

Implementing Agreement on Ocean Energy Systems

John Huckerby & Ana Brito Melo

Under New Management



15 April 2009 | 2nd Global Marine Renewable Energy Conference

IEA:OES-IA Mission & Vision

Vision

To realise, by 2020, the **use of cost-competitive, environmentally sound ocean energy** on a sustainable basis to provide a significant contribution to meeting future energy demands.

Mission

To **facilitate and co-ordinate** ocean energy research, development and demonstration **through international co-operation and information exchange**, leading to the deployment and commercialisation of sustainable, efficient, reliable, cost-competitive and environmentally sound ocean energy technologies.

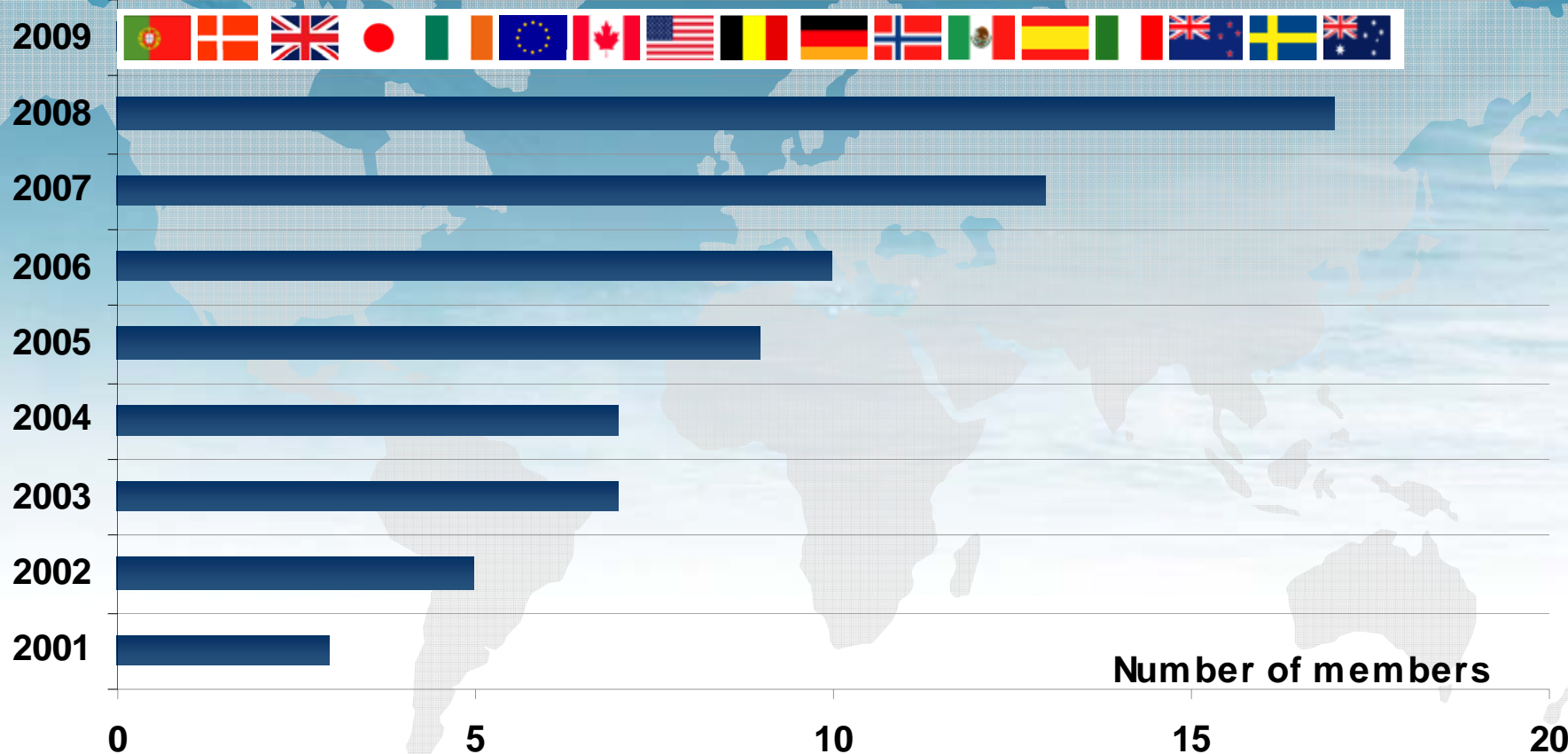
IEA:OES-IA Objectives

5 Year Strategic Plan (2007 – 2011)

1. To actively encourage and support the **development of networks** of participants involved in R, D & D, prototype testing and deployment, policy development and facilitate networking opportunities
2. To promote and facilitate **collaborative** research, development, and demonstration to identify and address barriers to, and opportunities for, the development and deployment of ocean energy technologies
3. To promote the **harmonization** of standards, methodologies, terminologies, and procedures, where such harmonization will facilitate the development of ocean energy
4. To become a **trusted source** of objective information and be effective in disseminating such information to ocean energy stakeholders, policymakers and the public
5. To promote policies and procedures consistent with sustainable development

Present Membership

TRENDS IN PARTICIPATION



Potential New Members



Countries invited to join the IEA-OES
Countries that are completing the process for joining

Ocean Energy Resources

Ocean Energy

Tidal Rise & Fall
Tidal/ocean
Currents



Waves



Salinity
Gradient



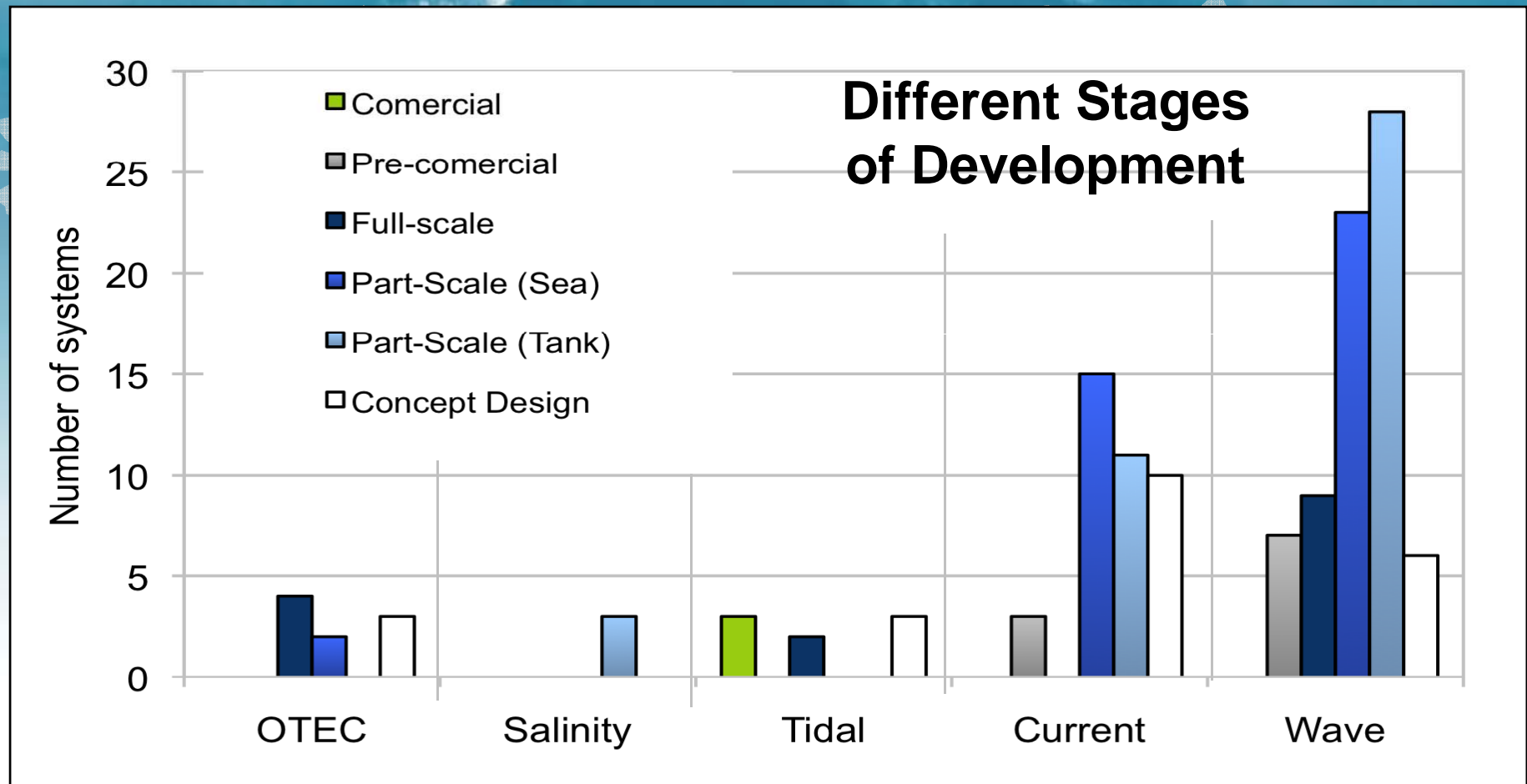
Thermal
Gradient



Submarine geothermal energy
Marine biomass

Offshore wind – not covered in this IA

Maturity of Technologies



Source: Powertech Labs Task Report, 2007

Tidal | Commercial Projects

France: La Rance Barrage



**Barrage de la Rance (240 MW)
St. Malo, FRANCE**

**KOREA | Completion of 254 MW Si-wha tidal barrage expected in June 2010;
Construction of two more tidal barrages being planned; overall installed capacity reaching 2,000 MW**

Korea: Si-Wha Barrage



Wave Farm - **World's First**

A set of three Pelamis attenuator devices (3 x 750 kW) became operational off the Portuguese northern coast in September 2008, making it the first grid-connected wave farm worldwide

Portugal: Aguçadoura



Tidal Current | Sea Testing



**2007 | Open Centre Turbine
(250 kW)
OpenHydro (Ireland)**

**2008 | Seagen (1.2 MW)
Marine Current Turbines
Ltd (UK)**
World's First - grid-
connected 'commercial
demonstrator'



Salinity Gradient | R & D Demonstrations



2009 | **World's First** - prototype osmotic power plant, near Oslo, Norway

Fresh Water from Ocean Energy

- ‘Free’ renewable energy for desalination
- Zero greenhouse gas emissions
- Can be located up to 5 km offshore
- Located close and scaled to market demand
- Minimal requirement for pipelines – ideal for remote sites
- Residual brine disposed at site
- Small footprint due to ocean energy density
- Substitute power production in the rainy season

Projects in Australia, US, Mexico and India

Indian Ocean: Floating LTTD Plant



Work Programme

TASKS

I Dissemination
OA: Portugal

II Guidelines for Testing
OA: Denmark

III Grid Integration
OA: Canada

IV Environmental Effects
OA: USA

2002 2003 2004 2005 2006 2007 2008

2009 2010 2011

1st extension

2nd extension

Mid-term report to
REW P

Documents Published

Wave And Marine Current Energy - Status And Research And Development Priorities | 2003

- Research and development priorities in the area



Review and Analysis of Ocean Energy Systems Development and supporting Policies | 2006

- Current status of OES R&D
- Policies and support mechanisms
- Services and facilities
- Common barriers to progress and possible solutions



Wave Data Catalogue for Resource Assessment | 2007

- Overview of wave data appropriate for wave energy resource assessment and characterization



Dissemination Tools

Poster Newsletters

DVD on Ocean Energy

IEA | OES
Ocean Energy Systems

INTERNATIONAL ENERGY AGENCY | IMPLEMENTING AGREEMENT ON OCEAN ENERGY SYSTEMS

OCEAN ENERGY OPPORTUNITY, PRESENT STATUS AND CHALLENGES

GLOBAL RESOURCE

Available global ocean energy resource is in the same order of magnitude of the present electricity production worldwide.

Five basic forms of ocean energy can be harvested to generate electricity and fresh water by various means:

FORM OF OCEAN ENERGY	ESTIMATED GLOBAL RESOURCES* (TWh/YEAR)	PRESENT GLOBAL ELECTRICITY PRODUCTIONS (TWh/YEAR)
Tides	100	17,000
Waves	20,000	
Thermal (Geothermal)	10,000	
Salinity Gradient	10,000	

TECHNOLOGY DEVELOPMENT STATUS

Technologies for harnessing energy from tides by a turbine or storage system are well developed, but the size of commercial projects must have significant impact on local economies and energy demand worldwide. Some of these technologies are at the stage of full-scale development and are undergoing sea trials.

Technologies for harnessing wave energy using various forms of energy conversion (WECs) are in the development stage.

Technologies for harnessing salinity energy are in the early stage of development.

Barriers & Challenges

Insufficient number of governments control national R&D, market mechanisms, and have better ocean energy policies that are open to ocean energy.

Lack of experience activities on performance and environmental impacts from a large number of full-scale sea trials.

Lack of understanding of financing and permitting process for projects.

Need for internationally designed performance assessment guidelines and standards.

Need for grid connection and capacity market challenges.

Strategic Actions of the IEA-OES

Develop a global network of scientists and engineers to promote ocean energy and provide a platform for information exchange and cooperation in research and development.

Provide a platform for scientists and engineers to provide a platform for information exchange and cooperation in research and development.

MISSION OF THE IEA-OES

To facilitate the development of ocean energy, IEA-OES will provide a platform for information exchange and cooperation in research and development.

EXAMPLES OF SELECTIVE CONVERSION TECHNOLOGIES & DEMONSTRATION PROJECTS WORLD-WIDE

WAVE ENERGY	TIDAL CURRENT ENERGY	TIDAL ENERGY
Padem First commercial wave energy converter in the world. Location: Padem, Spain. Capacity: 100 kW.	Sea Blue Energy First commercial tidal current energy converter in the world. Location: Sea Blue, Scotland. Capacity: 100 kW.	La Rance Tidal Power Plant First commercial tidal current energy converter in the world. Location: La Rance, France. Capacity: 240 MW.
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IEA | OES
Ocean Energy Systems

INTERNATIONAL ENERGY AGENCY | IMPLEMENTING AGREEMENT ON OCEAN ENERGY SYSTEMS

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Annual Reports



Other Collaborative Activities

IEA:OES-IA & IEA Secretariat Joint Book Project:

“Ocean Energy: Status, Prospects & Strategies”

Single, detailed, authoritative reference on OE status and development

IEA Project "Integration of Renewables into Electricity Grids"

Policy frameworks for the deployment of offshore RE technologies

IEA-RE Technology Development

*Accelerating the Deployment
of Offshore RE Technologies*



IEC - TC 114 : Marine Energy – Wave and Tidal Energy Converters

To develop international standards for wave and tidal energy technologies

Collaboration with EquiMar, Waveplam, World Ocean Council, IRENA?

To contribute to international developments in ocean energy; promote networks and accelerate uptake of ocean energy

Ocean Energy Themes

Recent and Present Trends

- 1. Early R & D, deployments and supportive policies**
Initial interest/investment in Portugal, UK, Denmark and Ireland
More recent developments in N. America and Australasia
Feed-in tariffs and marine supply obligations in most advanced countries
- 2. Proliferation of Testing Centres**
EMEC operational in 2004
More than 11 testing centres under development
- 3. Utility-scale Investors & GW-scale Investments**
Voith Hydro and RWE Innogy – JV for tidal energy
Aquamarine Power and Airtricity – 1 GW proposed
- 4. Expectations Met and Promised Delivered?**
Early developments have promised much...
Need for extended deployments to demonstrate capacity factors, O & M costs and commerciality
RAB report (2008) and Saltire Prize

IEA-OES Executive Committee

**If you have been,
thank you for listening!**

Chair

Dr John Huckerby

AWATEA, New Zealand

mail@awatea.org.nz

Vice-Chair

Mr. Jochen Bard

ISSET, Germany

jbard@iset.uni-kassel.de

Vice-Chair

Mr. Jose Luis Villate

ROBOTIKER, Spain

joseluis@robotiker.es

Secretary

Dr. Ana Brito Melo

WAVE ENERGY CENTRE, Portugal

ana@wave-energy-centre.org

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