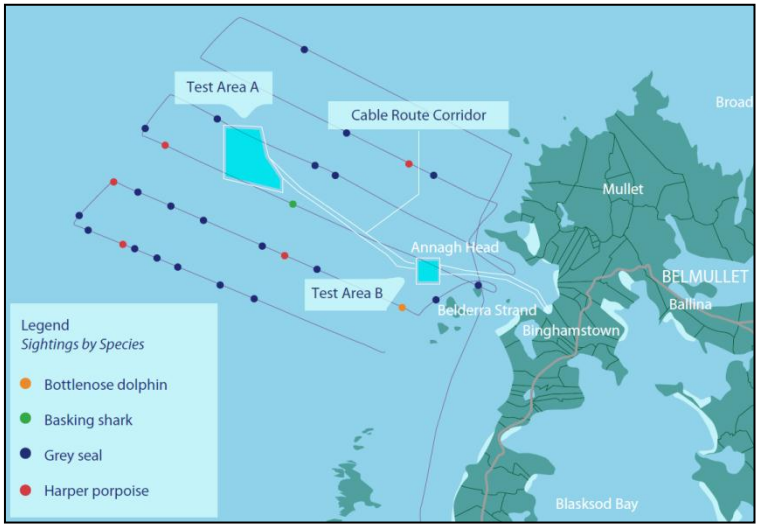
Cork
OE Test tank facility
Maritime and Energy Research Cluster (MERC)

AMETS, Belmullet Project Status

- **Foreshore Lease application submitted**
- **Complete Environmental Impact Statement (EIS) prepared – covers marine and terrestrial environment**
- **On-going marine environmental monitoring at test site location to ensure update data maintained**

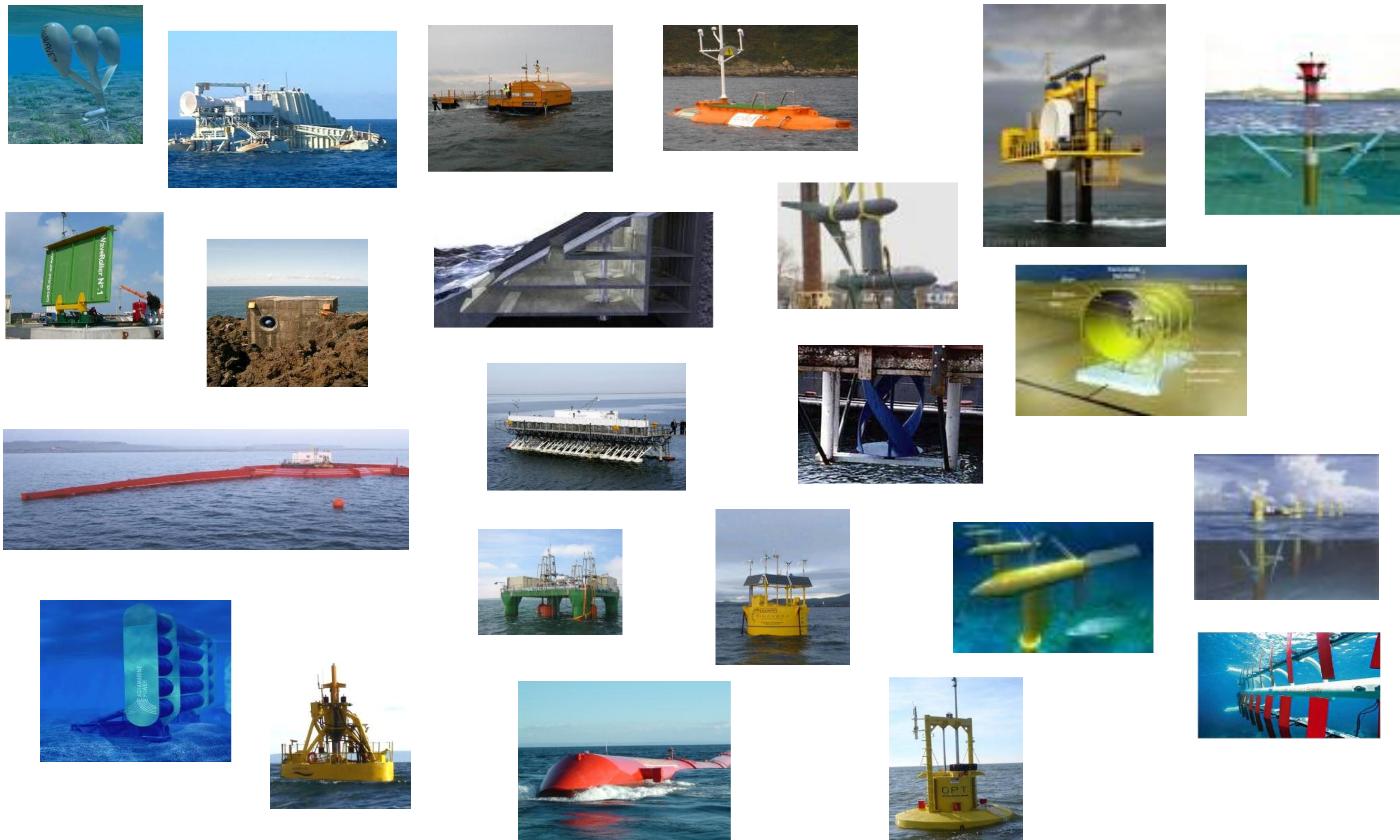
Surrounding terrestrial environment

Example of monthly megafauna observation



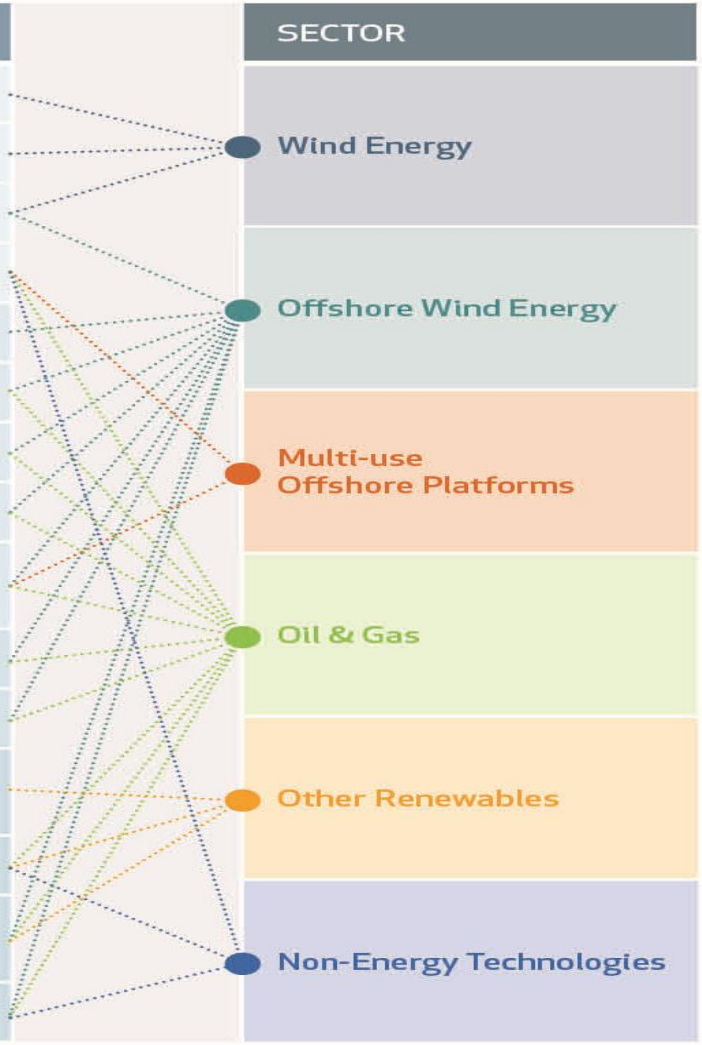
OE is a tough business that needs lots of marine industrial know-how

Technology “divergence”



Ocean energy synergies with other sectors

SECTOR	EXAMPLES
TECHNOLOGY	Turbines
	Power Take-Off
	Materials
	General Engineering Challenges
INFRASTRUCTURE	Offshore Grid
	Moorings and Foundations
	Ports and Harbours
	Vessels
	Co-Location: Shared Infrastructure
SUPPLY CHAIN	Human Resources
	Manufacturing Capacity
POLICIES	Renewable Energy Support Mechanisms
	Marine Spatial Planning
	Environmental Impact Assessment (EIA)
	Consenting Process



OCEAN ENERGY SYSTEMS

The Supply Chain

SEAI in collaboration with EI commissioned a Study on the Supply Chain Requirements & Irish Company Capability in the Offshore Wind, Wave & Tidal Energy Sector.

Marine Energy Supply Chain has **four tiers**:

Tier 1 Owner/Developer

Tier 2 Main contractor (EPIC)

Tier 3 Sub-supplier

Tier 4 Sub-supplier/sub-contractor

The Market

Short-term

- UK/Europe is global leader in installed offshore wind capacity.
- Over 1.5GW operating
- Expected to rise to 3GW by end of 2012
- In 2011 - 235 new turbines installed in Europe worth €2.4bn

Opportunity for Irish companies

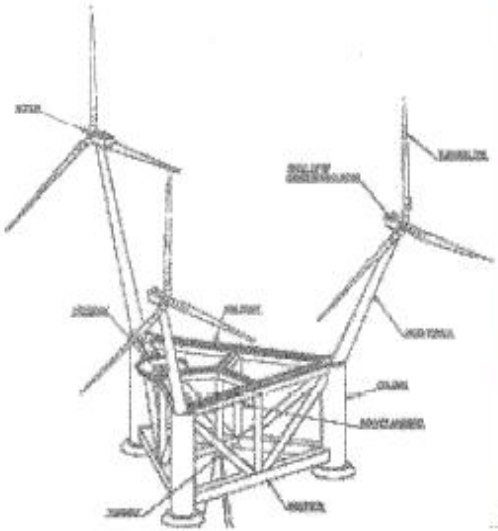
- Geography and culture ties with UK
- Gain experience in UK which can be transferred elsewhere

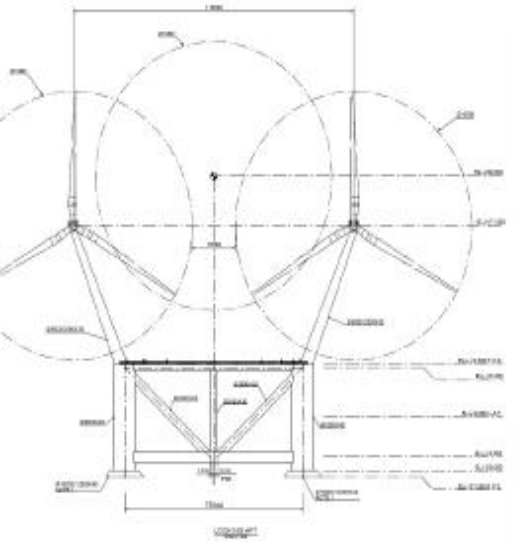
The Market

Med to Long Term

- Growing Market
  - Offshore Wind in Europe expected to grow to €8.8bn annually by 2020 (with 40GW installed)
  - Tidal & Wave cum'l market €8.5bn / 3.6GW by 2020
- Tidal and Wave Energy
  - Projects use similar supply chain
  - Common challenges
- Ireland has strong wave resource and internationally seen long term for commercial deployment

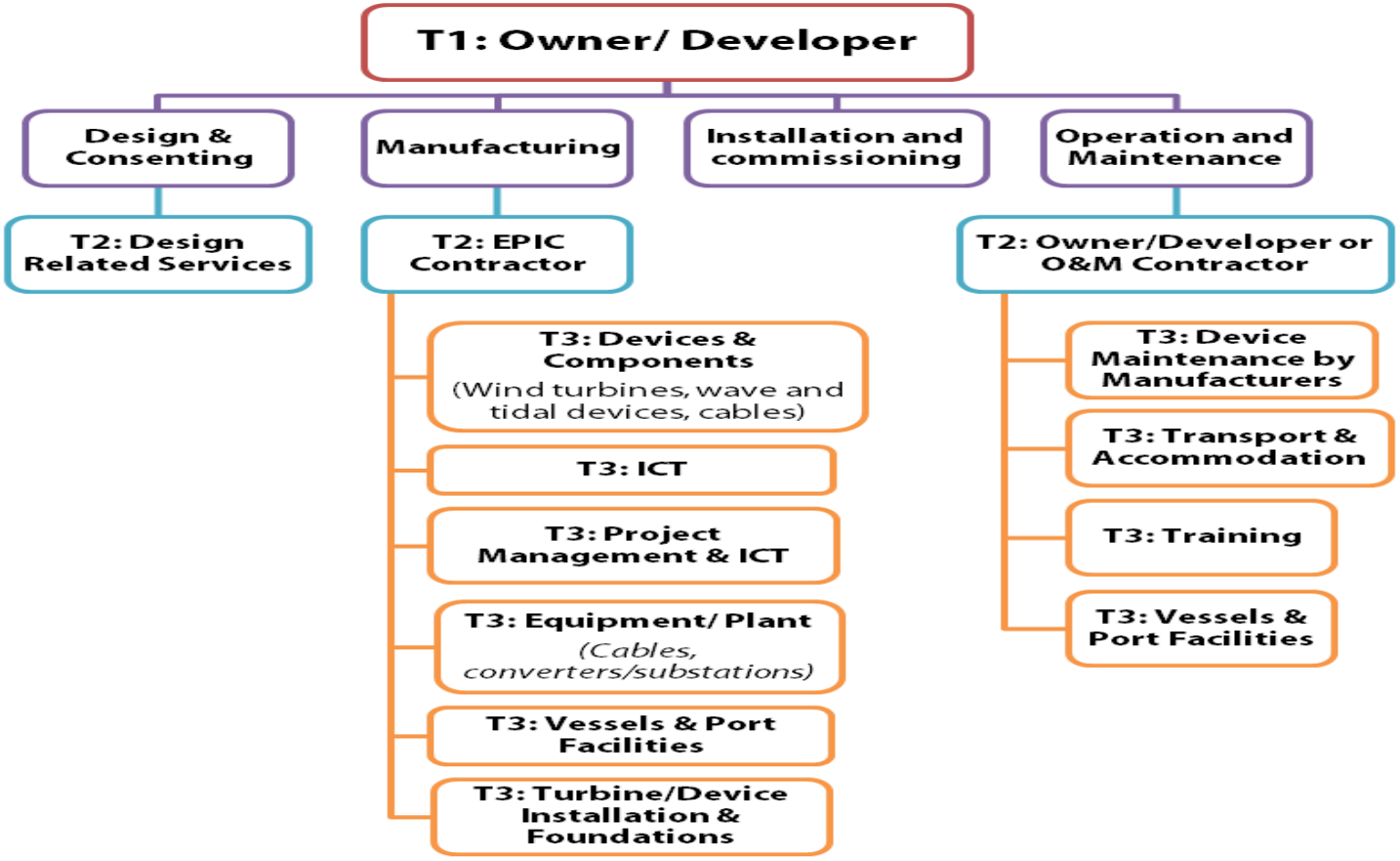
Floating Offshore Wind emerging





Principal Power

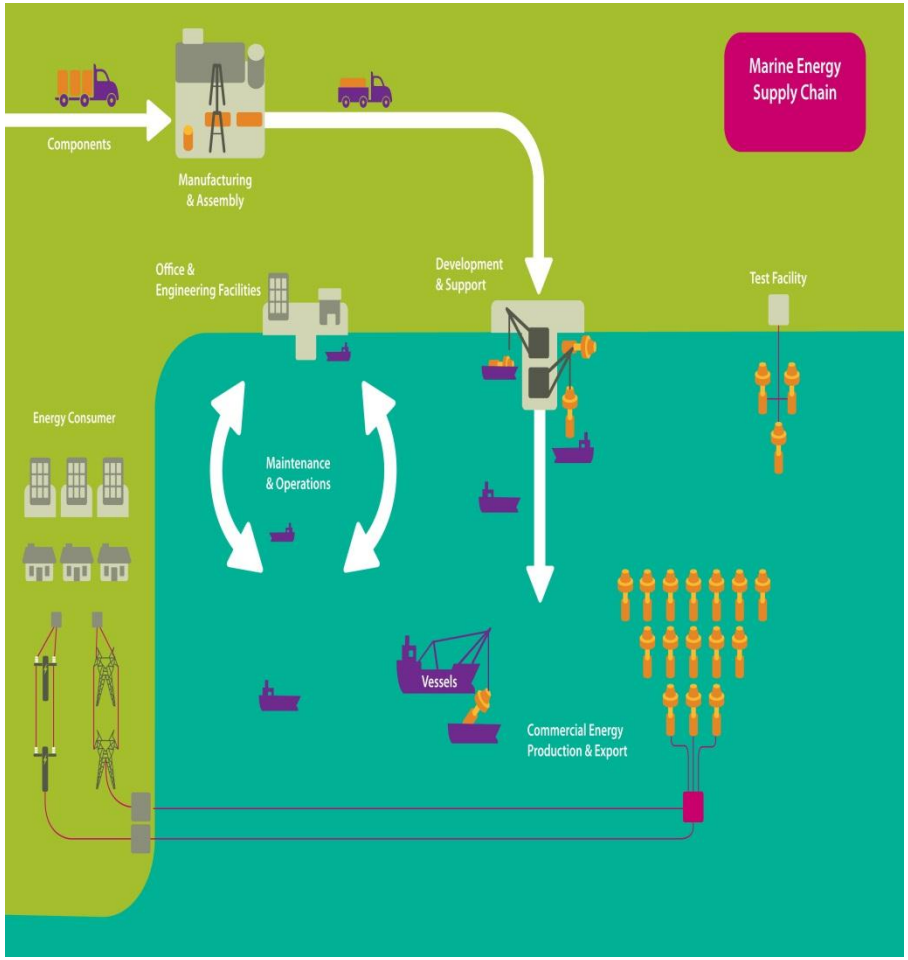
The Supply Chain



The Supply Chain

Supply Chain Areas:

- **Design and Consenting**
- **Manufacturing**
  - Wind turbine
  - Wave energy device
  - Tidal energy device
  - Associated plant
- **Installation & Commissioning**
- **Operations and Maintenance**



Irish Capability

Strong Capability:

Project Design	Site investigations, Planning/Foreshore, Design, Grid, ICT, Control, Stakeholder
R&D	Modelling, Tank testing, FEA
Environmental	EIS, Ecology, Fisheries, Mammal, marine acoustics, navigation
Vessel	Support vessels, deployment of sensors, environmental activities
Ancillary	Steelwork, vessels, tanks, pipework

Irish Capability

Strong Capability:

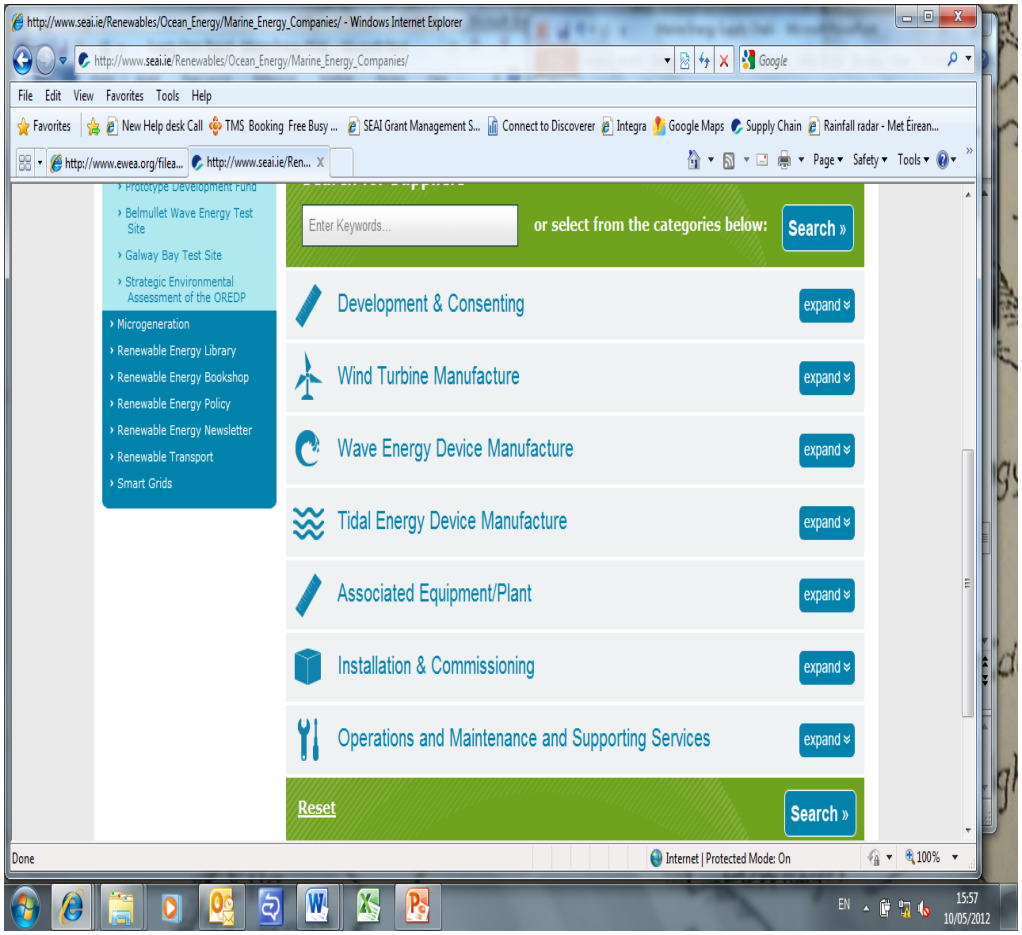
Electrical/Controls	Motors, actuators, Sensors, SCADA, switchgear#
Moorings	Design, cables, chain, buoys
Onshore	Substation, convertor station, civil
Training	Safety systems, survival, certification
ICT solutions	Real time monitoring, sensor networks, wireless/fibre networks, data mgmt, cloud, GIS, simulation, forecasting

Irish Capability

Limited Capability & Transferrable Skills

- Concrete Foundations
- Wind Turbine and Foundations Installation (service and support vessels)
- Wind Turbine Towers (steel, concrete)
- Wave Energy Hull & PTO systems
- Installation Project Management

Supply Chain - Database



Supply Chain report and database for Marine Energy including Offshore Wind, Wave and Tidal on www.seai.ie and www.enterprise-ireland.com

Large players pondering their strategies

Traditionally supply chains develop organically through demand pull and supply push (new ideas)

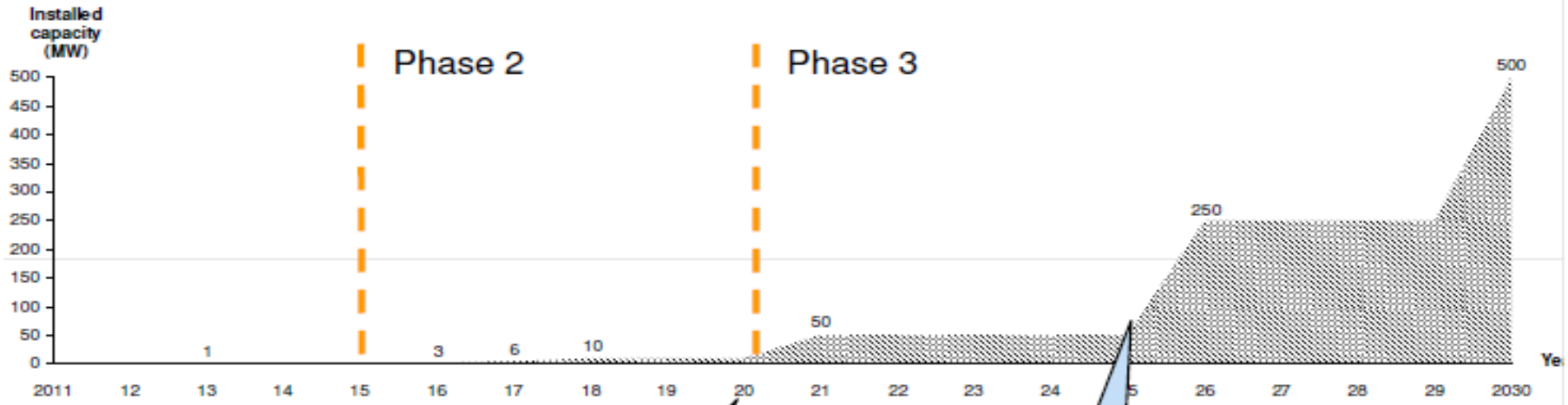
Marine energy does not have the time for this approach

Potential Solutions

- Marine energy companies should get rid of their paranoia and start cooperating in common design and create purchasing coops
- Governments should put pressure on O&G and industrial companies who benefit from tax subsidies and other government support to play a more active role and contribute their expertise
- Utilities should put pressure on companies who do significant business with them
- Promote and support industry value chain consortium such as Nautimus (Vattenfall, Abengoa, Babcock)

Some insights from the sector

There is a minimum roll-out rate for Ocean to be viable for a utility



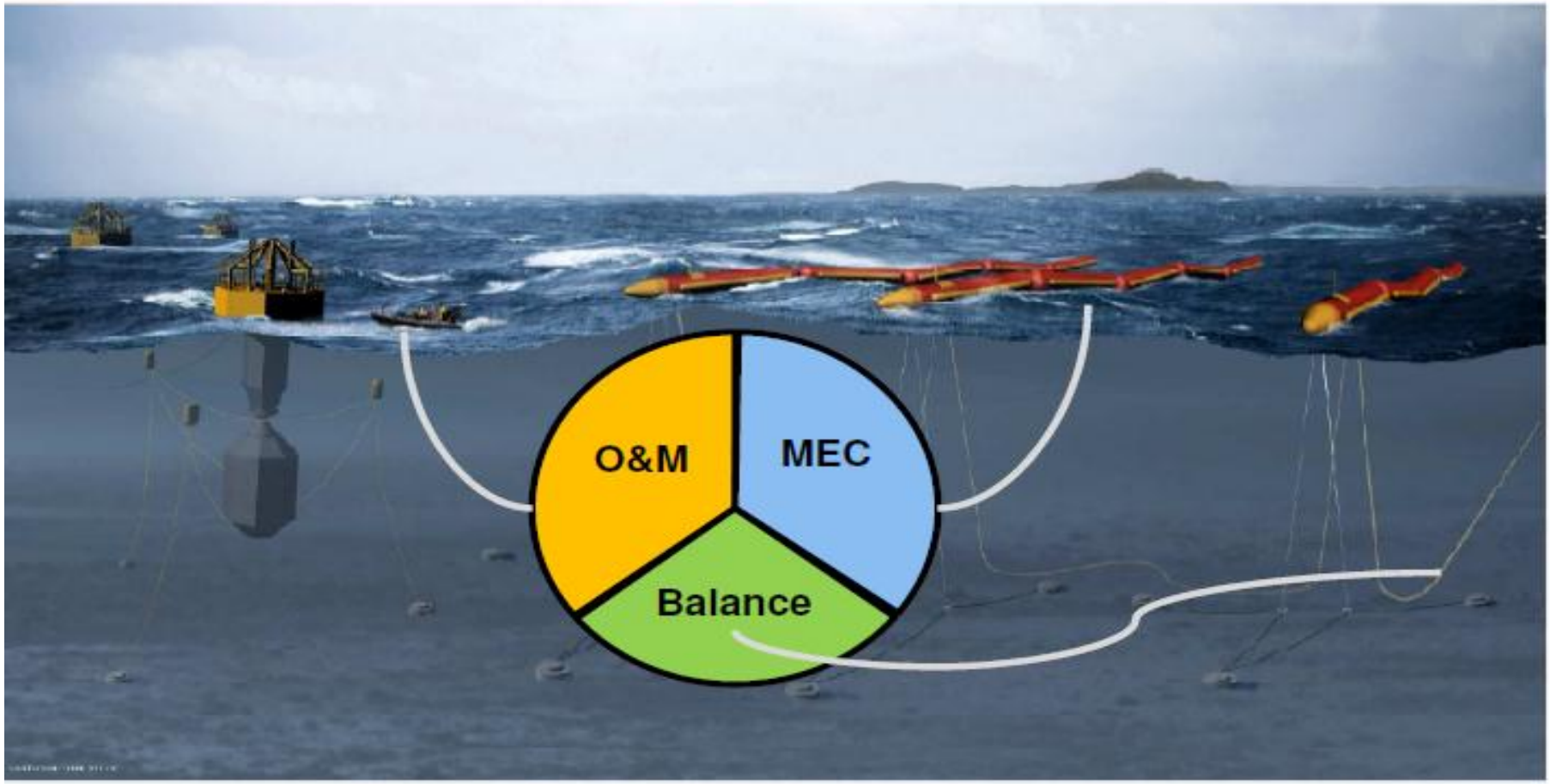
1 of 5 projects
Each €70M
5 units per year?

1 of 10 projects
Each >£200M
2 units per month?

1 of 20 projects
Each >£1B
1 units per week?

The technology challenge

The conversion technology is only 40% of the solution



Deep-water wave energy converters - Wavebob and Pelamis

Hayo Wave Energy Test Site

Evolving solutions

Nautimus

Product Suppliers — 40%

Nautimus — 60%

Utilities

Funding
R&D, IPR
Product sale

End to end solution
Supply chain dev'
EPC Contract
Grid
O&M
Sequrity / warranty
Market knowledge
Technical knowledge

Consenting / Policy
Community acceptance
Environmental risk
Funding vs €/kwh

pelamis wave power
ABB

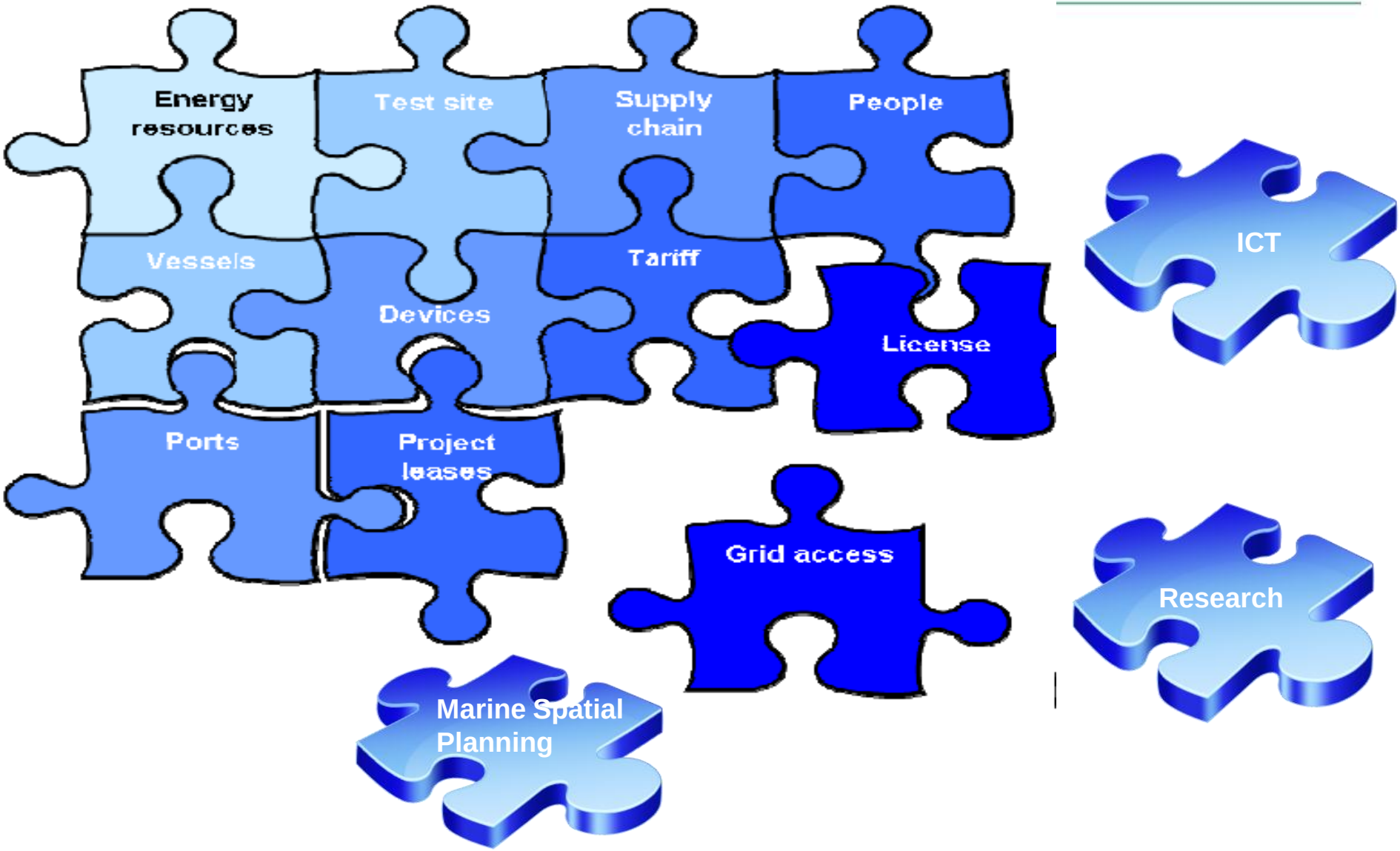
Customer
Stakeholders

VATTENFALL
ABENGOA
babcock

VATTENFALL
e·on
IBERDROLA

VATTENFALL

Marine Renewable Energy Jigsaw



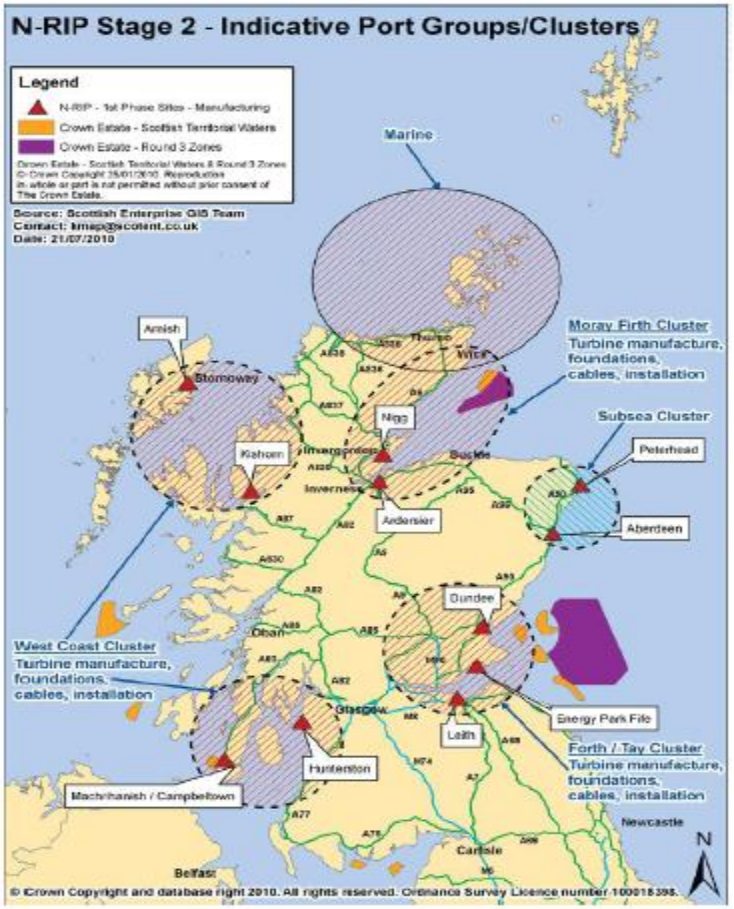
Actions

- Access UK market. Round 3 projects underway and a number of partnerships are in place
- FPAL / UVDB registration required by companies
- Develop offshore wind test site in Ireland
  - Attract foreign wind turbine manufacturers
  - Develop cluster of development
- Attract early stage OE projects and build industry cluster
- Develop ICT opportunity
  - Leverage SmartBay
  - Existing test site
  - Research facility HMRC/IMERC

Scotland showing the way

Infrastructure

- National Renewables Infrastructure Plan
- Indicative map of locational requirements
- Based on strong growth of industry supply chain
- Industry will drive use
- Needs alignment of Government and industry investment
- Triggered investment in a first group of sites
- £70m Fund open to applications
- More work needed on wave and tidal needs



Ireland - Westwave
Pre-commercial WEC deploymnet

- Pre-commercial WEC array deployment
- 5MW export by ca. 2015
- Industry led project – in conjunction with leading WEC developers
- 3 potential sites identified and surveyed
- Off-shore or nearshore opportunities
- Pave the way for commercial scale development

Grid is critical

Need to be proactive and create the infrastructual framework that is essential if early-stage project planning and development is to happen in Ireland.

Building on Eirgrid's offshore grid scenario analysis (EirGrid, 2011) and work of ISLES project a study is commencing to supplement the existing scenarios to further analyse the interrelationship between wind and wave energy and the structure of the network required to meet RES development off Ireland west coast.

Further Information

Thank you and further Information

Sustainable Energy Authority of Ireland

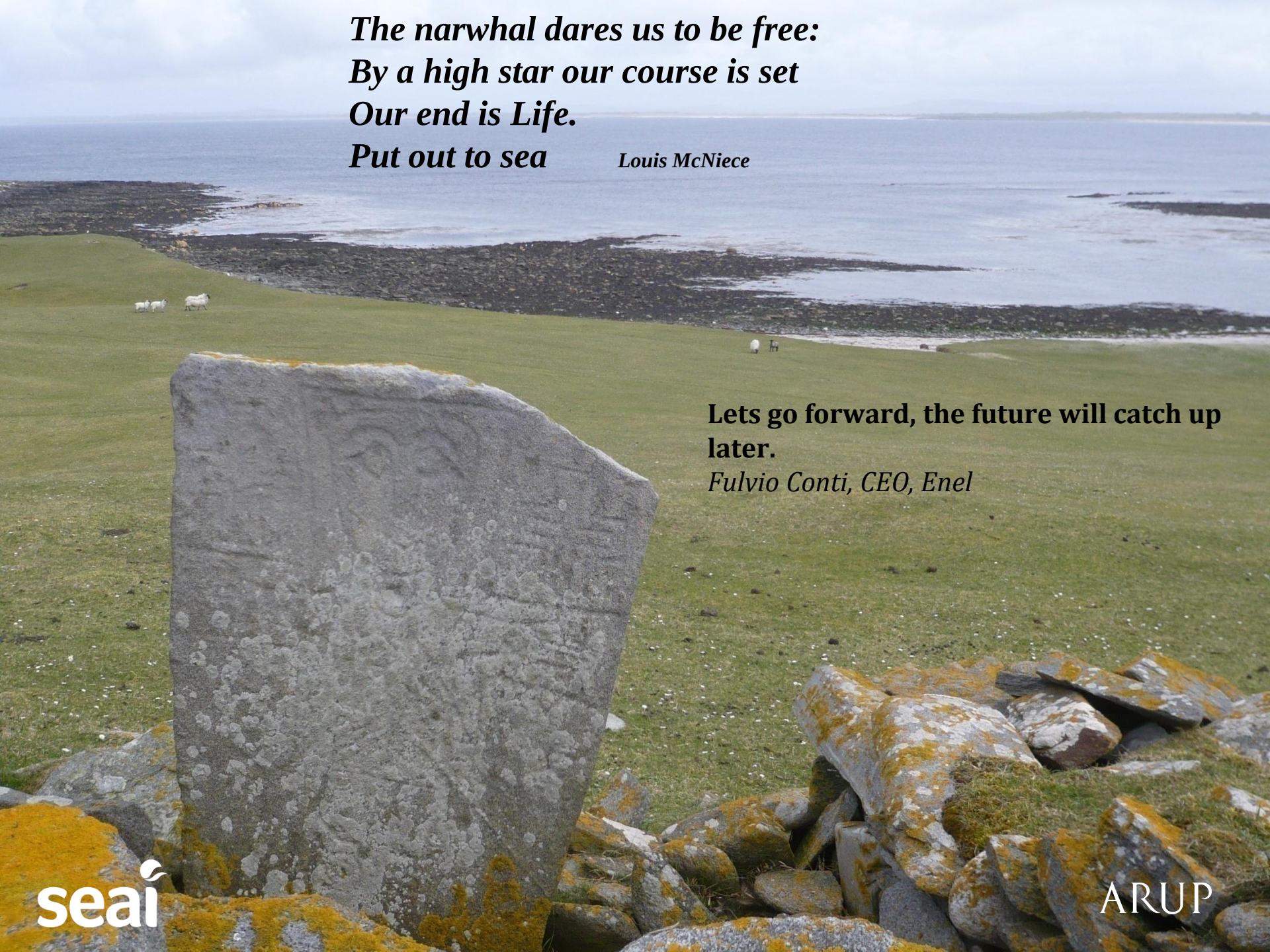
www.seai.ie/oceanenergy

Enterprise Ireland

www.enterprise-ireland.com

Marine Institute

www.marine.ie


The narwhal dares us to be free:
By a high star our course is set
Our end is Life.
Put out to sea *Louis McNiece*
Lets go forward, the future will catch up later.
Fulvio Conti, CEO, Enel
seai
ARUP