11th ewtec

Porto (Portugal)
2007

Lisbonne (Portugal)
1995

Patras (Greece)
1998

Aalborg (Denmark)
2013

Aalborg (Denmark)
2000

Edimbourg (UK)
1993

Nantes (France)
2015

Cork (Ireland)
2003

Southampton (UK)
2011

Glasgow (UK)
2005

Uppsala (Sweden)
2009

11th European Wave & Tidal Energy Conference

Nantes, France · 6 - 11 September 2015

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Final Programme

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WELCOME MESSAGE

Bienvenue à Nantes !

My colleagues of the LHEEA Laboratory at Ecole Centrale de Nantes, and myself, are pleased to invite you to participate in the Eleventh European Wave and Tidal Energy Conference EWTEC2015 which is to be held in Nantes (FRANCE), from the 6th to 11th September 2015.

In the field of Marine Renewable Energies, Research and industrial development are linked by the necessity to innovate to speed up access to the market.
This international scientific conference, which has been held every two years in Europe since 1993, provides a forum where researchers, engineers and all people involved in the development of Marine Renewable Energies can meet and exchange ideas, experience, and much more.

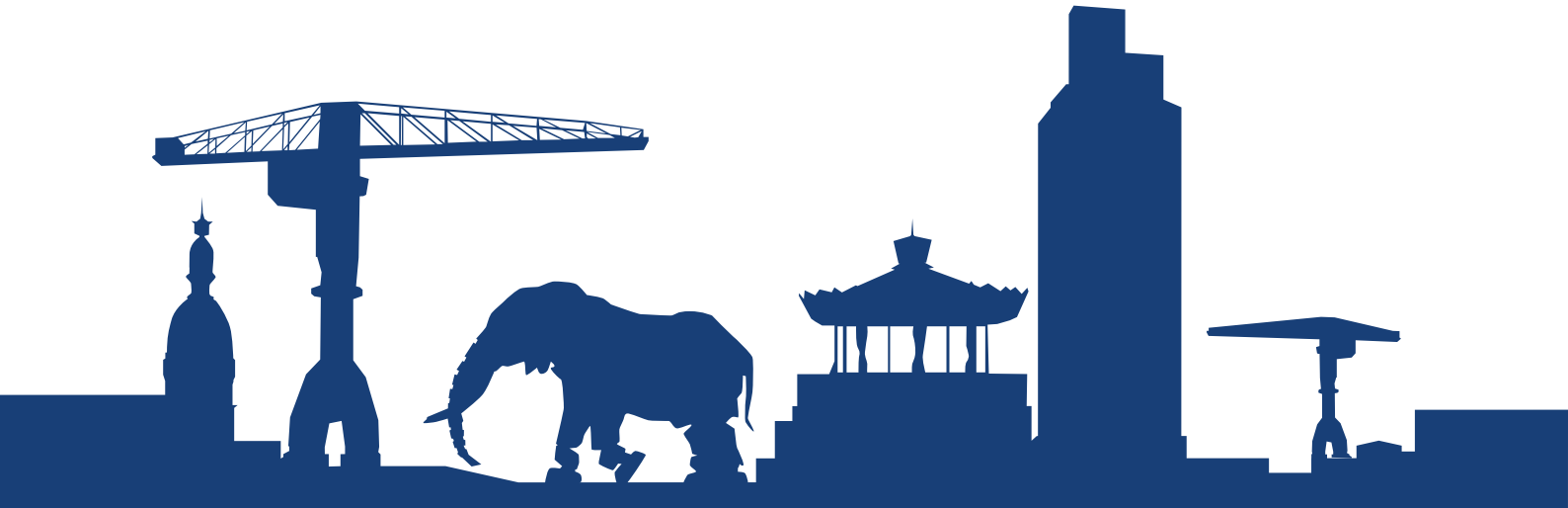
Nantes and the Région des Pays de la Loire host an increasing number of actors involved in the development of this sector: big industrial groups, SMEs, start-ups, and several internationally recognized academic institutions like Ecole Centrale de Nantes. EWTEC2015 will be an ideal opportunity to meet them all in the pleasant environment of the venue: La Cité des Congrès.

The city of Nantes, elected European Green Capital in 2013, is also an enjoyable place to live, and I hope you will be able to take some time to discover it by yourself during this week with us.

Finally, I want to thank here Nantes-Métropole and the regional council of Pays de la Loire, and all the sponsors supporting the event, together with Ecole Centrale de Nantes and CNRS who provided the human resources crucial for the success of such an event.

I wish you a fruitfull week, full of rich networking with the leading experts from more than fourty countries worldwide.

Alain H. Clément
Chair of EWTEC 2015



EWTEC COMMITTEES

EWTEC 2015 is organized by the Ecole Centrale de Nantes.

Local Organizing Committee

Chairman: Dr. Alain H. Clément
Technical Staff of LHEEA research department

Members of LHEEA research groups:

EMO: Ocean and Marine Energy
DSSM: Dynamics of Marine Structures and Systems
SEM-REV: Wave energy test site at sea

Technical Committee

The EWTEC Technical Committee is responsible for the review and selection of the papers and posters presented at the Conference.

Prof. AbuBakr Bahaj, *University of Southampton, UK*
Prof. Lars Bergdahl, *Chalmers University of Technology, Sweden*
Prof. Sergio Camporeale, *Politecnico di Bari, Italy*
Dr. Alain H. Clément, *École Centrale de Nantes, France*
Prof. António Falcão, *Instituto Superior Técnico, Portugal*
Dr. Peter Frigaard, *Aalborg University, Denmark*
Prof. Luis Gato, *Instituto Superior Técnico, Portugal*
Dr. Andrew Grant, *University of Strathclyde, UK*
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Prof. Mats Leijon, *Uppsala University, Sweden*
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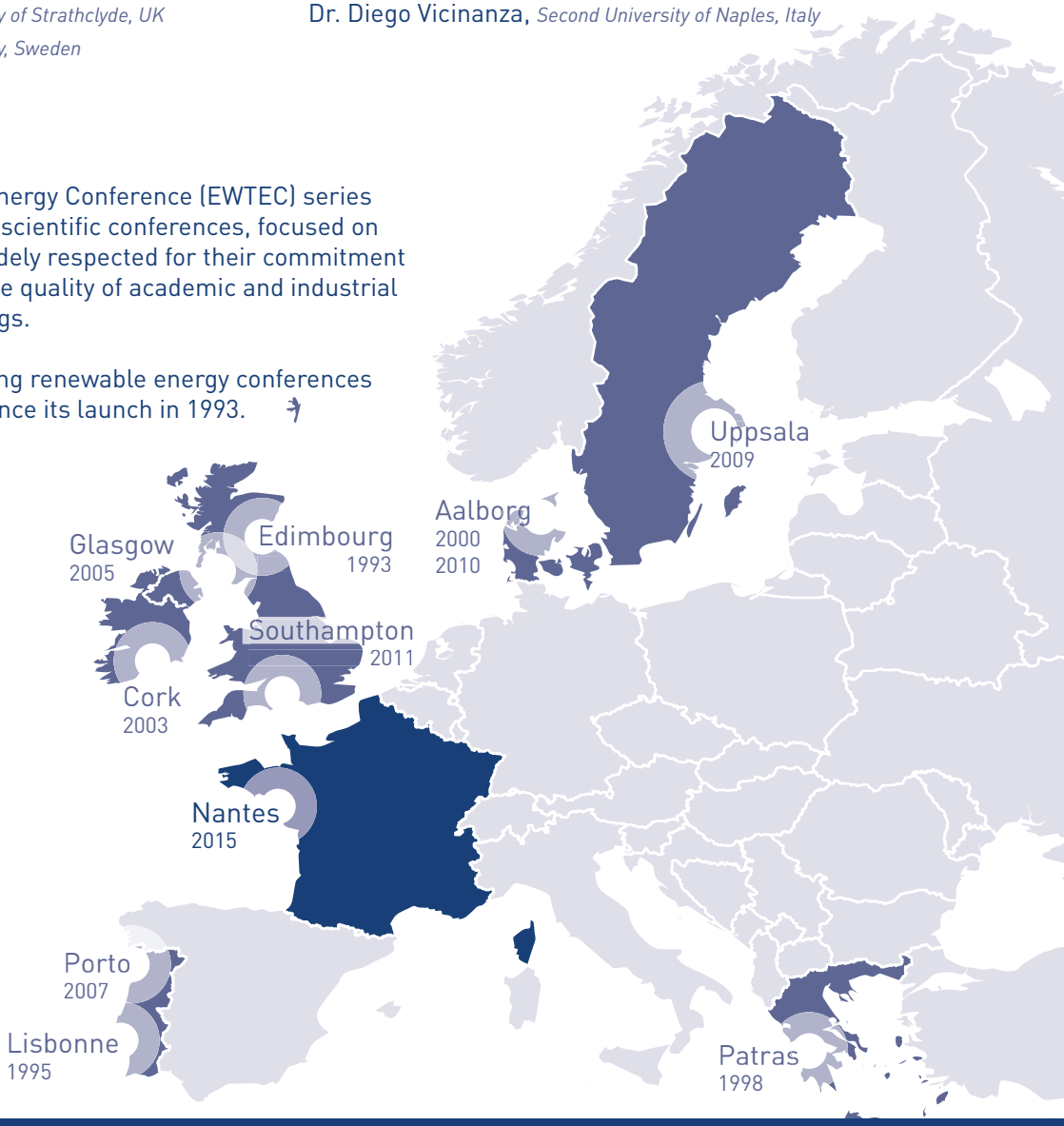
Prof. António Sarmento, *Wave Energy Centre, Portugal*
Dr. Jan Sundberg, *Uppsala University, Sweden*
Dr. Gareth Thomas, *University College Cork, Ireland*
Dr. Diego Vicinanza, *Second University of Naples, Italy*

ABOUT EWTEC

The European Wave and Tidal Energy Conference (EWTEC) series are international, technical and scientific conferences, focused on ocean renewable energy and widely respected for their commitment to maintain high standards in the quality of academic and industrial contributions to their proceedings.

EWTEC is well established among renewable energy conferences showing considerable growth since its launch in 1993.

History of the Conference:



SCHEDULE AT A GLANCE

Sunday 6 September

	GROUND FLOOR
16:30	REGISTRATION DESK OPENING
17:30 19:00	WELCOME RECEPTION

Monday 7 September

	AMPHI GUÉVEL	ROOM GIRARD	ROOM BOISNOER	ROOM GRASSET	ROOM CLAUDE
08:00 09:00	REGISTRATION DESK OPENING				
09:00 10:20	Plenary Opening Session				
10:20 10:40	COFFEE BREAK, VISIT OF THE EXHIBITION				
10:40 12:20	Wave: hydrodynamic modelling & structural mechanics **1**	Tidal: hydrodynamic modelling & structural mechanics **1**	Tidal : device development & testing **1**	Grid integration, PTO and control **1**	
12:20 14:00	LUNCH BREAK				Side event ALSTOM 12:30-13:30
14:00 15:20	Wave: hydrodynamic modelling & structural mechanics **2**	Tidal : device development & testing **2**	Grid integration, PTO and control **2**	Environmental impact and appraisal **1**	
15:20 15:40	COFFEE BREAK, VISIT OF THE EXHIBITION POSTER VIEWING SESSION 1				
15:40 17:20	Wave : device development & testing **1**	Tidal: hydrodynamic modelling & structural mechanics **2**	Grid integration, PTO and control **3**	Wave: resource characterization **1**	
17:20 17:30					
17:30 19:00		Side event ENGIE	Side event CEREMA	Side event MARINET	EWTEC General Assemby 17:30 - 20:00
19:00 20:00					

Tuesday 8 September

	AMPHI GUÉVEL	ROOM GIRARD	ROOM BOISNOER	ROOM GRASSET	ROOM CLAUDE
08:00 09:00	**REGISTRATION DESK OPENING**				
08:00 09:00			Elsevier Workshop		
09:00 10:20	Wave: hydrodynamic modelling & structural mechanics **3**	Tidal : device development & testing **3**	Wave : device development & testing **2**	Tidal : resource characterization **1**	Wave: resource characterization **2**
10:20 10:40	**COFFEE BREAK, VISIT OF THE EXHIBITION POSTER VIEWING SESSION 2**				
10:40 12:20	Wave: hydrodynamic modelling & structural mechanics **4**	Tidal: hydrodynamic modelling & structural mechanics **3**	Wave : device development & testing **3**	Tidal : resource characterization **2**	Station keeping (incl. floating foundations), materials, fatigue and structural loading **1**
12:20 14:00	**LUNCH BREAK PRESENTATION BY THE CANADIAN EMBASSY**				
14:00 15:20	Wave: hydrodynamic modelling & structural mechanics **5**	Tidal: hydrodynamic modelling & structural mechanics **4**	Environmental impact and appraisal **2**	Wave: resource characterization **3**	Station keeping (incl. floating foundations), materials, fatigue and structural loading **2**
15:20 15:40	**COFFEE BREAK, VISIT OF THE EXHIBITION POSTER VIEWING SESSION 3**				
15:40 17:20	Wave : device development & testing **4**	Tidal : device development & testing **4**	Environmental impact and appraisal **3**	Tidal : resource characterization **3**	Economical, social, legal & political aspects **1**
17:20 17:30					
17:30 19:00	Side event ANNEX IV - OES (Ocean Energy Systems)				

SCHEDULE AT A GLANCE

Wednesday 9 September

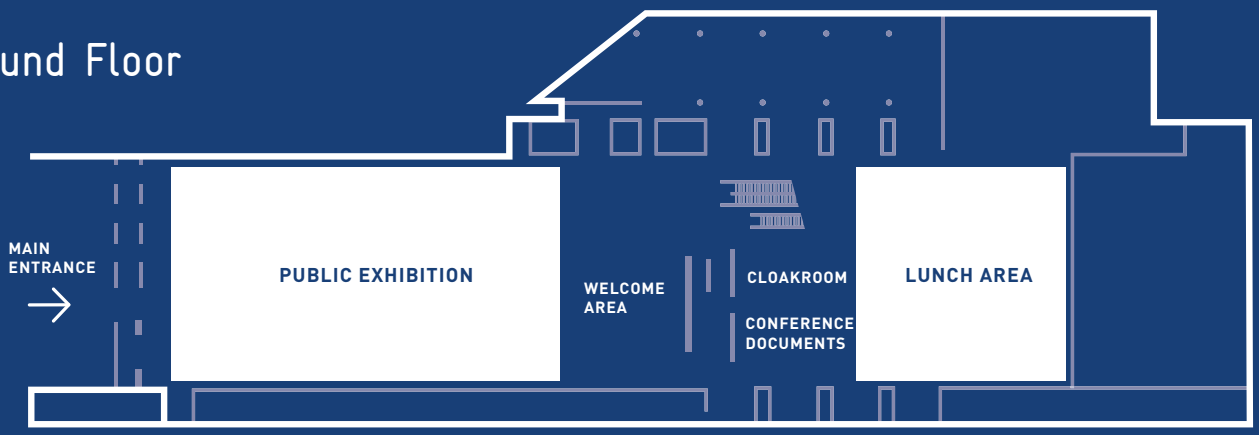
	AMPHI GUÉVEL	ROOM GIRARD	ROOM BOISNOER	ROOM GRASSET	ROOM CLAUDE
08:30 09:00	**REGISTRATION DESK OPENING**				
09:00 10:20	Wave: hydrodynamic modelling & structural mechanics **6**	Tidal : device development & testing **5**	Grid integration, PTO and control **4**	Environmental impact and appraisal **4**	Tidal: resource characterization **4**
10:20 10:40	**COFFEE BREAK, VISIT OF THE EXHIBITION POSTER VIEWING SESSION 4**				
10:40 12:20	Wave: hydrodynamic modelling & structural mechanics **7**	Tidal: hydrodynamic modelling & structural mechanics **5**	Wave: device development & testing **5**	Tidal: resource characterization **5**	Economical, social, legal & political aspects **2**
12:20 14:00	**LUNCH BREAK**				
14:00 15:20	Wave: hydrodynamic modelling & structural mechanics **8**	Tidal: hydrodynamic modelling & structural mechanics **6**	Environmental impact and appraisal **5**	Wave: resource characterization **4**	Economical, social, legal & political aspects **3**
15:20 15:40	**COFFEE BREAK, VISIT OF THE EXHIBITION POSTER VIEWING SESSION 5**				
15:40 17:20	Wave: hydrodynamic modelling & structural mechanics **9**	Tidal: hydrodynamic modelling & structural mechanics **7**	Wave: device development & testing **6**	Tidal : device development & testing **6**	Station keeping (incl. floating foundations), materials, fatigue and structural loading **3**
17:20 17:30					
17:30 19:00	Side event EDF				
19:30 23:30	**GALA DINNER AT THE MACHINES DE L'ILE**				

Thursday 10 September

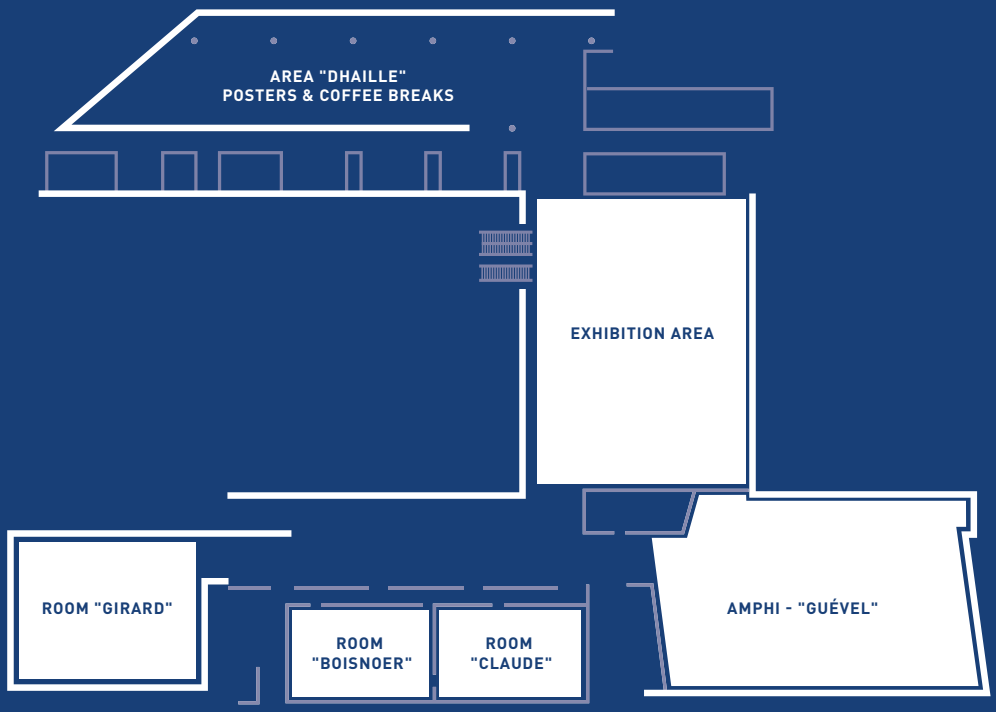
	AMPHI GUÉVEL	ROOM GIRARD	ROOM BOISNOER	ROOM GRASSET
08:30 09:00	**REGISTRATION DESK OPENING**			
09:00 10:20	Wave: hydrodynamic modelling & structural mechanics **10**	Wave : device development & testing **7**	Grid integration, PTO and control **5**	Environmental impact and appraisal **6**
10:20 10:40	**COFFEE BREAK, VISIT OF THE EXHIBITION POSTER VIEWING SESSION 6**			
10:40 12:20	Tidal: hydrodynamic modelling & structural mechanics **8**	Wave : device development & testing **8**	Grid integration, PTO and control **6**	Wave: resource characterization **5**
12:20 14:30	**FAREWELL LUNCH & CLOSING SESSION**			
14:30 18:30		INORE Workshop	MARINET Workshop	

FLOORPLAN

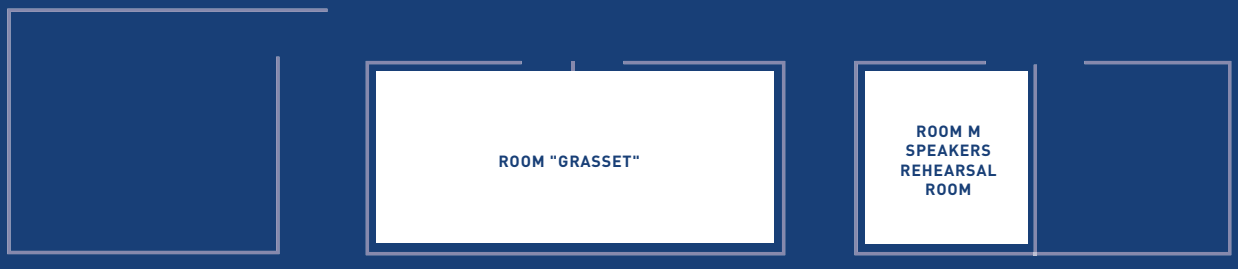
Ground Floor



First Floor



Level 4



ROOMS NAMING

On this occasion, rooms of the Cité des Congrès has been renamed with the name of famous french pioneers of wave and tidal energy.

AMPHI – «GUÉVEL»

Professor Pierre Guével established the Laboratoire d'Hydrodynamique Navale (now LHEEA) in the early seventies at Ecole Centrale de Nantes. From 1980, he supervised the pioneering researches on wave energy in France, planting the seeds of what will become the major academic research department on wave energy in France

ROOM «GIRARD»

The very first patent ever on wave energy is due to to a french father and his son: «Girard père et fils» in Paris, 1799!

ROOM «BOISNOER»

Gérard Boisnoer was the first man to express the idea, in 1921, to close the mouth of the river La Rance, in French Britany, and install here a tidal barrage to produce electricity. This 240 MW plant was launched in 1966 by Général de Gaule;

ROOM «GRASSET»

In 1928, engineer Paul Grasset began to build a wave activated power plant at the foot of a cliff in Biarritz. Based on a principle mixing OWC and waterhammer, this plant was never completed when the second world war began and stopped this experience. Ruins are still visible at St Martin cape, in Biarritz.

ROOM «CLAUDE»

In 1926, the engineer Georges Claude made a demonstration to the French academicians at Institut de France on how to convert the thermal gradient of sea waters to produce electricity. In 1933 he transformed the ship La Tunisie in a floating plant to produce 2000 tons of ice per day by this OTEC process.

COFFEE AND POSTERS AREA «DHAILLE»

Dhaille, in 1957, invented the wave dihedral to recover wave energy by overtopping.

PROGRAMME

Monday 7 September

Opening session

Amphi Guével – 09:00 – 10:20

Chairman: Alain Clément

Adresses by:

- Arnaud Poitou, *Directeur de l'Ecole Centrale de Nantes*
- Christophe Clergeau, *Vice-Président de la Région Pays de la Loire*
- Jean-Louis Bal, *Président du SER, Syndicat des Energies Renouvelables*
- François Moisan, *Directeur Exécutif de l'ADEME*
- Virginie Schwarz, *Directrice de l'Énergie au MEDDE*

This session will be translated from French to English

Coffee break and visit of the exhibition 10:20 – 10 :40

Wave: hydrodynamic modelling & structural mechanics 1

Amphi Guével – 10:40 – 12:20

Chairman: Claes Eskilsson, **Co-Chairman:** Thomas Mazarakos

10:40 7B1-1 **Assessment of Navier-Stokes modelling of an Oscillating Water Column wave energy converter**
Valérie Rameliarison - *Cerema, DTecEMF, LGCE (Laboratoire de Génie Côtier et Environnement) IMFT (Institut de Mécanique des Fluides de Toulouse),* **Dominique Astruc** - *IMFT (Institut de Mécanique des Fluides de Toulouse),* **Georges Chapalain** *-Cerema, DTecEMF, LGCE (Laboratoire de Génie Côtier et Environnement)*

11:00 7B1-2 **Analysis of viscous effects in flap-type oscillating wave surge converters**
Joao Horta Bettencourt - *School of Mathematical Sciences/UCD Earth Institute University College Dublin,* **Frederic Dias** - *School of Mathematical Sciences University College Dublin*

11:20 7B1-3 **Efficient ISPH Method for Breaking Wave Forces on Support Columns**
PeterKenneth Stansby - *School of Mechanical, Aerospace and Civil Engineering University of Manchester,* **Steven Lind** - *School of Mechanical, Aerospace and Civil Engineering University of Manchester,* **Benedict Rogers** *-School of Mechanical, Aerospace and Civil Engineering University of Manchester*

11:40 7B1-4 **Numerical analysis of a point absorber wave energy converter**
Virag Mishra - *University of Victoria,* **Scott Beatty** - *University of Victoria,* **Curran Crawford** *-University of Victoria,* **Peter Oshkai** - *University of Victoria,* **Bradley Buckham** - *University of Victoria*

12:00 7B1-5 **Power matrix assessment and extreme loads estimation on a flap type wave energy converter in front of a dike**
Virginie Baudry - *Ecole Centrale de Nantes LHEEA - CNRS UMR 6598,* **Salvatore Marrone** - *CNR INSEAN,* **Aurélien Babarit** *-Ecole Centrale de Nantes LHEEA - CNRS UMR 6598,* **David Le Touzé** - *Ecole Centrale de Nantes LHEEA - CNRS UMR 6598,* **Alain Clément** - *Ecole Centrale de Nantes LHEEA - CNRS UMR 6598*

Tidal: hydrodynamic modelling & structural mechanics 1

Room Girard – 10:40 – 12:20

Chairman: Christophe Corre, **Co-Chairman:** Pierre-Emmanuel Guillerm

10:40 7B2-1 **On the use of turbulence models for simulating the flow behind a tidal turbine represented by a porous media**
Sylvain S. Guillou - *Normandy University, UNICAEN, LUSAC, EA 4253 Rue Louis Aragon, BP 78, 50130 Cherbourg-Octeville, France*

11:00 7B2-2 **A Synthetic-Eddy-Method to represent the ambient turbulence in numerical simulation of marine current turbine**
Clément Carlier - *Laboratoire Ondes et Milieux Complexes (LOMC), UMR 6294, CNRS. IFREMER, Centre Manche Mer du Nord,* **Grégory Pinon** - *Laboratoire Ondes et Milieux Complexes (LOMC), UMR 6294, CNRS - Université du Havre,* **Grégory Germain** -*IFREMER, Centre Manche Mer du Nord,* **Elie Rivoalen** - *Laboratoire d'Optimisation et Fiabilité en Mécanique des Structures (LOFIMS), EA 3828, INSA de Rouen,* **Benoît Gaurier** - *IFREMER, Centre Manche Mer du Nord*

11:20 7B2-3 **Validation of High-Fidelity CFD Simulation of the Unsteady Turbulent Tidal Flow in Minas Passage**
Kevin Wilcox, *University of New Brunswick,* **Andrew Gerber,** *Department of Mechanical Engineering, University of New Brunswick*

11:40 7B2-4 **3D modeling of a Tidal Turbine - An Investigation of Wake Phenomena**
Nick Osbourne - *Dalhousie University,* **Dominic Groulx** - *Dalhousie University,* **Irene Penesis** -*University of Tasmania*

12:00 7B2-5 **Validation of a Practical CFD Method for Predicting Hydrokinetic Turbine Performance in Wake Shadow**
Michael Shives - *University of Victoria,* **Curran Crawford** - *University of Victoria*

Tidal : device development & testing 1

Room Boisnoer – 10:40 – 12:20

Chairman: Cameron Johnstone, **Co-Chairman:** Roger Grosvenor

10:40 7B3-1 **Effect of submergence on tidal turbine performance**
Penny Jeffcoate - *Queen's University Belfast,* **Francesco Salvatore** - *CNR-INSEAN,* **Cuan Boake** -*Applied Renewables Research Ltd,* **Bjoern Elsaesser** - *Queen's University Belfast*

11:00 7B3-2 **Experimental Evaluation of a Horizontal-Axis Marine Current Turbine Using Two Scale Models**
Masoud Rahimian - *Australian Maritime College, University of Tasmania,* **Jessica Walker** - *Australian Maritime College, University of Tasmania,* **Irene Penesis** -*Australian Maritime College, University of Tasmania,* **Rowan Frost** - *Australian Maritime College, University of Tasmania*

11:20 7B3-3 **Turbine-Structure Interaction on PLAT-O (Tension moored underwater Platform for Ocean Energy)**
Romain Fabre - *Cranfield University,* **Florent Trarieux** - *Cranfield University,* **Ralf Starzmann** -*Schottel GmbH,* **Jason Hayman** - *Sustainable Marine Energy Ltd*

11:40 7B3-4 **Performance of a flexible membrane tidal energy converter**
Astrid Déporte - *EEL Energy \Ifremer\Ademe,* **Martin Träsch** - *EEL Energy,* **Grégory Germain** - *Ifremer,* **Alan Artaux**, *Ifremer,* **Jean-Baptiste Drevet** - *EEL Energy,* **Peter Davies** - *Ifremer*

12:00 7B3-5 **Biomimetic improvement for a tidal turbine blade**
Weichao Shi - *School of Marine Science and Technology, Newcastle University,* **Mehmet Atlar** - *School of Marine Science and Technology, Newcastle University,* **Rosemary Norman** - *School of Marine Science and Technology, Newcastle University,* **Batuhan Aktas** - *School of Marine Science and Technology, Newcastle University,* **Serkan Turkmen** - *School of Marine Science and Technology, Newcastle University*

Grid integration, PTO and control 1

Room Grasset – 10:40 – 12:20

Chairman: Umesh A Korde, **Co-Chairman:** Jeff Scruggs

10:40 7B4-1 **A novel twin-rotor air turbine for bidirectional flows in wave energy conversion**
Antonio F O Falcao - *Instituto Superior Tecnico, Universidade de Lisboa, Lisbon, Portugal,* **Luís M C Gato** - *Injstituto Superior Tecnico, Universidade de Lisboa, 1049-001 Lisbon, Portugal,* **João C C Henriques** - *Instituto Superior Tecnico, Universidade de Lisboa, 1049-001 Lisbon, Portugal,* **Bruno Pereiras** - *Energy Department, University of Oviedo, Campus de Vieques, 33271 Gijon, Spain,* **Francisco Castro** - *Department of Energetic and Fluid Mechanics Engineering, University of Valladolid, Paseo del Cauce 59, E-47011 Valladolid, Spain*

11:00 7B4-2 **A Power Take-Off behaviour at high pressure operation point, using four double-acting hydraulic cylinders modelled by a port-based approach**
Juan Carlos Antolín-Urbaneja - *Fundacion TECNALIA RESEARCH & INNOVATION,* **Alain Cortés** - *Fundacion TECNALIA RESEARCH & INNOVATION,* **Marga Marcos** - *Dpto. Ingenieria de Sistemas y Automatica ETSI. Bilbao. University of the Basque Country,* **Joseba Lasa** - *Fundacion TECNALIA RESEARCH & INNOVATION,* **Itziar Cabanes** - *Dpto. Ingenieria de Sistemas y Automatica ETSI. Bilbao. University of the Basque Country*

11:20 7B4-3 **Design of a Froude scaled PTO lab setup**
Kristof L. De Koker - *Department of Electrical Energy, Systems and Automation - Ghent University,* **Guillaume Crevecoeur** - *Department of Electrical Energy, Systems and Automation - Ghent University,* **Marc Vantorre** -*Maritime Technology Division, Ghent University,* **Lieven Vandevelde** - *Department of Electrical Energy, Systems and Automation - Ghent University*

11:40 7B4-4 **Modelling and Simulation of a Collector Hub System Combining Core Technologies**
Mikael Sidenmark -*Ocean Harvesting Technologies AB,* Ahmed Rashid - *Blekinge Institute of Technology,* **Ashkan Ghodrati** - *Blekinge Institute of Technology, ,* **Anders Hultgren** - *Blekinge Institute of Technology*

12:00 7B4-5 **Approximate near-optimal time domain control of two systems of heaving axisymmetric 2-body wave energy converters**
Umesh A Korde - *South Dakota School of Mines and Technology*

Lunch break 12:20 – 14:00

Side event ALSTOM

Room Claude – 12:30 – 13:30

ALSTOM

Reducing the cost of tidal energy: stakes and development
Frédéric Pilorge, Ocean Engineering Manager

Wave: hydrodynamic modelling & structural mechanics 2

Amphi Guével – 14:00 – 15:20

Chairman: Peter K. Stansby, **Co-Chairman:** Jean-Christophe Gilloteaux

14:00 7C1-1 **Wave energy absorption by submerged flap-type oscillating wave surge converters**
Imogen Frances Noad - *School of Mathematics, University of Bristol, University Walk, Clifton, Bristol, BS8 1TW,* **Richard Porter**, *School of Mathematics, University of Bristol*

14:20 7C1-2 **Oscillating hydrofoils as energy devices operating in waves and currents**
Kostas Belibassakis - *School of Naval Architecture & Marine Engineering, National Technical University of Athens,* **Th. Gerostathis**, *School of Naval Architecture & Marine Engineering, National Technical University of Athens,* **E.S. Filippas**, *School of Naval Architecture & Marine Engineering, National Technical University of Athens,* **Julien Touboul**, *Université de Toulon,* **Vincent Rey**, *Université de Toulon*

14:40 7C1-3 **Numerical study on the dynamics of a novel two-raft wave energy absorption device**
Siming Zheng - *State Key Laboratory of Hydroscience and Engineering, Tsinghua University, China*

15:00 7C1-4 **Modelling of an offshore multi-purpose floating structure supporting a wind turbine including second-order wave loads**
Spyros A. Mavrakos - *National technical University of Athens, Laboratory for floating structures and Mooring Systems, School of Naval Architecture and Marine Engineering,* Thomas Mazarakos - *National technical University of Athens, Laboratory for floating structures and Mooring Systems, School of Naval Architecture and Marine Engineering,* **Dimitios Konispoliatis** -*National technical University of Athens, Laboratory for floating structures and Mooring Systems, School of Naval Architecture and Marine Engineering,* **Dimitios Manolas** - *National technical University of Athens, Aerodynamic Laboratory, School of Mechamical Engineers,* **Spyros Voutsinas** - *National technical University of Athens, Aerodynamic Laboratory, School of Mechamical Engineers*

Tidal : device development & testing 2

Room Girard - 14:00 - 15:20

Chairman: Bjoern Elsaesser, **Co-Chairman:** Claudio Bittencourt Ferreira

14:00 7C2-1 **Time-Frequency Analysis of TST Drive Shaft Torque for Tidal Stream Turbine Blade Fault Diagnosis.**
Matthew James Allmark - *Cardiff University*, **Paul Prickett** - *Cardiff University*, **Roger Grosvenor** -*Cardiff Universitty, Carwyn Frost - Cardiff University*

14:20 7C2-2 **Comparative analysis of Life Cycle Costs between the 2nd generation TEC GESMEY and a 1st Generation TEC**
Luis Ramon Nuñez Rivas - *Director of the E.T.S. Ingenieros Navales (Universidad Politecnica de Madrid UPM) and Professor of Marine Renewable Energies*, **Amable Lopez Piñeiro** - *Professor at the E.T.S. Ingenieros Navales (UPM)*, **Jose Andres Somolinos Sanchez** -*Professor E.T.S. Ingenieros Navales (UPM)*, **Eva Novoa Rojas** - *Director Genearl Fundacion Centro tecnologico SOERMAR*, **Alfonso M. Carneros Lozano** - *Director Tecnico Fundacion Soermar*

14:40 7C2-3 **Load Reduction Potential of Variable Speed Control Approaches for Fixed Pitch Tidal Current Turbines**
Matthias Arnold - *Stuttgart Wind Energy (SWE) University Stuttgart*, **Frank Biskup** - *Voith Hydro Ocean Current Technologies GmbH & Co. KG*, **Po Wen Cheng** -*Stuttgart Wind Energy (SWE) University Stuttgart*

15:00 7C2-4 **Design Tool for Passively Adaptive Turbine Blades**
Robynne E Murray - *Dalhousie University*, **Darrel Doman** - *Dalhousie University*, **Mike Pegg** -*Dalhousie University, Thomas Nevalainen - University of Strathclyde*, **Katie Gracie** - *University of Strathclyde*, **Cameron Johnstone** - *University of Strathclyde*

Grid integration, PTO and control 2

Room Boisnoer - 14:00 - 15:20

Chairman: Paolino Tona, **Co-Chairman:** Thibaut Kovaltchouk

14:00 7C3-1 **Estimation method for evaluating the wave-induced flicker level emitted by a tidal energy farm**
Anne Blavette - *SATIE (CNRS)*

14:20 7C3-2 **Assessing the Contribution of Marine Renewables Towards Meeting UK Electricity Demand**
Adam Collin - *The University of Edinburgh*, **Christos Kourtzis** - *The University of Edinburgh*, **Aby Sankaran Iyer** -*Marine Current Turbines*, **Lucy Cradden** - *The University of Edinburgh*, **Gareh Harrison** - *The University of Edinburgh*, **Aristides Kiprakis** - *The University of Edinburgh*

14:40 7C3-3 **Power Quality Analysis of a Wave Farm under Different Control Strategies and Sea States**
Sara N Armstrong - *Beaufort, University College Cork*

15:00 7C3-4

Environmental impact and appraisal 1

Room Grasset - 14:00 - 15:20

Chairman: Brian Polagye, **Co-Chairman:** Pal Schmitt

Session sponsored by ANNEX IV – OES (Ocean Energy System)

14:00 7C4-1 **Towards acoustic monitoring of marine mammals at a tidal energy site: Grand Passage, NS, Canada**
Chloe E. Malinka - *Sea Mammal Research Unit, University of St. Andrews, St Andrews, Fife, UK*, **Alex E. Hay** - *Dept. of Oceanography, Dalhousie University, Halifax, NS, Canada*, **Richard Cheel** -*Dept. of Oceanography, Dalhousie University, Halifax, NS, Canada*, **Mark Wood** - *Ocean Sonics Ltd., Great Village, NS, Canada*

14:20 7C4-2 **Surveying Marine Mammals in Nearby Tidal Energy Development Sites: a Comparison**
Steven Benjamins - *Scottish Association for Marine Science (SAMS)*

14:40 7C4-3 **An Integrated Solution to Real-time Marine Mammal Monitoring for Tidal Turbines**
Peter Bromley - *Tidal Energy Ltd*, **Cuan Boake** - *Applied Renewables Research Ltd*, **Merin Broudic** -*Swansea university*

15:00 7C4-4 **Using temporal analysis techniques to optimize hydroacoustic surveys of fish at MHK devices**
Haley A Viehman - *University of Maine School of Marine Sciences*

Coffee break and Poster Session 1 — 15:20 – 15:40

7P2-1 **Evaluation of wave energy and tidal stream resources in Bilbao (N Spain)**
Cesar Mösso - *Laboratori d'Emginyeria Maritima, Universitat Politecnica de Catalunya - BarcelonaTech,* **Marc Mestres** *- Laboratori d'Emginyeria Maritima, Universitat Politecnica de Catalunya - BarcelonaTech,* **Joan Pau Sierra** *-Laboratori d'Emginyeria Maritima, Universitat Politecnica de Catalunya - BarcelonaTech,* **Daniel González-Marco** *- Laboratori d'Emginyeria Maritima, Universitat Politecnica de Catalunya - BarcelonaTech*

7P2-2 **BLUENE - BLUe ENErgy for Mediterranean Sea**
Diego Vicinanza - *Second University of Naples (SUN) Department of Civil Engineering, Design, Building and Environment (DICDEA),* **Vincenzo Ferrante** *- CONISMA - National Inter-University Consortium of Marine Sciences,* **Enrico Zambianchi** *-CONISMA - National Inter-University Consortium of Marine Sciences,* **Caterina Praticò** *- CONISMA - National Inter-University Consortium of Marine Sciences,* **Jordi Abadal** *- Urban Ecology Agency of Barcelona,* **Francisco Cárdenas** *- Urban Ecology Agency of Barcelona,* **Moisès Morató** *- Urban Ecology Agency of Barcelona,* **Josip Matassi** *-Zadar County Development Agency,* **Ive Suric** *- Zadar County Development Agency,* **Sanja Pericic** *- Zadar County Development Agency,* **Takvor Soukissian** *- HCMR - Hellenic Centre for Marine Research, Euripides Papadopoulos - HCMR - Hellenic Centre for Marine Research, Adrian de Andres - INORE - International Network on Offshore Renewable Energies University of Edinburgh,* **Euripides Papadopoulos** *- HCMR - Hellenic Centre for Marine Research, Adrian de Andres, INORE - International Network on Offshore Renewable Energies University of Edinburgh,* **Henry Jeffrey** *- EERA - European Energy Research Alliance,* **Gianmaria Sannino** *- ENEA - Italian National Agency for New Technologies, Energy and Sustainable Economic Development,* **Lucia Margheritini** *- Marine Renewable 1-tech,* **Antonio Sarmento** *- WavEC Offshore Renewables,* **Jens Peter Kofoed** *- Wave Energy Research Group - Aalborg University,* **Nikolas Zografakis** *- Regional Energy Agency of Crete,* **Danica Maljkovic** *- Energy Institute Hrvoje Požar*

7P2-3 **Sonar for Environmental Monitoring: Understanding the Functionality of Active Acoustics as a Method for Monitoring Marine Renewable Energy Devices**
Francisco Gemo Albino Francisco - *Uppsala University Marie Curie OceanNet,* **Jan Sundberg** *- Uppsala University,* **Mats Leijon** *-Uppsala University*

7P2-4 **The role of uncertainty of site conditions in safety factors for design**
Gaizka Zarraonandia - *DNV GL,* **Steven Parkinson** *- DNV GL*

Wave : device development & testing 1

Amphi Guével – 15:40 – 17:20

Chairman: Jochem Weber, **Co-Chairman:** João Henriques

15:40 7D1-1 **WEC Classes: Preliminary Studies**
Joao Cruz - *Wavepower Technologies Ltd*

16:00 7D1-2 **A review and comparison of offshore floating concepts with combined wind-wave energy**
Nicolas Tomey Bozo - *Hydraulics and Maritime Research Centre - UCC,* **Jimmy Murphy,** *Marine Renewable Energy Ireland (MaREI), University College Cork,* **Tony Lewis**, *Marine Renewable Energy Ireland (MaREI), University College Cork,* **Gareth Thomas**, *Department of Applied Mathematics, University College Cork*

16:20 7D1-3 **WEC3: Wave Energy Converters modeling Code Comparison project**
Adrien Combourieu - *INNOSEA,* **Aurélien Babarit** *- Ecole centrale de Nantes,* **Michael Lawson** *-NREL,* **Kelley Ruehl** *- SANDIA National Laboratory,* **André Roy** *- Dynamic System Analysis Ltd.,* **Dean Steinke** *- Dynamic System Analysis Ltd.,* **Ronan Costello** *- NUI Maynooth,* **Pauline Laporte Weywada** *-DVN-GL*

16:40 7D1-4 **Different Reliability Assessment Approaches for Wave Energy Converters**
Simon Ambühl - *Aalborg University,* **Morten Kramer** *- Aalborg Univeristy,* **John Dalsgaard Sørensen** *-Aalborg University*

17:00 7D1-5 **Dimensionality of the performance matrix for wave energy converters**
Clayton Elliot Hiles - *Cascadia Coast Research Ltd.*

Tidal: hydrodynamic modelling & structural mechanics 2

Room Girard – 15:40 – 17:20

Chairman: Ian Masters, **Co-Chairman:** Matthias Arnold

15:40 7D2-1 **CFD Simulations of a Full-Scale Tidal Turbine: Comparison of LES and RANS with Field Data**
Umair Ahmed - *University of Manchester,* **Imran Afgan** - *University of Manchester,* **David Apsley** -*University of Manchester,* **Tim Stallard** - *University of Manchester,* **Peter Stansby** - *University of Manchester*

16:00 7D2-2 **Impact of Structural Flexibility on Loads on Tidal Current Turbines**
Matthias Arnold - *Stuttgart Wind Energy (SWE) University Stuttgart,* **Frank Biskup** - *Voith Hydro Ocean Current Technologies GmbH & Co. KG,* **Matthias Kretschmer**, *Stuttgart Wind Energy (SWE) University Stuttgart,* **Po Wen Cheng** *-Stuttgart Wind Energy (SWE) University Stuttgart*

16:20 7D2-3 **Experimental Investigation of Tidal Rotor Loading due to Wave, Current and Impact with Sea Animals**
Grégory Payne - *University of Edinburgh,* **Tim Stallard**, *University of Manchester,* **Rodrigo Martinez**, *The University of Edinburgh*

16:40 7D2-4 **CFD turbulence modelling of tidal turbine unsteady blade load**
Xue Wang - *PhD student of University of Strathclyde*

17:00 7D2-5 **An Unsteady Blade Element Momentum Theory for Tidal Stream Turbines with Morris Method Sensitivity Analysis**
Thomas Mikael *Nevalainen - University of Strathclyde,* **Cameron M Johnstone** - *University of Strathclyde,* **Andrew Grant** *-University of Strathclyde*

Grid integration, PTO and control 3

Room Boisnoer – 15:40 – 17:20

Chairman: JC Henriques, **Co-Chairman:** Laura-Mae Macadré

15:40 7D3-1 **Model Predictive Control of a Direct Wave Energy Converter Constrained by the Electrical Chain using an Energetic model**
Thibaut Kovaltchouk - *SATIE Laboratory (UMR CNRS 8029) Campus de Ker Lann - Av. R. Schuman 35170 BRUZ, France,* **François Rongère** - *LHEEA, CNRS UMR6598, LUNAM, Ecole Centrale de Nantes, Nantes, France,* **Muriel Primot** *-IRCCyN, CNRS UMR6597, LUNAM, Ecole Centrale de Nantes, Nantes, France,* **Judicaël Aubry** - *Mechatronics team, ESTACA, CERIE, Laval, France,* **Hamid Ben Ahmed** - *SATIE Laboratory (UMR CNRS 8029) Campus de Ker Lann - Av. R. Schuman 35170 BRUZ, France,* **Bernard Multon** - *SATIE Laboratory (UMR CNRS 8029) Campus de Ker Lann - Av. R. Schuma 35170 BRUZ, France*

16:00 7D3-2 **An Efficiency-Aware Model Predictive Control; Strategy for a Heaving Buoy Wave Energy Converter**
Paolino Tona - *IFP Energies nouvelles,* **Hoai-Nam Nguyen** - *IFPEN,* **Guillaume Sabiron** *-IFPEN,* **Yann Creff** - *IFPEN*

16:20 7D3-3 **Wave to Wire Power Maximisation from a Wave Energy Converter**
Adrian O Sullivan - *MAREI SFI Research Center, Cork,* **Gordon Lightbody** - *MAREI SFI Research Center, Cork*

16:40 7D3-4 **Damping optimisation for maximizing energy conversion**
Wanan Sheng - *Beaufort, University College Cork, Ireland*

17:00 7D3-5 **Optimal causal control of wave energy converters in stochastic waves - Accommodating nonlinear dynamic and loss models**
Jeff Scruggs - *University of Michigan*

Wave: resource characterization 1

Room Grasset – 15:40 – 17:20

Chairman: Guillaume Ducrozet, **Co-Chairman:** Flemming Schlütter

15:40 7D4-1 **Going further than the scatter diagram: tools for analysing the wave resource and classifying sites**
Remy Claude Rene Pascal - *Abengoa Seapower, Alejandro* **Torres Molina** - *Abengoa Seapower,* **Alejandro González Andreu** -*Abengoa Seapower*

16:00 7D4-2 **WEC survivability threshold and extractable wave power**
Christophe Maisondieu - *IFREMER*

16:20 7D4-3 **Validation of the IEC Technical Specification for Wave Energy Resource Assessment**
Steffanie Piche - *University of Ottawa,* **Andrew Cornett** - *National Research Council of Canada & University of Ottawa,* **Scott Baker** - *National Research Council of Canada,* **Ioan Nistor** - *University of Ottawa*

16:40 7D4-4 **Comparison of parametric models for swell events**
Komlan Agbéko Kpogo-Nuwoklo - *IFREMER*

17:00 7D4-5 **A Unified Formulation for Unimodal and Bimodal Wave Spectra**
Ed B.L. Mackay - *DNV GL*

ENGIE Side Meeting

Room Girard – 17:30 – 19:00

Overview of ENGIE's activities in Ocean Energy
Ana Novak-Zdravkovic, Research & Innovation Division

The raz Blanchard Tidal project
Gilles L'Haridon, Futures Energies, Marine Renewable Energies

From Hydro to Tidal projects
Romain Barthelet, Compagnie Nationale du Rhône

CEREMA Side Meeting

Room Boisnoer – 17:30 – 19:00

Chairman: Philippe Sergent

Offshore Windfarm Decommissioning: technical and environmental recommendations
Julie Droit

Spatial planning for offshore energy in France
Léa Thiebaud

EMACOP project : analysis of possible development of on-shore WEC along French coasts
Philippe Sergent and Bertrand Michard

MARINET Side Meeting

Room Grasset - 17:30 – 19:00

The MARINET Showcase: Delivering Impact by transnational access to leading Research Infrastructures.

Selected MARINET users present their experience of how MARINET has helped them in developing tomorrow's Tidal, Wave, Offshore Wind, Hybrid/Combined, and Key Enabling technologies.

EWTEC General Assembly

Room Claude - 17:30 – 20:00

Tuesday 8 September

Elsevier Workshop: How to get published in a scientific journal ?

Room Boisnoer – 08:00 – 09:00

Presenter: Katherine Eve, Energy Executive Publisher

Audience: The session is intended for early-career researchers (undergraduate students, PhD students, and Post Doctorate researchers) who are new to writing scientific articles or have written a handful of articles and would like to hone their writing skills.

Scope: This will be an information packed session that covers all aspects of writing scientific articles; from the abstract to the references, from preparation to publication. Topics covered will include: Why is it so important to write a good paper? What is a good paper and how do I write one? How do I decide where to submit my paper? What happens during review? What do I need to do to publish ethically? Attendees will also have the opportunity to ask questions.

Wave: hydrodynamic modelling & structural mechanics 3

Amphi Guével – 09:00 – 10:20

Chairman: Gareth Thomas, **Co-Chairman:** Kostas Belibassakis

09:00 8A1-1 **Wave forces on a U-OWC breakwater**
Pasquale Fabio Filianoti - *Università Mediterranea di Reggio Calabria*, **Riccardo Piscopo** - *politecnico di Bari*, **Luana Gurnari**, *Università Mediterranea di Reggio Calabria*

09:20 8A1-2 **Hydrodynamic Optimization of the UGEN - Wave Energy Converter with U-shaped Interior Oscillating Water Column**
Sergio Ribeiro e Silva - *CENTEC, Instituto Superior Técnico, University of Lisbon Av. Rovisco Pais, 1049-001 Lisboa (Portugal)*, **Rui Gomes** - *LAETA, IDMEC, Instituto Superior Tecnico, University of Lisbon, Av. Rovisco Pais, 1049-001 Lisboa (Portugal)*, **Antonio Falcao** -*LAETA, IDMEC, Instituto Superior Tecnico, University of Lisbon, Av. Rovisco Pais, 1049-001 Lisboa (Portugal)*

09:40 8A1-3 **Hydrodynamic Analysis and Performance of a Single Fixed Circular OWC Device**
Jean-Roch Nader - *National Centre for Maritime Engineering & Hydrodynamics, Australian Maritime College, University of Tasmania*

10:00 8A1-4 **Efforts Towards a Validated Time-Domain Model of an Oscillating Water Column with Control Components**
Thomas Eoin Kelly - *Centre for Ocean Energy Research, Maynooth University*, **Thomas Dooley** - *Centre for Renewable Energy at Dundalk Institute of Technology*, **John Campbell** -*Wave Energy Ireland Limited.*, **John Ringwood** - *Centre for Ocean Energy Research, Maynooth University*

Tidal : device development & testing 3

Room Girard – 09:00 – 10:20

Chairman: Paul Prickett, **Co-Chairman:** Chulhee Jo

09:00 8A2-1 **Best Available Technique for Ultra Low Head; Tidal- and River Hydropower**
Jacob van Berkel - *Pro-Tide*

09:20 8A2-2 **Influence of Fixed-Pitch Tidal Turbine Hydrodynamic Characteristic on the Generator Design**
Sofiane Djebarri - *Naval Academy France*, **Jean-Frédéric Charpentier** - *Naval Academy France*, **Franck Scuiller** -*Naval Academy France*, **Mohamed Benbouzid** - *LBMS Université de Brest (IUT)*

09:40 8A2-3 **Smart Affordable Tidal Energy Using Novel Composites**
Tomas Flanagan - *Eire Composites*, **Adrian Doyle** - *EireComosites, Conchur O'Bradaigh -University College Cork*

10:00 8A2-4 **Characterisation of current generation in the FloWave facility**
Donald Noble - *FloWave Ocean Energy Research Facility / The University of Edinburgh*, **Thomas Davey** - *FloWave Ocean Energy Research Facility*, **Tom Bruce** -*Institute for Energy Systems, School of Engineering, University of Edinburgh*, **Helen Smith** - *College of Engineering, Mathematics and Physical Sciences, University of Exeter*, **Panagiotis Kaklis** - *Naval Architecture*, **Adam Robinson** - *Institute for Energy Systems, School of Engineering, University of Edinburgh*

Wave : device development & testing 2

Room Boisnoer – 09:00 – 10:20

Chairman: Joao Cruz, **Co-Chairman:** François Rongère

09:00 8A3-1 **Validation of storm load limitation of a novel wave energy converter using scale model testing**
John Christopher Chapman - *Marine Power Systems Ltd.*, **Daniel Perez Torres** - *Marine Institute, Plymouth University*, **Andrea Baldini** -*Marine Institute, Plymouth University*, **Ian Masters** - *Marine Energy Research Group, College of Engineering, Swansea University*, **Graham Foster** - *Marine Power Systems Ltd.*, **Gareth Stockman** - *Marine Power Systems Ltd.*, **Deborah Greaves** - *Marine Institute, Plymouth University*

09:20 8A3-2 **Design Optimization of a new Attenuator Wave Energy Converter**
Rachael Moore - *Queen's University Belfast*, **Cian Murtagh** - *SeaPower Ltd, Ireland*, **Bjoern Elsaesser** -*Queen's University of Belfast*

09:40 8A3-3 **Numerical and experimental investigation of wave energy devices with inflated bags**
John Chaplin - *University of Southampton*, **Francis Farley** - *University of Southampton*, **Deborah Greaves** -*Plymouth University*, **Martyn Hann** - *Plymouth University*, Adi Kurniawan - *Plymouth University*, **Malcolm Cox** - *Griffon Hoverwork Ltd*

10:00 8A3-4 **Numerical and experimental study of a pendulum wave energy converter**
José Antonio Armesto - *Environmental Hydraulics Institute - IH Cantabria, Universidad de Cantabria*, **Raúl Guanche** - *Environmental Hydraulics Institute - IH Cantabria, Universidad de Cantabria*, **Víctor Ayllón** -*Environmental Hydraulics Institute - IH Cantabria, Universidad de Cantabria*, **Carlos Barrera** - *Environmental Hydraulics Institute - IH Cantabria, Universidad de Cantabria*, **Íñigo J Losada** - *Environmental Hydraulics Institute - IH Cantabria, Universidad de Cantabria*, **César Vidal** - *Environmental Hydraulics Institute - IH Cantabria, Universidad de Cantabria, Ignacio Cobo - CT innova*

Tidal : resource characterization 1

Room Grasset – 09:00 – 10:20

Chairman: Andrew Cornett, **Co-Chairman:** Simon Phillip Neill

09:00 8A4-1 **Tidal Resource in Strait between Island and Landmass**
Alberto Pérez Ortiz - *Industrial Doctoral Centre for Offshore Renewable Energy. The King´s Buildings, EH9 3JL, Edinburgh, U.K.*, **Alistair Borthwick** - *Institute for Energy Systems, The University of Edinburgh. The King´s Buildings, EH9 3JL, Edinburgh, U.K.*, **Helen Smith** -*College of Engineering, Mathematics and Physical Sciences, University of Exeter, Penryn Campus, TR10 9FE, Penryn, U.K*, **Paul Vigars** - *Alstom Renewable Power - Ocean Energy. 8 floor, Castlemead, BS1 3AG, Bristol, U.K.*, **Qing Xiao** - *Department of Naval Architecture, Ocean and Marine Engineering, University of Strathclyde, G4 0LZ, Glasgow, U.K.*

09:20 8A4-2 **How Does Channel Constriction Affect the Potential for Tidal Stream Power**
Malcolm Smeaton - *Ocean Physics Group, University of Otago*

09:40 8A4-3 **Shoreline and bathymetry approximation in mesh generation for tidal renewable simulations**
Alexandros Avdis - *Imperial College London*, **Christian Jacobs** - *Imperial College London*, **Jon Hill** -*University of York*, **Gerard Gorman** - *Imperial College London*, **Matthew Piggott** - *Imperial College London*

10:00 8A4-4 **Turbulence and Tidal Turbines**
Tom Blackmore - *University of Southampton*, **Benoît Gaurier**, *Laboratoire Comportement des Structures en Mer, IFREMER*, **Luke Myers**, *University of Southampton*, **Gregory Germain**, *Laboratoire Comportement des Structures en Mer, IFREMER*, **AbuBakr S Bahaj**, *University of Southampton*

Wave: resource characterization 2

Room Claude – 09:00 – 10:20

Chairman: Diego Vicinanza, **Co-Chairman:** Lars Johanning

09:00 8A5-1 **Wave Sensor Observations during a severe Storm event at a Marine Energy Development Site**
Arne Vogler - *Marine Energy Research Group, Lews Castle College, University of the Highlands and Islands Stornoway, Isle of Lewis, HS2 0XR, Scotland,* **Vengatesan Venugopal** - *University of Edinburgh, Institute for Energy Systems, Edinburgh, EH9 3JL, UK,* **Donald Armstrong** -*Marine Energy Research Group, Lews Castle College, University of the Highlands and Islands Stornoway, Isle of Lewis, HS2 0XR, Scotland*

09:20 8A5-2 **A preliminary assessment of the wave characteristics at the Atlantic Marine Energy Test Site (AMETS) using SWAN**
Reduan Atan - *NUI Galway,* **Jamie Goggins** - *Marine Renewable Energy Ireland (MaREI) Research Centre,* **Stephen Nash** - *Ryan Institute for Environmental, Marine and Energy Research*

09:40 8A5-3 **Production and Dissemination of Marine Renewable Energy Resource Information**
Jean Dubranna - *MINES ParisTech, PSL Research University, O.I.E. Centre Observation, Impact, Energy,* **Thierry Ranchin** - *MINES ParisTech, PSL Research University, O.I.E. Centre Observation, Impact, Energy,* **Lionel Ménard** -*MINES ParisTech, PSL Research University, O.I.E. Centre Observation, Impact, Energy,* **Benoit Gschwind** - *MINES ParisTech, PSL Research University, O.I.E. Centre Observation, Impact, Energy*

10:00 8A5-4 **Challenging best knowledge to real conditions on the SEMREV marine test site**
Y Perignon - *ECN,* **Izan Le Crom** - *ECN*

Coffee break and Poster session 2 — 10:20 – 10:40

8P1-1 **Using the natural caves to produce electricity from ocean waves: modelling the air flow trough its superficial cavities using a bidirectional venturi tube**
Wilson Madaleno Monteiro - Department of Science and Technology, University of Cape-Verde, Sarah Christine Tatum *- Cardiff Marine Energy Research Group, Cardiff University,* **Carwyn Frost** - *Cardiff Marine Energy Research Group, Cardiff University,* **Daphne O'Doherty** -*Cardiff Marine Energy Research Group, Cardiff University,* **Allan Mason-Jones** *- Cardiff Marine Energy Research Group, Cardiff University,* **Tim O'Doherty** - *Cardiff Marine Energy Research Group, Cardiff University*

8P1-2 **Evaluating the Thrust Control Capabilities of the DeltaStream Turbine**
Magnus Harrold - *Tidal Energy Ltd., IDCORE,* **Peter Bromley**, *Tidal Energy Ltd.,* **David Clelland**, *University of Strathclyde,* **Aristides Kiprakis**, *University of Edinburgh,* **M. Abusara**, *University of Exeter*

8P1-3 **Techno-economic comparison between air turbines and dielectric elastomer generators as power take off for oscillating water column wave energy converters.**
Boris Teillant - *WavEC - Offshore Renewables,* **Miguel Vicente** - *WavEC - Offshore Renewables,* **Gastone Pietro Rosati Papini** -*PERCRO SEES, TeCIP Institute, Scuola Superiore Sant' Ana,* **Giacomo Moretti** - *PERCRO SEES, TeCIP Institute, Scuola Superiore Sant' Ana,* **Marco Alves** - *WavEC - Offshore Renewables, Rocco - PERCRO SEES, TeCIP Institute, Scuola Superiore Sant' Ana,* **Marco Fontana** - *PERCRO SEES, TeCIP Institute, Scuola Superiore Sant' Ana*

8P1-4 **Environmental interactions in contrasting environments: transferring strategies from high-flow tidal energy developments to low-flow and low-head tidal energy sites.**
Raeanne Miller - *Scottish Association for Marine Science,* **Jim Fawcett** - *Isle of Wight Council*

8P1-5 **CFD modelling of a tidal stream turbine subjected to profiled flow and surface gravity waves**
Sarah Christine Tatum - *Cardiff Marine Energy Research Group, Cardiff University,* **Carwyn Frost** - *Cardiff Marine Energy Research Group, Cardiff University,* **Daphne O'Doherty** -*Cardiff Marine Energy Research Group, Cardiff University,* **Allan Mason-Jones** - *Cardiff Marine Energy Research Group, Cardiff University,* **Tim O'Doherty** - *Cardiff Marine Energy Research Group, Cardiff University*

Wave: hydrodynamic modelling & structural mechanics 4

Amphi Guével – 10:40 – 12:20

Chairman: Deborah Greaves, **Co-Chairman:** Christophe Peyrard

10:40 8B1-1 **Contrasting the hydrodynamics of heaving and surging wave energy converters**
Matt Folley - *QUB,* **Alan Henry** - *Aquamarine Power Ltd,* **Trevor Whittaker** -*QUB*

11:00 8B1-2 **New results on hydrodynamic response of generic point-absorber wave energy converters**
Tim Verbrugghe - *Ghent University,* **Andreas Kortenhaus** - *Ghent University*

11:20 8B1-3 **Wave Induced Motions of Point-Absorbers: an Hierarchical Investigation of Hydrodynamic Models**
Claes Eskilsson - *Department of Shipping and Marine Technology, Chalmers University of Technology,* **Johannes Palm** *- Department of Shipping and Marine Technology, Chalmers University of Technology,* **Allan P. Engsig-Karup** *- DTU Compute, Technical University of Denmark,* **Umberto Bossi** *- DTU Compute, Technical University of Denmark,* **Mario Ricchiuto** *- CARDAMOM Team, INRIA Bordeaux-Sud-Ouest*

11:40 8B1-4 **Power absorption by arrays of wave energy converters over variable bottom topography**
Kostas Belibassakis - *School of Naval Architecture & Marine Engineering, National Technical University of Athens*

12:00 8B1-5 **On the solution of multi-body wave energy converter motions using pseudo-spectral methods**
Francesco Paparella - *Center for Ocean Energy Research (COER), Maynooth University, Co. Kildare, Ireland,* **Giorgio Bacelli** *- National Laboratories, Albuquerque NM, USA,* **Mícheál Ó'Catháin** *-SSE Generation Development, Red Oak South, South County Business Park, Leopardstown, Dublin 18, Ireland,* **John V. Ringwood** *- Center for Ocean Energy Research (COER), Maynooth University, Co. Kildare, Ireland*

Tidal: hydrodynamic modelling & structural mechanics 3

Room Girard – 10:40 – 12:20

Chairman: Richard Willden, **Co-Chairman**: Stuart Walker

10:40 8B2-1 **Design and Optimization of Hydrofoils for Hydrokinetic Turbine Using Multi-Objective Genetic Algorithm**
Jesudasan Rejish *- Energy Research Institute @ Nanyang Technological University,* Narasimalu Srikanth *- Energy Research Institute @ Nanyang Technological University*

11:00 8B2-2 **Correcting for mesh size dependency in a regional model's representation of tidal turbines**
Simon Waldman - *Heriot-Watt University,* **Guillaume Genet** *- Institut National des Science Appliquées Strasbourg, France,* **Susana Bastón** *- ICIT, Heriot-Watt University, Orkney, UK,* **Jonathan Side** *- ICIT, Heriot-Watt University, Orkney, UK*

11:20 8B2-3 **The impact of Tidal Stream Turbines on 3D flow and bed shear stress measured with Particle Image Velocimetry in a laboratory flume**
Laura-Beth Jordan - *Department of Geography, Environment and Earth Sciences, University of Hull, UK,* **Lada Vybulkova** *- Department of Mechanical and Aerospace Engineering, University of Strathclyde, UK,* **Steve Simmons** *-Department of Geography, Environment and Earth Sciences, University of Hull, UK,* **Stuart McLelland** *- Department of Geography, Environment and Earth Sciences, University of Hull, UK,* **Brendan Murphy** *- Department of Geography, Environment and Earth Sciences, University of Hull, UK,* **Daniel Parsons** *- Department of Geography, Environment and Earth Sciences, University of Hull, UK*

11:40 8B2-4 **Array performance in an oscillatory tidal channel with turbine power capping**
Christopher Vogel - *University of Oxford,* **Richard Willden** *- University of Oxford,* **Guy Houlsby** *- University of Oxford*

12:00 8B2-5 **Evaluation of RANS BEM and self-similar wake superposition for tidal stream turbine arrays**
Alexander Olczak *- University of Manchester,* **David Sudall** *- University of Manchester,* Tim Stallard *-University of Manchester,* **Peter K Stansby** *- University of Manchester*

Wave : device development & testing 3

Room Boisnoer – 10:40 – 12:20

Chairman: Peter Frigaard, **Co-Chairman:** Diego Vicinanza

10:40 8B3-1 **Cable robots for experimental investigations of wave energy converters**
Benjamin Friedhoff - *Development Centre of Ship Technology and Transport Systems,* **Jan Peckolt** *- NEMOS GmbH,* **Jan Pütz** *-NEMOS GmbH,* **Christian Sturm** *- NEMOS GmbH*

11:00 8B3-2 **A comparative study of the wave energy collected at Saint Jean de Luz (France) by an overtopping converter and a flap activated converter**
Mathieu Mory - *Université de Pau et des Pays de l'Adour,* **Jérémy Dugor** *- Casagec Ingénierie,* **Virginie Baudry** *-LHEEA - UMR CNRS 6598 Ecole Centrale de Nantes,* **Aurélien Barbarit** *- LHEEA - UMR CNRS 6598 Ecole Centrale de Nantes,* **Alain Clément** *- LHEEA - UMR CNRS 6598 Ecole Centrale de Nantes*

11:20 8B3-3 **Drag minimisation for high capture width with three float wave energy converter M4**
Peter Kenneth Stansby - *School of Mechanical, Aerospace and Civil Engineering University of Manchester Manchester M13 9PL,* **Hanbin Gu** *- School of Mechanical, Aerospace and Civil Engineering, University of Manchester,* **Efrain Carpintero Moreno** *-School of Mechanical, Aerospace and Civil Engineering, University of Manchester,* **Tim Stallard** *- School of Mechanical, Aerospace and Civil Engineering, University of Manchester*

11:40 8B3-4 **Experimental investigation of rubble mound breakwaters for wave energy conversion**
Claudio Luppa - *University of Catania*, **Diego Vicinanza** - *University of Catania*

12:00 8B3-5 **Study of a 6 DOF wave energy converter interacting with regular and irregular waves using 3D CFD**
Manuel Gerardo Verduzco-Zapata - *Universidad de Colima Facultad de Ciencias Marinas*,
Francisco J. Ocampo-Torres, *Centro de Investigación Científica y de Educación Superior de Ensenada*

Tidal : resource characterization 2

Room Grasset - 10:40 - 12:20

Chairman: Luke Blunden, **Co-Chairman:** Matt Lewis

10:40 8B4-1 **Observations of flow characteristics at potential tidal stream energy sites**
Matt Lewis - *Bangor University*, **Simon Neill** - *Bangor University*, **Peter Robins** -*Bangor University*, **Sophie Ward** - *Bangor University*, **Marco Piano** - *Bangor University*, *Reza Hashemi - Bangor University*, **Alice Goward-Brown** - *Bangor University*

11:00 8B4-2 **Wake Characteristics of a Natural Submerged Pinnacle and Implications for Tidal Stream Turbine Installations**
Paul Stephen Evans - *Cardiff University*, **Eli Lazarus**, *Cardiff University*, **Mason-Jones**, *Cardiff University*, **Daphne O'Doherty**, *Cardiff University*, **Tim O'Doherty**, *Cardiff University*

11:20 8B4-3 **Turbulence in Marine Environments**
Thomas Henry Clark - *Ocean Array Systems Ltd.*

11:40 8B4-4 **An Assessment of the Turbulence at a Tidal Energy Site using a VMP and an ADCP**
Justine McMillan - *Dalhousie University*, **Alex Hay** - *Dalhousie University*, **Rolf Lueck** -*Rockland Scientific Inc.*, **Fabian Wolk** - *Rockland Scientific Inc.*

12:00 8B4-5 **Correlation between synchronised power and flow measurements, a way to characterize turbulence effects on marine current turbine.**
Olmo Duran Medina- *Laboratory of Oceanology and Geosciences CNRS Research Unit (UMR) LOG 8187*

Station keeping (incl. floating foundations), materials, fatigue and structural loading 1

Room Claude - 10:40 - 12:20

Chairman: Lars Bergdahl, **Co-Chairman**: Majid A Bhinder

10:40 8B5-1 **Effects of Tidal Range on Mooring Systems of Wave Energy Converters**
Stephen Murphy - *Hydraulic and Maritime Research Centre, University College Cork, Youngline Industrial Estate*, **Majid Bhinder** - *Hydraulic and Maritime Research Centre, University College Cork, Youngline Industrial Estate*, **Pierre Casaubieilh** - *Hydraulic and Maritime Research Centre, University College Cork, Youngline Industrial Estate*, Wanan Sheng - *Hydraulic and Maritime Research Centre, University College Cork, Youngline Industrial Estate*

11:00 8B5-2 **Experimental Investigation of Mooring Configurations for Wave Energy Converters**
Guilherme Moura Paredes - *Faculdade de Engenharia, Universidade do Porto*, **Johannes Palm** - *Department of Shipping and Marine Technology,Chalmers University of Technology*, **Claes Eskilsson** -*Department of Shipping and Marine Technology, Chalmers University of Technology*, **Lars Bergdahl** - *Department of Shipping and Marine Technology, Chalmers University of Technology*, **Francisco Taveira-Pinto** - *Faculdade de Engenharia, Universidade do Porto*

11:20 8B5-3 **Performance comparison of Marine Renewable Energy Converter mooring lines subjected to real sea and accelerated loads**
Alvaro Rodriguez Ruiz - *CTC*, **Sam Weller** - *University of Exeter*, **Jose Canedo** -*Lankhorst Euronete Portugal*, **Raul Rodriguez** - *CTC*, **Verónica Gonzalez de Lena** - *CTC*, **Philipp Thies** - *University of Exeter*, **David Parish** - *University of Exeter*, *Lars* **Johanning** -*University of Exeter*, **Alberto Leão** - *Lankhorst Euronete Portugal*

11:40 8B5-4 **Comparison of a Traditional Catenary and Compliant Taut Mooring System for Marine Energy Systems**
Bret Bosma - *Oregon State University*, **Wanan Sheng** - *HMRC - University College Cork*, **Florent Thiebaut** -*HMRC - University College Cork*

12:00 8B5-5 **Preliminary Assessment of Available Tools for Wave Energy Converter Mooring Design**
Jonas Bjerg Thomsen - *Aalborg University*, **Francesco Ferri** - *Aalborg University* **Jens Peter Kofoed** - *Aalborg University*

Lunch break and Presentation by the Canadian Embassy 12:20 – 14:00

M. Paul Laberge, Senior Counsel, Special Projects, Emera Inc.
and **M. Bruce Cameron:** «Establishing Marine Renewable Energy Legislation in Nova Scotia»

Wave: hydrodynamic modelling & structural mechanics 5

Amphi Guével – 14:00 – 15:20

Chairman: Gerard Delhommeau, **Co-Chairman:** Pasquale Filianoti

14:00 8C1-1 **Theoretical and numerical aspects of the open source BEM solver NEMOH**
A Babarit - *Ecole Centrale de Nantes*, **Gérard Delhommeau** - *Ecole Centrale de Nantes*

14:20 8C1-2 **Introducing Second Order Wave Loads in the Open-Source Boundary Element Methods Code Nemoh**
Maxime Philippe - *INNOSEA*, **Adrien Combourieu** - *INNOSEA*, **Christophe Peyrard** -*Saint-Venant Hydraulics Laboratory - EDF R&D*, **Fabien Robaux** - *Saint-Venant Hydraulics Laboratory - EDF R&D and INNOSEA*, **Gérard Delhommeau** - *LHEEA Lab. Ecole Centrale de Nantes - CNRS*, **Aurélien Babarit** - *LHEEA Lab. Ecole Centrale de Nantes - CNRS,*

14:40 8C1-3 **A Review of Non-Linear Approaches for Wave Energy Converter Modelling**
Markel Peñalba Retes - *Center for Ocean Energy Research (COER) NUI Maynooth*, **John Ringwood** - *Center for Ocean Energy Research (COER) NUI Maynooth*

15:00 8C1-4 **The Benefits of Nonlinear Froude-Krylov Force Modelling for Two Heaving Point Absorbers**
Markel Peñalba Retes - *Center for Ocean Energy Research (COER) NUI Maynooth*, Alexis Merigaud - *Center for Ocean Energy Research (COER) NUI Maynooth*, **John Ringwood** -*Center for Ocean Energy Research (COER) NUI Maynooth*, **Jean-Christophe Gilloteaux** - *Laboratoire de recherche en Hydrodynamique, Energétique et Environnement Atmosphérique Ecole Centrale de Nantes*

Tidal: hydrodynamic modelling & structural mechanics 4

Room Girard – 14:00 – 15:20

Chairman: Matthias Arnold, Co-Chairman: Richard Willden

14:00 8C2-1 **Effects of Blade Deflections on the Horizontal Axis Tidal Turbine Performance**
Kanghee Lee - *Inha University*, **Chulhee Jo** - *Inha University*, **Doyoub Kim** -*Inha University*, **Sujin Hwang** - *Inha University*

14:20 8C2-2 **Fault prognosis and diagnosis of blade misalignment in tidal stream turbines using unsteady BEMT**
Michael Togneri - *Swansea University*, **Ian Masters** - *Swansea University*, **Matthew Allmark** -*Cardiff University*, **Faris Elasha** - *Cranfield University*

14:40 8C2-3 **Structural and Hydrodynamic Modelling of Composite Tidal Turbine Blades**
Edward Fagan - *National University of Ireland, Galway*

15:00 8C2-4 **Tidal Turbine Foundation Load Limiting Controller**
Simon Harper - *AlstomPower*, **Greg Pittam** - *Alstom Ocean Energy*, **James Harrison** -*Alstom Ocean Energy*

Environmental impact and appraisal 2

Room Boisnoer – 14:00 – 15:20

Chairman: Thomas Lake, **Co-Chairman:** Iain Alastair Fairley
Session sponsored by ANNEX IV – OES (Ocean Energy Systems)

14:00 8C3-1 **Sediment transport in the Pentland Firth and impacts of tidal stream energy extraction**
Iain Alastair Fairley - *College of Engineering, Swansea University*, **Harshinie Karunarathna** - *College of Engineering, Swansea University*, **Ian Masters** -*College of Engineering, Swansea University*

14:20 8C3-2 **Impact of scaled tidal stream turbine over mobile sediment beds**
Rafael Ramirez-Mendoza - *National Oceanography Centre*, **Laurent Amoury** - *National Oceanography Centre*, **Peter Thorne** -*National Oceanography Centre*, **Richard Cooke** - *National Oceanography Centre*, **Steve Simmons** - *University of Hull*, **Stuart McLelland** - , **Murphy Brendan** - *University of Hull*, **Daniel Parsons** -*University of Hull*

14:40 8C3-3 **Marine Renewable Energy Sediment Stability Evaluation Framework**
Jesse Roberts - *Water Power Program Sandia National Laboratories,* **Craig Jones** - *Integral Consulting*

15:00 8C3-4 **Remote detection of sea surface roughness signatures related to subsurface bathymetry, structures and tidal stream turbine wakes**
Paul Bell - *National Oceanography Centre, UK*

Wave: resource characterization 3

Room Grasset – 14:00 – 15:20

Chairman: Christophe Maisondieu, **Co-Chairman:** Philip Balitsky

14:00 8C4-1 **Wave-current interaction in the Pentland Firth and Orkney Waters**
Ruairi MacIver - *Lews Castle College, University of the Highlands and Islands Stornoway, Isle of Lewis, HS2 0HL, Scotland.,* **David Christie**, *University of the Highlands and Islands,* **Philippe Gleizon** - *Environmental Research Institute, North Highland College, University of the Highlands and Island,Thurso, KW14 7EE, Scotland*

14:20 8C4-2 **Impact of Temporal Variation of Wind Input on Wave Parameters Prediction Using Numerical Wave Model**
Vengatesan Venugopal - *Senior Lecturer, Institute for Energy Systems, School of Engineering, The University of Edinburgh*

14:40 8C4-3 **High-Order Spectral method for nonlinear wave propagation over variable bathymetry**
Maïté Gouin - *IRT Jules Verne & LHEEA Lab Ecole Centrale Nantes,* **Guillaume Ducrozet** - *LHEEA Lab Ecole Centrale Nantes,* **Pierre Ferrant** -*LHEEA Lab Ecole Centrale Nantes*

15:00 8C4-4 **The influence of tidal flows on wave modelling: A wave energy sensitivity analysis**
Ian Ashton - *University of Exeter,* **Antoine Morvan** - *ENSTA, Bretagne,* **Pierre Cazenave** -*Plymouth Marine Laboratory,* **Lars Johanning** - *University of Exeter,* **Jon Hardwick** - *University of Exeter*

Station keeping (incl. floating foundations), materials, fatigue and structural loading 2

Room Claude – 14:00 – 15:20

Chairman: Sergio Camporeale, **Co-Chairman:** Bret Bosma

14:00 8C5-1 **Wet Flexural Fatigue Behaviour of Tidal Turbine Blade Composite Materials**
Hassan Izadi Gonabadi - *Newcastle University*

14:20 8C5-2 **Flexural characteristics of tidal turbine blade made of composite materials**
Hassan Izadi Gonabadi - *Newcastle University*

14:40 8C5-3 **Tribological Challenges of Scaling Up Tidal Turbine Blades**
Shayan Sharifi - *Tribology Group, University of Strathclyde,* **Margaret Mary Stack** - *Professor at the Mechanical & Aerospace Engineering Department The Tribology Group Leader University of Strathclyde,* **Cameron Johnstone** -*Senior Lecturer at the Mechanical & Aerospace Engineering Department University of Strathclyde*

15:00 8C5-4 **Tidal turbine Gearboxes life Prediction**
Faris Elasha - *Cranfield University*

Coffee break and Poster Session 3 — 15:20 – 15:40

8P2-1 **Bend and Twist Effect for Large-Scale Vertical Axis Turbine**
Wen Di Liu - *University of Strathclyde*

8P2-2 **Proposed methodology for assessing cost synergies between wave energy and other sea uses**
Lucia Margheritini - *Aalborg University,* **Jan Erik Hanssen** - *1-Tech,* **Keith O'Sullivan** -*Hydraulics And Maritime Research Centre, University College Cork,* **Pedro Mayorga** - *Enerocena*

8P2-3 **Tidal Effect Compensation System Design for High Range Sea Level Variations**
Mohd Nasir Ayob - *Swedish Centre for Renewable Electric Energy Conversion Division for Electricity, Uppsala University, Sweden,* **Valeria Castellucci** *- Swedish Centre for Renewable Electric Energy Conversion Division for Electricity, Uppsala University, Sweden,* **Matteo Terzi** *- Swedish Centre for Renewable Electric Energy Conversion Division for Electricity, Uppsala University, Sweden,* **Rafael Waters** *- Swedish Centre for Renewable Electric Energy Conversion Division for Electricity, Uppsala University, Sweden*

8P2-4 **Analysis of WEC Array Economics: Current State-of-the-Art and Future Needs**
Chris Sharp *- Northwest National Marine Renewable Energy Center - Oregon State University,*
Bryony DuPont *- Northwest National Marine Renewable Energy Center - Oregon State University*

8P2-5

Wave : device development & testing 4

Amphi Guével - 15:40 - 17:20

Chairman: Aurelien Babarit, **Co-Chairman:** Jan Peckolt

15:40 8D1-1 **The Value of Full Scale Prototype Data - Testing Oyster 800 at EMEC, Orkney.**
Louise Marie O'Boyle *- Aquamarine Power Ltd.,* **Jos van 't Hoff** *- Aquamarine Power Ltd.,* **Kenneth Doherty** *-Aquamarine Power Ltd*

16:00 8D1-2 **Status Update Lysekil Research Project, Sweden**
Arvind Parwal *- Angstrom Lab, Uppsala University, Sweden,* **Flore Remouit**, *Division of Electricity, Angstrom Lab, Uppsala University,* **Yue Hong** *- Division of Electricity, Angstrom Lab, Uppsala University,* **Francisco Francisco** *- Division of Electricity, Angstrom Lab, Uppsala University,* **Valeria Castellucci** *- Division of Electricity, Angstrom Lab, Uppsala University,* **Ling Hai** *- Division of Electricity, Angstrom Lab, Uppsala University***Liselotte Ulvgård** *- Division of Electricity, Angstrom Lab, Uppsala University,* **Wei Li** *- Division of Electricity, Angstrom Lab, Uppsala University,* **Erik Lejerskog** *- Division of Electricity, Angstrom Lab, Uppsala University,* **Antoine Baudoin** *- Division of Electricity, Angstrom Lab, Uppsala University,* **Md. Nasir Ayob** *- Division of Electricity, Angstrom Lab, Uppsala University,* **Maria Angeliki Chatzigiannakou** *- Division of Electricity, Angstrom Lab Uppsala University,* **Kalle Hainkonen** *- Division of Electricity, Angstrom Lab, Uppsala University,* **Rickard Ekstrom** *- Division of Electricity, Angstrom Lab, Uppsala University & ABB, Sweden,* **Cecilia Bostrom** *- Division of Electricity, Angstrom Lab, Uppsala University,* **Malin Goteman** *- Division of Electricity, Angstrom Lab, Uppsala University,* **Rafael Waters** *- Division of Electricity, Angstrom Lab, Uppsala University,* **Olle Svensson** *- Division of Electricity, Angstrom Lab, Uppsala University,* **Jan Sundberg** *- Division of Electricity, Angstrom Lab, Uppsala University,* **Magnus Rahm** *- Division of Electricity, Angstrom Lab, Uppsala University,* **Jens Engstrom** *- Division of Electricity, Angstrom Lab, Uppsala University,* **Andrej Savin** *- Division of Electricity, Angstrom Lab, Uppsala University,* **Mats Leijon** *- Division of Electricity, Angstrom Lab, Uppsala University and Seabsed AB*

16:20 8D1-3 **Wave Energy Converter System Safety Analysis**
Uzoma Okoro *- Cranfield University*

16:40 8D1-4 **Lessons Learned from Building and Operating a Grid Connected Wave Energy Plant**
Jonathan Fievez *- Carnegie Wave Energy,* **Tim Sawyer** *- Carnegie Wave Energy*

17:00 8D1-5 **Monitoring of the U-OWC under construction in Civitavecchia (Rome, Italy)**
Felice Arena *- Mediterranea University,* **Vincenzo Fiamma** *- Mediterranea University,* **Valentina Laface** *- Mediterranea University,* **Giovanni Malara** *- Mediterranea University,* Alessandra Romolo *- Mediterranea University,* **Federica Strati** *- Mediterranea University*

Tidal : device development & testing 4

Room Girard - 15:40 - 17:20

Chairman: Conchur Obradaigh, **Co-Chairman:** Matthew James Allmark

15:40 8D2-1 **Experimental Testing of Bi-Directional Tidal Turbine Rotors**
Irene Penesis *- National Centre for Maritime Engineering and Hydrodynamics, Australian Maritime College, University of Tasmania,* **Charles Cropp** *- National Centre for Maritime Engineering and Hydrodynamics, Australian Maritime College, University of Tasmania,* Jessica Walker *-National Centre for Maritime Engineering and Hydrodynamics, Australian Maritime College, University of Tasmania,* **Pengfei Liu** *- National Research Council Canada,* **Rowan Frost** *- National Centre for Maritime Engineering and Hydrodynamics, Australian Maritime College, University of Tasmania,*

16:00 8D2-2 **The effect of wave-current interaction on the near-wake of horizontal axis tidal stream turbines**
Tiago de Jesus Henriques *- University of Liverpool*

16:20 8D2-3 **CFD Simulations of the Triton Tidal Energy Platform to analyse the surrounding flow pattern**
Ian Pugh Jones - *ANSYS UK*, **Andrew Wells** - *ANSYS UK*, **Ralf Starzmann** – *Schottel*, **Sarah Bischoff** – *Schottel*

16:40 8D2-4 **Consequences of Preset Pitch Angle and Solidity for Cross Flow Turbines**
Benjamin Strom - *University of Washington*, **Brian Polagye** - *University of Washington*

17:00 8D2-5 **Critical Analysis of the Effectiveness of Blade Pitching for Vertical Axis Water Turbine**
Gorle Jagan Mohan Rao - *CNRS-ISAE-ENSMA*, **Ludovic Chatellier** - *Department of Fluids Thermal and Combustion, Institute PPRIME, CNRS, ISAE-ENSMA*, **Frederic Pons** - *Department of Fluids Thermal and Combustion, Institute PPRIME, CNRS, ISAE-ENSMA*, **Malick Ba** - *Department of Fluids Thermal and Combustion, Institute PPRIME, CNRS, ISAE-ENSMA*

Environmental impact and appraisal 3

Room Boisnoer – 15:40 – 17:20

Chairman: Jan Sundberg, **Co-Chairman:** Tim Sawyer
Session sponsored by ANNEX IV – OES (Ocean Energy Systems)

15:40 8D3-1 **Combining offshore wind and wave energy extraction: an environmental perspective**
Bob Rumes - *Royal Belgian Institute of Natural Sciences Management Unit of the North Sea Mathematical Models (MUMM)*

16:00 8D3-2 **Hybrid wave and offshore wind farms: a comparative case study of co-located layouts.**
Sharay Astariz - *University of Santiago de Compostela*, **Carlos Perez-Collazo** - *Plymouth University*, **Javier Abanades** -*Plymouth University*, **Gregorio Iglesias** - *Plymouth University*

16:20 8D3-3 **Synergies between wave energy and coastal protection**
Javier Abanades - *Plymouth University*, **Deborah Greaves** - *Plymouth University*, **Gregorio Iglesias** -*Plymouth University*

16:40 8D3-4 **Wave Energy Converter Effects on Nearshore Wave Propagation**
Jesse Roberts - *Sandia National Laboratories*, **Grace Chang** - *Integral Consulting*, **Craig Jones** -*Integral Consulting*

17:00 8D3-5 **Environmental Management and Monitoring of Carnegie Wave Energy's Perth Wave Energy Project**
Edwina HR Davies Ward - *Carnegie Wave Energy Ltd*, **Tim Sawyer** - *Carnegie Wave Energy Ltd*

Tidal : resource characterization 3

Room Grasset – 15:40 – 17:20

Chairman: Helen Smith, **Co-Chairman:** Thomas Roc

15:40 8D4-1 **Energy extraction potential from the Alderney Race**
Daniel Stephen Coles - *University of Southampton*, **Luke Stephen Blunden** - *University of Southampton*, **AbuBakr Bahaj** -*University of Southampton*

16:00 8D4-2 **Inter-Comparison of 3D Tidal Flow Models Applied To Orkney Islands and Pentland Firth for Resource Assessment**
Anas Abdul Rahman - *University of Edinburgh*, **Vengatesan Venugopal** - *University of Edinburgh*

16:20 8D4-3 **Variability of the tidal-stream energy resource of the northwest European seas**
Peter Edward Robins - *Bangor University*, **Matt James Lewis** - *Bangor University*, **Simon Phillip Neill** -*Bangor University*

16:40 8D4-4 **Cumulative Impact Assessment of Tidal Energy in the Irish Sea**
David Haverson - *Industrial Doctoral Centre for Offshore Renewable Energy*, **John Bacon** - *Centre for Environment, Fisheries and Aquaculture Science*, **Helen Smith** -*University of Exeter*, **Vengatesan Venugopal** - *University of Edinburgh*, **Qing Xiao** - *University of Strathclyde*

17:00 8D4-5 **Tidal Gardens may supply 1 500 TWh/year with favourable impacts**
Francois Lemperière – *Hydrocoop*, **Jean-Pierre Vigny** – *Hydrocoop*

Economical, social, legal & political aspects 1

Room Claude – 15:40 – 17:20

Chairman: Antonio Sarmento, **Co-chairman:** Lucia Margheritini

15:40 8D5-1 **Structured Innovation of high performance Wave Energy Converter Technology**
Jochem W Weber - *National Renewable Energy Laboratory*

16:00 8D5-2 **Economic and reliability assessment of a combined Marine Renewable Energy platform**
Fiona Devoy McAuliffe - *University College Cork,* **Laura-Mae Macadré** - *BUREAU VERITAS,* **Martin Heyman Donovan** -*DONG Energy,* **Jimmy Murphy** - *University College Cork,* **Katie Lynch** - *University College Cork*

16:20 8D5-3 **Integrated assessment methodologies between private investment and public in Ocean Renewable Energy**
Gordon Dalton - *Beaufort HMRC ERI, Cork, Ireland,* **Grant Allan** - *Department of Economics, University of Strathclyde,* **Nicola Beaumont** - *Plymouth Marine Laboratory,* **Aliki Georgakaki** - *Low Carbon Research Institute, Welsh School of Architecture, Cardiff University,* **Nick Hacking**, *Welsh School of Architecture (WSA), Cardiff University,* **Tara Hooper,** *Plymouth Marine Laboratory,* **Sandy Kerr**, *Herriot Watt, ICIT, Orkney,* **Anne Marie O'Hagan** - *MaREI, ERI, University College Cork,* **Kieran Reilly**, *MaREI, ERI, University College Cork,* **Pierpaolo Ricci** - *Tecnalia Research and Innovation, Parque Tecnológico de Bizkaia,* **Wanan Sheng**, *MaREI, ERI, University College Cork,* **Tim Stallard** - *University of Manchester*

16:40 8D5-4 **Sea Area Use Issues and Management Strategies of China Marine Energy Development Projects**
Li Feng - *National Ocean Technology Center,* **Wei Xu** - *National Ocean Technology Center*

17:00 8D5-5 **Addressing the Uncertainties in Application of Hydrodynamic Loads for Industrial Tidal Stream Technology Support Structure Design**
Keith O' Sullivan -*Black & Veatch Ltd.,* **Claire Cohen** -*Black & Veatch Ltd.,* **Andrew Jones** - *Black & Veatch Ltd.,* **Tim Baker** - *Black & Veatch Ltd.*

ANNEX IV - OES (Ocean Energy Systems)
Workshop: Environmental Effects of Marine Energy Development: the State of the Science

Amphi Guével – 17:30 – 19:00

Purpose of the Workshop:

- Brief the marine energy community on the 2016 Annex IV State of the Sci
- Seek feedback from the community on topics of importance to the Annex IV initiative.
- Provide methods for formal feedback on the Annex IV State of Science Report.

17:30 **Welcome, introductions, purpose of meeting**
Jocelyn Brown - *Saracino, US Department of Energy, US*
Luke Hanna, *Pacific Northwest National Laboratory, US*

17:40 **Background of Annex IV and SoS report. Overall interactions and risk**
Andrea Copping, *Pacific Northwest National Laboratory*

17:55 **Collision and Marine Mammals**
Carol Sparling, *Sea Mammal Research Unit, UK*

18:05 **Collision and Fish**
Gayle Zydlewski, *Universityof Maine, US*

18:15 **Electromagnetic Fields**
Samantha Eaves, *US Department of Energy, US*

18:20 **Marine Spatial Planning**
Anne Marie O'Hagan, University College Cork, Ireland

18:25 **Case Studies on Consenting Wave and Tidal Devices**
Teresa Simas, WaveEc, Portugal

18:30 **Wrap up**
Andrea Copping, Pacific Northwest National Laboratory

18:35 **Audience feedback**

Wednesday 9 September

Wave: hydrodynamic modelling & structural mechanics 6

Amphi Guével – 09:00 – 10:20

Chairman: Maxime Philippe, **Co-Chairman:** Scott Beatty

09:00 9A1-1 **A spectral method for detailed extreme wave analysis.**
Raphael Dubois - *Open Ocean SAS*

09:20 9A1-2 **Numerical Prediction of Extreme Loads on the CETO Wave Energy Converter**
Jonathan Fievez - *Carnegie Wave Energy*, **Ashkan Rafiee** - *Carnegie Wave Energy*

09:40 9A1-3 **Extreme Loading on an Oscillating Wave Surge Converter**
Paul Lamont-Kane - *Queen's University Belfast*, **Alan Henry** - *Aquamarine Power Ltd.*, **Jonathan Nicholson** -*Aquamarine Power Ltd.*, **Alan McKinley** - *Queen's University Belfast*, **Pal Schmitt** - *Queen's University Belfast*, **Matt Folley** - *Queen's University Belfast*, **Bjoern Elsaesser** - *Queen's University Belfast*

10:00 9A1-4 **Random CFD experiments on Seawave Slot-Cone Generator**
Diego Vicinanza - *Second University of Naples (SUN) Department of Civil Engineering, Design, Building and Environment (DICDEA)*, **Fabio Dentale** - *Department of Civil Engineering, University of Salerno*, **Mariano Buccino** -*Department of Civil, Architectural and Environmental Engineering, University of Naples Federico II*, **Daniela Salerno** - *Department of Civil Engineering, University of Salerno*

Tidal : device development & testing 5

Room Girard – 09:00 – 10:20

Chairman: Gregory Germain, **Co-Chairman:** Ludovic Chatellier

09:00 9A2-1 **Measuring and modelling the power curve of a Commercial-Scale tidal turbine**
James McNaughton - *Alstom Ocean Energy*, **Simon Harper** - *Alstom Ocean Energy*, **Rognvald Sinclair** -*Alstom Ocean Energy*, **Brian Sellar** - *The University of Edinburgh*

09:20 9A2-2 **Field testing a full-scale tidal turbine Part 1: Power Performance Assessment**
Ralf Starzmann - *SCHOTTEL HYDRO GmbH*, **Penny Jeffcoate** - *Queen's University Belfast*, **Stefan Scholl** - *SCHOTTEL Hydro*, **Sarah Bischoff**

09:40 9A2-3 **Studying the Wake of a Marine Current Turbine Using an Acoustic Doppler Current Profiler**
Staffan Lundin - *Division of Electricity, Uppsala University*, **Nicole Carpman** - *Division of Electricity, Uppsala University*, **Karin Thomas** -*Division of Electricity, Uppsala University*, **Mats Leijon** - *Division of Electricity, Uppsala University*

10:00 9A2-4 **From lab to field: deployment of a scale turbine in a tidal estuary**
Khilan Shah - *University of Southampton*, **Tom Blackmore** - *University of Southampton*, **Luke Blunden** -*Universtity of Southampton*, **Luke Myers** - *University of Southampton*, **AbuBakr Bahaj** - *University of Southampton*

Grid integration, PTO and control 4

Room Boisnoer – 09:00 – 10:20

Chairman: Anne Blavette, **Co-Chairman:** Felice Arena

09:00 9A3-1 **Island Power Management using a Marine Current Turbine Farm and an Ocean Compressed Air Energy Storage System**
Mohamed Benbouzid - *University of Brest, EA 4325 LBMS*, **Lei Sheng** - *Huazhong University of Science and Technology, State Key Laboratory of Coal Combustion, Wuhan*, **Zhibin Zhou** -*University of Brest, EA 4325 LBMS*, **Jean Frédéric Charpentier** - *French Naval Academy, EA 3634 IRENav*, **Xiaowei Liu** - *Huazhong University of Science and Technology, State Key Laboratory of Coal Combustion, Wuhan*

09:20 9A3-2 **Optimising Network Design Options for Marine Energy Converter Farms**
Adam Collin - *The University of Edinburgh*, **Sotirios Karatzounis** - *The University of Edinburgh*, **Anup Nambiar** -*The University of Edinburgh*, **Aristides Kiprakis** - *The University of Edinburgh*, **Judy Rea** - *University College Cork*, **Ben Whitby** - *IT Power*

09:40 9A3-3 **Stochastic models of WEC array power for grid integration**
Helen Bailey - *West Coast Wave Initiative at University of Victoria*, **Bryson Robertson** - *West Coast Wave Initiative at University of Victoria*, **Juan Ortiz** -*West Coast Wave Initiative at University of Victoria*, **Bradley Buckham** - *West Coast Wave Initiative at University of Victoria*

10:00 9A3-4 **Optimal Power Aggregation Methods for Marine Renewable Energy Converters; a Combined Economic and Reliability Approach**
Laura-Mae Macadré - *Bureau Veritas*, **Fiona Devoy McAuliffe** - *University College Cork*, **Ozan Keysan** -*Middle East Technical University, Martin* **Heyman Donovan** - *DONG Energy*, **Sara Armstrong** - *University College Cork*, **Jimmy Murphy** - *University College Cork*, **Katie Lynch** - *University College Cork*

Environmental impact and appraisal 4

Room Grasset – 09:00 – 10:20

Chairman: Andrea Copping, **Co-Chairman:** Jesse Roberts
Session sponsored by ANNEX IV – OES (Ocean Energy Systems)

09:00 9A4-1 **Hydrodynamic Response to Large Scale Tidal Energy Extraction**
Alice Goward Brown - *Bangor University*, **Simon Neill** - *Bangor University*

09:20 9A4-2 **Field testing a full-scale tidal turbine Part 2: In-line Wake Effects**
Pal Schmitt - *Queen's University Belfast*, **Bjoern Elsaesser**, *Queens University Belfast,Marine Laboratory*, **Sarah Bischof** - *SCHOTTEL HYDRO Spay, Rheine, Germany*, **Ralf Starzmann** - *SCHOTTEL HYDRO Spay, Rheine, Germany,*

09:40 9A4-3 **Simulating Habitat Use in a 3D Tidal Environment**
Thomas Lake - *Marine Energy Research Group, College of Engineering, Swansea University*, **Ian Masters** - *Marine Energy Research Group, College of Engineering, Swansea University*, **T. Nick Croft** -*Marine Energy Research Group, College of Engineering, Swansea University*

10:00 9A4-4 **Changes in Vertical Fish Distributions Near a Hydrokinetic Device in Cobscook Bay, Maine, USA**
Garrett Staines - *University of Maine School of Marine Sciences*, **Gayle Zydlewski** - *University of Maine School of Marine Sciences*, **Haley Viehman** -*University of Maine School of Marine Sciences*, **Haixue Shen** - *University of Maine School of Marine Sciences*, **James McCleave** - *University of Maine School of Marine Sciences*

Tidal : resource characterization 4

Room Claude – 09:00 – 10:20

Chairman: Matt Lewis, **Co-Chairman:** Stephen C. Kramer

09:00 9A5-1 **Appraisal of IEC Technical Specification for Tidal Energy Resource Assessment at Minas Passage, Bay of Fundy, Canada**
Andrew Cornett - *National Research Council Canada & University of Ottawa*, Mathieu Toupin - *University of Ottawa*, **Ioan Nistor** -*University of Ottawa*

09:20 9A5-2 **Study of the effects of a moving depression on 3D currents around the Orkney Islands**
Andrew Good - *OpenHydro Technology Ltd.*, **Marcel Curé** - *The Numerics Warehouse Ltd.*, **Kevin Harnett** -*OpenHydro Technology Ltd.*, Roxana Tiron - *OpenHydro Technology Ltd*

09:40 9A5-3 **Characterisation of the Agulhas Current as a Resource for Marine Energy Extraction**
Imke Meyer - *Centre for Renewable and Sustainable Energy Studies, Stellenbosch University*, **Johannes L. Van Niekerk** - *Centre for Renewable and Sustainable Energy Studies, Stellenbosch University*

10:00 9A5-4 **Mapping tidal energy resources by High Frequency Radar: Application to resource characterization around the Ushant Island (W. Brittany coast)**
Alexei Sentchev - *Université du Littoral*, **Maxime Thiébault,** *Laboratoire d'Océanologie et de Géosciences, Université du Littoral*, **Maxime Thiébault**, *Laboratoire d'Océanologie et de Géosciences, Université du Littoral*

Coffee break and Poster Session 4 — 10:20 – 10:40

9P1-1 **Design and model testing of a ducted tidal current device**
Chul Hee Jo, *Inha University*, **Kang Hee Lee**, *Inha University*, **Chan Hoe Goo**, *Inha University*, **Su Jin Hwang** - *Inha university*,

9P1-2 **Design challenges arising from the nature of cost-incurring and revenue-earning loads**
Alexandra A E Price - *Non-affliliated*

9P1-3 **The deployment of the Sea Station platform at the SmartBay Ireland test site**
Kevin James Leyne - *Beaufort Research UCC Pouladuff Road Cork*, **Mark Wemyss** - *SmartBay Ireland Ltd Parkmore Business Park Galway*

9P1-4 **Marine Renewable Energy Converters Biofouling: A Critical Review on Impacts and Prevention**
Mohamed Benbouzid - *University of Brest, EA 4325 LBMS*, **Hosna Titah-Benbouzid** - *University of Brest, EA 4325 LBMS*

Wave: hydrodynamic modelling & structural mechanics 7

Amphi Guével – 10:40 – 12:20

Chairman: Matt Folley, **Co-Chairman:** François Rongère

10:40 9B1-1 **Implementation of an OpenFOAM Numerical Wave Tank for Wave Energy Experiments**
Josh Davidson - *Centre for Ocean Energy Research Maynooth University, Ireland*

11:00 9B1-2 **Development, Verification and Application of the SNL-SWAN Open Source Wave Farm Code**
Kelley Ruehl - *Sandia National Laboratories*, **Aaron Porter** - *Coast & Harbor Engineering*, **Chris Chartrand** -*Sandia National Laboratories*, **Helen Smith** - *University of Exeter*, **Grace Chang** - *Integral Consulting Inc*, **Jesse Roberts** - *Sandia National Laboratories*

11:20 9B1-3 **ISWEC Design Tool**
Giacomo Vissio - *Politecnico di Torino*, **Calogero Di Carlo** - *Politecnico di Torino*, **Giovanni Bracco** -*Politecnico di Torino*, **Ermanno Giorcelli** - *Politecnico di Torino*, **Giuliana Mattiazzo** - *Politecnico di Torino*, **Biagio Passione** - *Politecnico di Torino*, **Mattia Raffero** - *Politecnico di Torino*, **Antonello Sirigu** -*Politecnico di Torino*

11:40 9B1-4 **Expanding ISWEC Modelling with a Lumped-Mass Mooring Line Model**
Matthew Hall - *University of Maine*, **Giacomo Vissio** - *Politecnico di Torino*, **Biagio Passione** -*Politecnico di Torino*

12:00 9B1-5 **Experimental validation of InWave, a numerical design tool for WECs**
Adrien Combourieu - *INNOSEA*, **Maxime Philippe** - *INNOSEA*, **Alain Larivain** -*Hydrocap*, **Julius Espedal** - *Langlee Wave Power*

Tidal: hydrodynamic modelling & structural mechanics 5

Room Girard – 10:40 – 12:20

Chairman: Tim Stallard, **Co-Chairman:** Christophe Corre

10:40 9B2-1 **Practical Optimisation of Intra-Array Cabling at a Tidal Energy Site**
Benjamin John Sewell - *Mojo Maritime Limited*, **Rachel Nicholls-Lee** - *Mojo Maritime Limited*, **Simon Hindley** - *Mojo Maritime Limited*, **Maxime Morandeau** - *Mojo Maritime France SAS*, **Richard Argall** - *Mojo Maritime Limited*

11:00 9B2-2 **Development and Validation of RANS CFD Model for Hydrodynamic Prediction of a Horizontal Tidal Current Turbine**
Changhong Hu - *Research Institute for Applied Mechanics, Kyushu University*

11:20 9B2-3 **The Influence of Solidity on the Performance Characteristics of a Tidal Stream Turbine**
Ceri Elin Morris - *Cardiff University*, **Allan Mason-Jones** - *Cardiff University*, **Daphne Marie O'Doherty** - *Cardiff University*, **Tim O'Doherty** - *Cardiff University*

11:40 9B2-4 **Optimising the design of a tidal stream turbine support structure for improved turbine performance**
Stuart Robert John Walker - *University of Sheffield*

12:00 9B2-5 **Flow Misalignment and Tidal Stream Turbines: A CFD Study**
Carwyn Huw Frost - *Cardiff Marine Energy Research Group (CMERG) - Cardiff University,* **Paul Evans** - *Cardiff Marine Energy Research Group (CMERG) - Cardiff University,* **Daphne O'Doherty** -*Cardiff Marine Energy Research Group (CMERG) - Cardiff University,* **Allan Mason-Jones** - *Cardiff Marine Energy Research Group (CMERG) - Cardiff University,* **Tim O'Doherty** - *Cardiff Marine Energy Research Group (CMERG) - Cardiff University*

Wave : device development & testing 5

Room Boisnoer – 10:40 – 12:20

Chairman: John Ringwood, **Co-Chairman:** Luis Gato

10:40 9B3-1 **Practical performance of control strategies for point absorbers**
Morten Møller Jakobsen - *Department of Civil Engineering Aalborg University,* **Francesco Ferri** - *Department of Civil Engineering Aalborg University,* **Morten Kramer** -*Department of Civil Engineering Aalborg University*

11:00 9B3-2 **Laboratory experiments on a heaving buoy wave-energy converter with inherent phase control**
Jørgen Hals Todalshaug - *NTNU,* **Patrik Möller** - *CorPower Ocean, Gunnar Steinn Ásgeirsson -CorPower Ocean,* **Jéromine Maillet** - *CorPower Ocean,* **Eysteinn Hjálmarsson** - *CorPower Ocean, Miguel Lopes - WavEC,* **Pedro Pires** - *WavEC,* **Matthieu Guérinel** -*WavEC*

11:20 9B3-3 **Pneumatic power regulation, short-term forecasting and relief valve control at the Pico OWC**
Kieran Monk - *Plymouth University Wavec -Offshore renewables, Daniel Conley - Plymouth University,* **Victor Winands** - *Aalborg University,* **Miguel Lopes** - *Wavec offshore renewable,* **Qingping Zou** - *University of Maine,* **Deborah Greaves** - *Plymouth University*

11:40 9B3-4 **Wave Energy Conversion: Linear vs. Coulomb PTO damping strategies**
Cian J Murtagh - *LIT*

12:00 9B3-5 **Incident Wave State Estimation of Point Absorber Type Wave Energy Converter**
Jaeseung Kim - *Yonsei University,* **Seung Kwan Song** - *Yonsei University,* **Jin Bae Park** - *Control lab, Yonsei Unviversity, S.Korea*

Tidal : resource characterization 5

Room Grasset – 10:40 – 12:20

Chairman: AbuBakr Bahaj, **Co-Chairman:** Mathieu Toupin

10:40 9B4-1 **A continuous approach for the optimisation of tidal turbine farms**
Stephan Cornelis Kramer - *Imperial College London*

11:00 9B4-2 **Tidal energy leasing and tidal phasing**
Simon Philip Neill - *Bangor University,* **Reza Hashemi** - *Bangor University,* **Matt Lewis** -*Bangor University*

11:20 9B4-3 **Tidal stream resource assessment through optimisation of array design with quantification of uncertainty**
David Matthew Culley - *Imperial College London,* **Simon Wolfgang Funke** - *Simula,* **Stephan Kramer** - *Imperial College London,* **Matthew Piggott** - *Imperial College London*

11:40 9B4-4 **Giga Watt Arrays: How Many Tidal Turbines Will it Take?**
Ross Vennell - *Ocean Physics Group University of Otago Dunedin New Zealand,* **Alice Harang** - *Ocean Physics Group Department Marine Science University of Otago, Dunedin, New Zealand,* Malcom Smeaton -*Ocean Physics Group,Department Marine Science University of Otago, Dunedin, New Zealand,* **Margot Gerritsen** - *Institute for Computational and Mathematical Engineering Department of Energy Resources Engineering Stanford University, USA*

12:00 9B4-5 **Standard methodology for tidal array project optimisation: An idealized study of the Minas Passage**
Simon W. Funke - *Simula Research Laboratory,* **Kristen M. Thyng** - *Department of Oceanography Texas A&M University,* Thomas Roc -*Department of Mathematics and Statistics Acadia University*

Economical, social, legal & political aspects 2

Room Claude – 10:40 – 12:20

Chairman: Adrian de Andrés, **Co-chairman:** Boris Teillant

10:40 9B5-1 **The strategic objective of competitive collaboration: Managing the solid market launch of marine energy**
Ralf Bucher - *University of Edinburgh, Institute for Energy Systems, Kings Buildings, Mayfield Road, Edinburgh EH9 3JL, United Kingdom*

11:00 9B5-2 **Should tidal stream energy be publicly funded? Evidence from a choice experiment study**
Angela Vazquez - *University of Santiago de Compostela,* **Gregorio Iglesias** - *Plymouth University*

11:20 9B5-3 **Roadmaps for the development of Technologies related to Danish Wave Power Systems**
Kim Nielsen - *Ramboll,* **Jan Krogh** - *Aalborg University*

11:40 9B5-4 **Ocean energy database: Technology characterization at sub-assembly level**
Marta Raquel Silva - *WavEC - Offshore Renewables,* **Alex Raventos** - *WavEC - Offshore Renewables,* **Andreas Uihlein** - *Joint Research Centre - Energy Technology Policy Outlook,* **Davide Magagna** - *Joint Research Centre - Energy Technology Policy Outlook*

12:00 9B5-5 **Incentive-based Financial Support Scheme for immature Renewable Energy Systems**
Morten Thøtt Andersen - *Dept. Civil Engineering Aalborg University,* Peter Frigaard - *Dept Civil Engineering Aalborg University*

Lunch break 12:20 – 14:00

Wave: hydrodynamic modelling & structural mechanics 8

Amphi Guével – 14:00 – 15:20

Chairman: Gareth Thomas, **Co-Chairman:** Hugh Wolgamot

14:00 9C1-1 **Identification of Nonlinear excitation force kernels using numerical wave tank experiments**
Simone Giorgi - *Centre for Ocean Energy Research (COER) Maynooth University Maynooth, Co. Kildare, Ireland*

14:20 9C1-2 **Numerical modelling of an Oscillating Wave Surge Converter using Volterra theory**
Joseph van't Hoff - *Aquamarine Power,* **Matt Folley** - *Queen's University Belfast,* **Trevor Whittaker** -*Queen's University Belfast*

14:40 9C1-3 **Hydrodynamics Testing of the 1:20 ISWEC Model**
Mattia Raffero - *Politecnico di Torino,* Giacomo Vissio - *Politecnico di Torino,* **Biagio Passione** -*Politecnico di Torino*

15:00 9C1-4 **Experimental Analysis of WEC Wave Fields**
Cameron McNatt - *Institute for Energy Systems The School of Engineering The University of Edinburgh,* **Vengatesan Venugopal** - *Institute for Energy Systems The School of Engineering The University of Edinburgh,* **David Forehand** -*Institute for Energy Systems The School of Engineering The University of Edinburgh,* **Gregory Payne** - *Institute for Energy Systems The School of Engineering The University of Edinburgh*

Tidal: hydrodynamic modelling & structural mechanics 6

Room Girard – 14:00 – 15:20

Chairman: Tim O'Doherty, **Co-Chairman:** Tim Stallard
Session sponsored by ANNEX IV - OES (Ocean Energy Systems)

14:00 9C2-1 **BEM-CFD: A Revised Model for Accurate Prediction**
Matt Edmunds - *Swansea University*

14:20 9C2-2 **On the energy potential associated with blades radial force in a Marine Vertical Axis Turbine: Performance optimization by a numerical study**
Mathilde Belhache - *Laboratoire Universitaire des Sciences Appliquées de Cherbourg (LUSAC)*

14:40 9C2-3 **Simulating Tidal Turbines with adaptive meshes and RANS turbulence models**
Amin Abolghasemi - *Imperial College London,* **Matthew D Piggott** - *Imperial College London,* **Johannes Spinneken** - *Imperial College London,* **Axelle Vire** - *Delft University of Technology,* **Colin J Cotter** - *Imperial College London,* **Sarah Crammond** - *MeyGen Ltd.*

15:00 9C2-4 **A numerical study of the effect of passive control on cavitation for marine hydrokinetic turbines**
Ramona B Barber - *University of Washington*, **Michael R Motley** - *University of Washington*

Environmental impact and appraisal 5

Room Boisnoer – 14:00 – 15:20

Chairman: Jesse Roberts, **Co-Chairman:** Gregorio Iglesias
Session sponsored by ANNEX IV – OES (Ocean Energy System)

14:00 9C3-1 **Numerical Modeling of the Impact Response of Tidal Devices and Marine Mammals**
Molly Elissa Grear - *University of Washington*, **Michael R. Motley** - *University of Washington*

14:20 9C3-2 **Field testing a full-scale tidal turbine Part 3: Field Measurements of Turbine Noise Characteristics**
Pal Schmitt - *Queen's University Belfast*, **Bjoern Elsaesser** - *Queens University Belfast,Marine Laboratory*, **Matthew Coffin** - *Akoostix Inc. 10 Akerley Blvd, Suite 12 Dartmouth, NS B3B 1J4*, **Joe Hood** -*Akoostix Inc. 10 Akerley Blvd, Suite 12 Dartmouth, NS B3B 1J4*, **Ralf Starzmann** -*SCHOTTEL HYDRO GmbH*

14:40 9C3-3 **Discussion of the effects of the underwater noise generated by a wave energy device - Portugal**
Erica Mogas Cruz - *WavEC Offshore Renewables*, **Teresa Simas** - *WavEC Offshore Renewables*, **Erkki Kasanen** -*AW-Energy Oy*

15:00 9C3-4 **Acoustic Characterization of a Hydrokinetic Turbine**
Brian Lenox Polagye - *University of Washington, Northwest National Marine Renewable Energy Center*, **Paul Murphy** - *University of Washington, Northwest National Marine Renewable Energy Center*

Wave: resource characterization 4

Room Grasset – 14:00 – 15:20

Chairman: Ed Mackay, **Co-Chairman:** Yves Pérignon

14:00 9C4-1 **A Markov Chain Model to Enhance the Weather Simulation Capabilities of an Operations and Maintenance Tool for a Wave Energy Array**
Anthony Gray - *IDCORE Pelamis Wave Power*, **Lars Johanning** - *University of Exeter*, **Beth Dickens** -*Pelamis Wave Power*

14:20 9C4-2 **Regional Wave Energy Resource Assessment with an Unstructured-Grid Surface Wave Modeling Approach**
Zhaoqing Yang - *Pacific Northwest National Laboratory*, **Taiping Wang** - *Pacific Northwest National Laboratory*

14:40 9C4-3 **Driving Models from Sensor Data: How Much Information do we Need?**
David Christie - *University of the Highlands and Islands*

15:00 9C4-4 **Optimization Process for Wave Energy Assessments In Energetic Waters, Considerations On Wind-Wave Interactions And Spatial Alterations**
George Lavidas - *Institute of Energy Systems, University of Edinburgh*

Economical, social, legal & political aspects 3

Room Claude – 14:00 – 15:20

Chairman: Kim Nielsen, **Co-Chairman:** Davide Magagna

14:00 9C5-1 **Developing Best Practice in Uncertainty Assessment for Wave and Tidal Energy Projects**
Neil Adams - *Frazer-Nash Consultancy*

14:20 9C5-2 **Uncertainties on the techno-economic feasibility assessment of wave energy projects**
Adrian David de Andres - *Institute of Energy Systems, The University of Edinburgh, Edinburgh, United Kingdom*, **Raúl Guanche** - *Environmental Hydraulics Institute of Cantabria, University of Cantabria, Santander, Spain*, **Pedro Diaz**-*Simal -Environmental Hydraulics Institute of Cantabria, University of Cantabria, Santander, Spain*, **César Vidal** - *Environmental Hydraulics Institute of Cantabria, University of Cantabria, Santander, Spain*, **Íñigo Javier Losada** - *Environmental Hydraulics Institute of Cantabria, University of Cantabria, Santander, Spain*

14:40 9C5-3 **Finding locations for wave energy development as a function of reliability metrics**
Adrian David de Andres - *Institute of Energy Systems, The University of Edinburgh, Edinburgh, United Kingdom*, **Henry Jeffrey** - *Institute of Energy Systems, The University of Edinburgh, Edinburgh, United Kingdom*, **Raúl Guanche** -*Environmental Hydraulics Institute of Cantabria, University of Cantabria, Santander, Spain*

15:00 9C5-4 **The development of a risk-based certification scheme for Marine Renewable Energy Converters**
Laura-Mae Macadré - *Bureau Veritas, Marine & Offshore Division*, **Nicolas Dietenbeck** - *Bureau Veritas, Industry Division*, **Stéphane Paboeuf** -*Bureau Veritas, Marine & Offshore Division*, **Stéphane le Diraison** - *Bureau Veritas, Marine & Offshore Division*

Coffee break and Poster Session 5 — 15:20 – 15:40

9P2-2 **Flow characterisation and numerical modelling of OWC wave energy converters**
Aggelos S. Dimakopoulos - *HR Wallingford*, **Mark J. Cooker** - *School of Mathematics, University of East Anglia*, **Encarnacion Medina Lopez** -*HR Wallingford*, **Daniele Longo** - *HR Wallingford*

9P2-3 **How Large Scale Channel Dynamics Influence the Optimum Tidal Power Available? How does power scale with the number of tidal turbines?**
Alice Harang - *Ocean Physics Group Department of Marines Sciences, University of Otago*, **Ross Vennell** - *Ocean Physics Group Department of Marines Sciences, University of Otago*, **Margot Gerritsen** -*Department of Energy Resource Engineering, Stanford University*, **Malcolm Smeaton** - *Ocean Physics Group Department of Marines Sciences, University of Otago*

9P2-4 **EMACOP project: characterising the wave energy resources of hot spots in Brittany for on-shore WEC**
Bertrand Michard - *Cerema / Direction Technique Eau, Mer et Fleuves Technopole Brest Iroise - BP 5 - 29280 Plouzané*

9P2-5 **Establishing Marine Renewable Energy Legislation in Nova Scotia, Canada**
Melissa Oldreive - *Nova Scotia Department of Energy*, **Bruce Cameron** - *Nova Scotia Department of Energy*, **Sandra Farwell** -*Nova Scotia Department of Energy*

Wave: hydrodynamic modelling & structural mechanics 9

Amphi Guével – 15:40 – 17:20

Chairman: Scott Beatty, **Co-Chairman:** Peter Kenneth Stansby

15:40 9D1-1 **Hydrodynamic Analysis of Array of Point Absorbers Combined with a Floating Platform**
Ashank Sinha - *Instituto Superior Tecnico, CENTEC, Lisbon*, **Debabrata Karmakar** - *Instituto Superior Tecnico, CENTEC, Lisbon*, **Carlos Guedes Soares** -*Instituto Superior Tecnico, CENTEC, Lisbon*

16:00 9D1-2 **Effects of second-order hydrodynamics on efficiency of a wave energy array**
Hugh Wolgamot - *University of Western Australia*

16:20 9D1-3 **Sensitivity analysis of WEC array layout parameters effect on the power performance**
Pau Mercadé Ruiz - *PhD Student. Department of civil engineering, Aalborg University*, **Francesco Ferri** - *Department of civil engineering, Aalborg University*, **Jens Peter Kofoed** -*Department of civil engineering, Aalborg University*

16:40 9D1-4 **Optimal Arrangements of Elementary Arrays of Wave Power Devices**
Justin McGuinness - *Ph.D. Student in Applied Mathematics at University College Cork*, **Gareth Thomas** - *Senior Lecturer in Applied Mathematics at University College Cork*

17:00 9D1-5 **Evaluation of Response Based Design method and validation of wave loads computations in CFD**
Olivia Thilleul – *HydrOcean*, Remi Menard – *HydrOcean*, **Florian Surmont** - *Bureau Veritas*, **Christian Berhault**, *Ecole Centrale de Nantes*, **Jean-Charles Poirier** – *Sirehna*, **Anne-Sophie Dubois** – *STX*, **Francois Cany** – *STX*, **Jonathan Bossard** - *Alstom*

Tidal: hydrodynamic modelling & structural mechanics 7

Room Girard – 15:40 – 17:20

Chairman: Stuart Walker, **Co-Chairman:** Ian Masters

15:40 9D2-1 **Numerical simulations of marine hydrokinetic devices in complex bathymetries**
Cristian Escauriaza - *Hydraulic and Environmental Engineering Department. Pontificia Universidad Catolica de Chile*, **Karina Soto** - *Hydraulic and Environmental Engineering Department. Pontificia Universidad Catolica de Chile*

16:00 9D2-2 **Optimisation of tidal turbine separation distance using semi-empirical turbine models**
Martin Koh - *Nanyang Technological University Interdisciplinary Graduate School*

16:20 9D2-3 **Numerical Validation of the Two-Scale Actuator Disc Theory for Marine Turbine Arrays**
Takafumi Nishino - *Cranfield University,* **Edgar Perez-Campos** - *Cranfield University*

16:40 9D2-4 **Numerical and Experimental study of elementary interactions in marine current turbines array**
Clément Carlier - *Laboratoire Ondes et Milieux Complexes (LOMC). IFREMER, Centre Manche Mer du Nord,* Grégory Pinon - *Laboratoire Ondes et Milieux Complexes,* **Grégory Germain** -*IFREMER, Centre Manche Mer du Nord,* **Elie Rivoalen** - *Laboratoire d'Optimisation et Fiabilité en Mécanique des Structures (LOFIMS). Laboratoire Ondes et Milieux Complexes (LOMC),* **Benoît Gaurier** - *IFREMER, Centre Manche Mer du Nord*

17:00 9D2-5 **Experimental Investigation of Tidal Turbine Partial Array Theory Using Porous Discs**
Susannah Cooke - *University of Oxford,* **Richard Willden** - *University of Oxford, Byron Byrne -University of Oxford, GB* **Byron Byrne** - *University of Oxford,* **Tim Stallard** - *University of Manchester,* **Alex Olczak** - *University of Manchester*

Wave : device development & testing 6

Room Boisnoer – 15:40 – 17:20

Chairman: Antonio Falcao, **Co-Chairman:** Mathieu Mory

15:40 9D3-1 **Model test of submergible point absorber using oscillating water column with an impulse turbine module**
Seung Kwan Song - *Control lab, Yonsei Unviversity, S.Korea,* **Jae Seung Kim** - *Control lab, Yonsei Unviversity, S.Korea,* **Jin Bae Park** -*Control lab, Yonsei Unviversity, S.Korea*

16:00 9D3-2 **Fast Selection of Bidirectional Turbines for Oscillating Water Column Systems from a Catalogue of Turbine Types**
Thomas Carolus - *University of Siegen ,* **C. Moisel, R. Starzmann**

16:20 9D3-3 **Hydrodynamic characteristics of a U-OWC plant: comparison between analytical and numerical results**
Giovanni Malara - *DICEAM Dept., Mediterranea University of Reggio Calabria Wavenergy.it s.r.l.,* **Rui Gomes -** *LAETA, IDMEC, Instituto Superior Técnico, Universidade de Lisboa,* **Felice Arena** – *DICEAM Dept., Mediterranea University of Reggio Calabria,* **Joao Henriques** - *LAETA, IDMEC, Instituto Superior Tecnico, Universidade de Lisboa,* **Luis Gato** - *LAETA, IDMEC, Instituto Superior Tecnico, Universidade de Lisboa*

16:40 9D3-4 **A simplified time-domain model calibrated with experimental data for a multi-chamber OWC device**
Arantza Iturrioz - *Environmental Hydraulics Institute of Cantabria - IH Cantabria, Universidad de Cantabria* **Javier Sarmiento** - *Environmental Hydraulics Institute of Cantabria - Universidad de Cantabria,* **José A. Armesto** - *Environmental Hydraulics Institute of Cantabria - Universidad de Cantabria,* **Raúl Guanche** - *Environmental Hydraulics Institute of Cantabria - Universidad de Cantabria,* **César Vidal** - *Environmental Hydraulics Institute of Cantabria - Universidad de Cantabria,* **Íñigo J. Losada** - *Environmental Hydraulics Institute of Cantabria - Universidad de Cantabria*

17:00 9D3-5 **Wave channel tests of a slack-moored floating oscillating water column in regular waves**
Rui Gomes - *LAETA, IDMEC, Instituto Superior Tecnico*

Tidal : device development & testing 6

Room Grasset – 15:40 – 17:20

Chairman: Jean-Frédéric Charpentier, **Co-Chairman:** Donald Noble

15:40 9D4-1 **Development of smart materials for marine renewable energy processes**
Rafee Abdulmajeed Rafee Ahamed - *University of Strathclyde, Glasgow*

16:00 9D4-2 **The new DNV GL Standard for Tidal Energy Converters**
Claudio Bittencourt Ferreira - *DNV GL*

16:20 9D4-3 **Development of a blade design methodology for over-speed power-regulated tidal turbines**
Katie Gracie - *University of Strathclyde, Glasgow,* **Thomas Nevalainen** - *University of Strathclyde, Glasgow,* **Cameron M. Johnstone** -*University of Strathclyde, Glasgow,* **Robynne E. Murray** - *Dalhousie University, Darrel A. Doman - Dalhousie University,* **Michael J. Pegg** - *Dalhousie University*

16:40 9D4-4 **Minesto Performance: Application of the IEC Tidal Performance Specification to a Non-Standard Tidal Energy Converter**
Hannah Christine Buckland - *Black and Veatch,* **Erik Dölerud** - *Minesto AB,* **Tim Baker** -*Black and Veatch*

17:00 9D4-5 **Probabilistic evaluation of cavitation erosion of rotor blades of tidal stream turbines**
Leon Chernin, *Dimitri V Val*

Station keeping (incl. floating foundations), materials, fatigue and structural loading 3

Room Claude – 15:40 – 17:20

Chairman: Guilherme Moura Paredes, **Co-Chairman:** Jean Marc Rousset

15:40 9D5-1 **Design and Stability Analysis on Tower Structure for Hybrid System of Wind, Wave and Tidal Current Energy Converters**
Patrick Mark Singh - *Mokpo National University,* **Young-Do Choi** - *Mokpo National University*

16:00 9D5-2 **Modelling mooring line non-linearities (material and geometric effects) for a wave energy converter using AQWA, SIMA and Orcaflex**
Majid A Bhinder - *Beaufort Research - HMRC, University College Cork, Ireland,* **Madjid Karimirad** - *MARINTEK, Norway,* **Sam Weller** -*University of Exeter, UK,* **Yannick Debruyne** - *WavEC - Offshore Renewables, Lisbon.,* **Matthieu Guérinel** - *WavEC - Offshore Renewables, Lisbon.,* **Wanan Sheng** - *Beaufort Research - HMRC, University College Cork, Cork, Ireland*

16:20 9D5-3 **Dynamic analysis of a floating tidal energy platform in Grand Passage**
Dean Steinke - *Dynamic Systems Analysis Ltd.,* **Andrew Baron** - *Dynamic Systems Analysis Ltd.,* **André Roy** -*Dynamic Systems Analysis Ltd.,* **Ryan Nicoll** - *Dynamic Systems Analysis Ltd*

16:40 9D5-4 **The Role of Accelerated Testing in Reliability Prediction**
Sam Weller - *University of Exeter,* **Philipp Thies** - *University of Exeter,* **Tessa Gordelier** -*University of Exeter,* **Lars Johanning** - *University of Exeter*

17:00 9D5-5 **Parametric Study of the Characteristics of Dynamic Cables**
Shun-Han Yang - *Chalmers University of Technology, Department of Shipping and Marine Technology, Division of Marine Technology,* **Jonas W. Ringsberg** - *Chalmers University of Technology, Department of Shipping and Marine Technology, Division of Marine Technology,* **Erland Johnson** -*Chalmers University of Technology, Department of Shipping and Marine Technology, Division of Marine Technology SP Technical Research Institute of Sweden, Department of Structural and Solid Mechanics*

EDF Side Meeting : What future for Tidal power?

Amphi Guével – 17:30 – 19:00

Dr. Denis Aelbrecht - Hydraulics Expert (EDF - Hydro Eng. Center)

Ocean energy industry is living a booming development since about 10-20 years worldwide, as Marine Renewable Energy (MRE) sources are seen to play a key role in the future power generation mix diversity. New emerging marine energy technologies are actively developed, with variable maturity level, from fundamental R&D phases to demonstrator / pre-industrial projects or either commercialization (for only a few of them). It is known that robustness, costs and environmental performance will stand as the three key factors of success for any marine energy projects (new tidal kinetic, wave, offshore-wind, ... and tidal power).

Tidal power is the MRE technology that has the most undebated advanced industrial maturity. Current consideration about tidal power is somewhat always ambiguous : recognition of an industrial maturity, both on technical and economical aspects, on one hand ; but judgment on environmental impacts - often not well known nor characterized - generally leads to consider that new projects cannot be envisionned, on the other hand.

The conference will aim at contributing to a vision of what could be the future of Tidal power. Based on lessons learned from pioneering EDF industrial experience at La Rance tidal power plant (France, 48 years of operation), including environmental aspects, and other existing/future projects, the conditions for possible new developement of tidal power projects will be discussed, covering the following issues : resource potential assessment, environmental issues (ecology and sediments), technology improvement opportunities, additional services of tidal projects (shore protection, flooding risk reduction, ...), economical aspects. New tidal power concepts will also be introduced, showing that future of tidal power will for sure result from a combination of innovations in all aspects of the industry : technology performance, environmental performance, societal integration, economical performance and ... industrial/political will. The examples of current tidal power development activity in some countries (UK, South Korea, India, ...) will also be used to enrich this vision.

Thursday 10 September

Wave: hydrodynamic modelling & structural mechanics 10

Amphi Guével – 09:00 – 10:20

Chairman: Deborah Greaves, **Co-Chairman:** Adrien Combourieu

09:00 10A1-1 **Validation of a numerical method to predict the structural response of a wave energy converter against at-sea data**
Benjamin Child - *DNV GL*, **John Roadnight** - *DNV GL*, **Christopher Ridgewell** -*AW-Energy*

09:40 10A1-3 **WaveRoller load determination from ocean testing**
Tuula Maki - *AW-Energy Oy*, **Matti Vuorinen** - *AW-Energy Oy*, **Christopher Ridgewell** -*AW-Energy Oy*

10:00 10A1-4 **SPH Modeling of Hydrodynamic Loads on a Point Absorber Wave Energy Converter Hull**
Shahab Yeylaghi - *Mechanical Engineering Department at University of Victoria*, **Scott Beatty** - *Mechanical Engineering Department at University of Victoria*, **Curran Crawford** -*Mechanical Engineering Department at University of Victoria*, **Peter Oshkai** - *Mechanical Engineering Department at University of Victoria*, **Bradley Buckham** - *Mechanical Engineering Department at University of Victoria*, **Belaid Moa** - *Compute Canada, WestGrid, University of Victoria*

Wave : device development & testing 7

Room Girard – 09:00 – 10:20

Chairman: Vengatesen Venugopal, **Co-Chairman:** Francesc Fabregas

09:00 10A2-1 **The Free Floating Clam - Performance and Potential**
John Wilfrid Phillips - *University of Plymouth*, **Deborah M Greaves** - *University of Plymouth*, **Alison C Raby** - *University of Plymouth*

09:20 10A2-2 **Assessing the performance of a modular flap-type wave energy converter**
Laurie Wilkinson - *Industrial Doctoral Centre for Offshore Renewable Energy (IDCORE), Aquamarine Power Ltd*, **Kenneth Doherty** - *Aquamarine Power Ltd*, **Jonathan Nicholson** -*Aquamarine Power Ltd*, **Trevor Whittaker** - *Queen's University Belfast*, **Sandy Day** - *University of Strathclyde*

09:40 10A2-3 **Preliminary Analysis of an Oscillating Surge Wave Energy Converter with Controlled Geometry**
Nathan Michael Tom - *National Renewable Energy Laboratory*, **Michael Lawson** - *National Renewable Energy Laboratory*, **Yi-Hsiang Yu** -*National Renewable Energy Laboratory*, **Alan Wright** - *National Renewable Energy Laboratory*

10:00 10A2-4 **Extreme Loads and Pressures Applied to SurgeWEC: a Small Oscillating Wave Surge Converter**
Darragh Clabby - *Resolute Marine Limited*

Grid integration, PTO and control 5

Room Boisnoer – 09:00 – 10:20

Chairman: Wanan Sheng, **Co-Chairman:** Sara N Armstrong

09:00 10A3-1 **On latching control for wave energy converters: the case of oscillating water column**
João C. C. Henriques - *Instituto Superior Técnico, Universidade de Lisboa*, **Juan Carlos Chong Portillo** - *Instituto Superior Técnico, Universidade de Lisboa*, **Francois-Xavier Faÿ** -*Tecnalia*, **Eider Robles** - *Tecnalia*, **Luis M. C. Gato** - *Instituto Superior Técnico, Universidade de Lisboa*, **Imanol Touzon** - *Tecnalia*

09:20 10A3-2 **Combined control for oscillating-body type wave energy converter for Japan**
Takeshi Kamio - *Department of Mechanical Engineering, The University of Tokyo*, **Makoto Iida** - *Research Center for Advanced Science and Technology, The University of Tokyo, Chuichi -Department of Mechanical Engineering, The University of Tokyo*

09:40 10A3-3 **Control strategies in oscillating water column wave energy converters**
François-Xavier Faÿ - *Tecnalia Research & Innovation Early Stage Research in OceaNet, Eider* **Robles Sestafe** - *Tecnalia Research & Innovation*, **João Henriques** -*IDMEC, Instituto Superior Técnico*, **Margarita Marcos Muñoz** - *DISA, ETSI de Bilbao,Universidad del País Vasco*

10:00 10A3-4 **Emulation of a Hydrokinetic Turbine to Assess Control and Power Quality**
Robert Cavagnaro - *University of Washington / University College Cork*, **Brian Polagye** - *University of Washington*, **Jim Thomson** -*University of Washington Applied Physics Laboratory*, **Brian Fabien** - *University of Washington*, **Dominic Forbush** - *University of Washington*, **Levi Kilcher** - *National Renewable Energy Laboratory*, **James Donegan** - *Ocean Renewable Power Company*, **Jarlath McEntee** -*Ocean Renewable Power Company*

Environmental impact and appraisal 6

Room Grasset – 09:00 – 10:20

Chairman: Teresa Simas, **Co-Chairman:** Francisco Francisco
Session sponsored by ANNEX IV – OES (Ocean Energy Systems)

09:00 10A4-1 **A methodology to assess displacement effects on key wildlife species arising from Marine Energy Conversion Systems using onshore observation data**
Caitlin Rowenna Long - *European Marine Energy Centre Ltd*, **Lindesay Scott-Hayward** - *Centre for Research into Ecological and Environmental Modelling, University of St Andrews*, **Jennifer Norris** -*European Marine Energy Centre Ltd*

09:20 10A4-2 **Velocity-Pressure Solution to Modeling 3D Noise Propagation from an Array of Current Energy Converters**
Jesse Roberts - *Water Power Program Sandia National Laboratories*, **Charles Johnson** - *Department of Mechanical and Industrial Engineering Montana State University*, **Erick Johnson** -*Department of Mechanical and Industrial Engineering Montana State University*

09:40 10A4-3 **Impact of EMF Emissions from Submarine Cables on Marine Species**
Manhar R. Dhanak - *Florida Atlantic University*, **Richard E. Spieler** - *Nova Southeastern University*, **Robert Coulson** -*Florida Atlantic University*, **A. Kirk Kilfoyle** - *Nova Southeastern University*, **John Frankenfield** - *Florida Atlantic University*, **Shirley Ravenna** - *Florida Atlantic University*, **George Valdes** - *South Florida Ocean Measurement Center, Naval Surface Warfare Center - Carderock Division*

10:00 10A4-4 **Enabling Siting and Permitting of Marine Energy Devices, in conjunction with Engineering Design and Deployment Strategies**
Andrea Copping - *Pacific Northwest National Laboratory*, **Simon Geerlofs** - *Pacific Northwest National Laboratory*, **Luke Hanna** -*Pacific Northwest National Laboratory*

Coffee break and Poster Session 6 — 10:20 – 10:40

10P1-1 **Controller analyses for Oscillating Water Column Wave Energy**
Maíra Granero Cordeiro - *Universidade de São Paulo*, **Décio Crisol Donha** - *Universidade de São Paulo*

10P1-2 **Wave and tidal energy in Europe: assessing present technologies**
Davide Magagna - *European Commission - Joint Research Centre Institute for Energy and Transport Westerduinweg 3,1755 LE Petten, The Netherlands*, **Andreas Uilhein** - *European Commission - Joint Research Centre Institute for Energy and Transport Westerduinweg 3, 1755 LE Petten, The Netherlands*, **Marta Silva** -*WavEC - Offshore Renewables Rua Dom Jerónimo Osório,n.° 11, 1° andar, 1400 - 119, Lisboa, Portugal*, **Alex Raventos** - *WavEC - Offshore Renewables Rua Dom Jerónimo Osório,n.°11, 1° andar, 1400 - 119, Lisboa, Portugal*

10P1-3 **Wave energy mapping along the European Atlantic coast**
Philippe Gleizon - *Environmental Research Institute*

10P1-4 **Reanalyse of an Analytical Model for One Tidal Turbine Wake Prediction**
Ottavio Angelo Lo Brutto - *Normandy University, UNICAEN, LUSAC*, **Van Thinh Nguyen** - *Normandy University, UNICAEN, LUSAC*, **Sylvain Guillou** -*Normandy University, UNICAEN, LUSAC*, **Hamid Gualous** - *Normandy University, UNICAEN, LUSAC*, **Bertrand Boudart** - *Normandy University, UNICAEN, LUSAC*

Tidal: hydrodynamic modelling & structural mechanics 8

Amphi Guével – 10:40 – 12:20

Chairman: Changong Hu, **Co-Chairman:** Allan Mason-Jones

10:40 10B1-1 **A coupled Blade Element Momentum / Computational Fluid Dynamics approach for the fast power output prediction of ducted vertical-axis water turbines**
Christophe Corre - *Ecole Centrale de Lyon Laboratoire de Mécanique des Fluides et d'Acoustique UMR CNRS 5509,* **Favio Dominguez** - *LEGI UMR 5519 BP 53 38041 Grenoble Cedex 9 France,* **Jean-Luc Achard** -*LEGI UMR 5519 BP 53 38041 Grenoble Cedex 9 France,* **Jeronimo Zanette** - *Hydroquest Le Tarmac 29, chemin du Vieux Chêne 38240 Meylan France*

11:00 10B1-2 **Hydrodynamic Interaction of a Horizontal Axis Turbine on a Floating Offshore Tidal Energy Converter**
Mattijs Oud - *Graduated engineer from Delft University of Technology, currently working in the offshore industry*

11:20 10B1-3 **3D Modelling and Optimization of a Hydrokinetic Power Generation Barge**
Scott Baker - *National Research Council of Canada Ocean, Coastal and River Engineering,* **Andrew Cornett** - *National Research Council of Canada Ocean, Coastal and River Engineering,* **Maarten Kluijver** -*Moffatt & Nichol*

11:40 10B1-4 **Tidal current turbine optimisation using CFD simulation**
Pol Muller - *DCNS Research / SIREHNA,* **Florent Sainclair** - *DCNS Research / SIREHNA,* **Andrew Carlisle** - *OpenHydro,* **Coline Delafosse** - *DCNS*

12:00 10B1-5 **Validation of a computational hydrodynamics model for horizontal-axis marine current turbines**
Francesco Salvatore - *CNR-INSEAN,* **Fabio Difelice** - *CNR-INSEAN,* **Diane Dhomé** -*SABELLA SAS,* **Jean-Christophe Allo** - *SABELLA SAS,* **Flavia Bellotto** - *CNR-INSEAN,* **Danilo Calcagni** - *CNR-INSEAN*

Wave: device development & testing 8

Room Girard – 10:40 – 12:20

Chairman: Claes Eskilsson, **Co-Chairman:** Morten Kramer

10:40 10B2-1 **Using a Phase-Time-Path-Difference Approach to Measure Directional Wave Spectra in FloWave**
Samuel Draycott - *IDCORE FloWave TT Ltd. Universities of Edinburgh, Strathclyde & Exeter,* **Thomas Davey** - *FloWave TT Ltd., David M Ingram -Institute for Energy Systems, University of Edinburgh,* **John Lawrence** - *European Marine Energy Centre, EMEC,* **Alexander Day** - *University of Strathclyde,* **Lars Johanning** - *University of Exeter*

11:00 10B2-2 **Novel mixed-flow air-turbine for bidirectional operation in OWC wave energy converters**
Christoph Moisel - *University of Siegen, Germany,* **Paul-Bonatz**-*Str. 9-11 57076 Siegen*

11:20 10B2-3 **Laboratory experiments on Oscillating Water Column Wave Energy Converters integrated in a Very Large Floating Structure**
Ilaria Crema - *Department of Civil and Environmental Engineering of Florence University,* **Irene Simonetti** - *Department of Civil and Environmental Engineering of Florence University,* **Lorenzo Cappietti** - *Department of Civil and Environmental Engineering of Florence University,* **Hocine Oumeraci** - *Dept. of Hydromechanics and Coastal Engineering, TU Braunschweig*

11:40 10B2-4 **Investigation into the calibration of orifices used in OWC tank testing**
Remy Claude Rene Pascal - *Abengoa Seapower,* **Florent Thiebaut** - *MAREI, HMRC/Beaufort-UCC,* **Alejandro González Andreu** -*Abengoa Seapower*

12:00 10B2-5 **CFD evaluation of the absorption coefficient of a submerged breakwater embedding an OWC device**
Filippo Scarpetta - *Dipartimento di Matematica, Meccanica e Management, Politecnico di Bari,* **Marco Torresi** - *Dipartimento di Matematica, Meccanica e Management, Politecnico di Bari,* **Sergio Mario Camporeale** -*Dipartimento di Matematica, Meccanica e Management, Politecnico di Bari*

Grid integration, PTO and control 6

Room Boisnoer – 10:40 – 12:20

Chairman: Takeshi Kamio, **Co-Chairman:** Anne Blavette

10:40 10B3-1 **Electrical Design Considerations for Islanded Power Buoy for Wave Energy Convertor Test Site**
Judith Ann Rea - *MAREI Beaufort, University College Cork*

11:00 10B3-2 **Diagnosis of Tidal Turbine Generator Windings by Mean of High Frequency Parametric Identification**
Emmanuel Schaeffer - *LUNAM Université, EA 4642 IREENA,* **Essedik Ferdjallah-Kherkhachi** - *LUNAM Université, EA 4642 IREENA,* **Luc Loron** *-LUNAM Université, EA 4642 IREENA,* **Mohamed Benbouzid** - *Université de Brest, EA 4325 LBMS*

11:20 10B3-3 **On the Generator Constraint Design of a Wave Energy Converter at a Pre-Sizing Stage**
Sebastien Olaya - *École Nationale d'Ingénieurs de Brest (ENIB) / Laboratoire Brestois de Mécanique et des Systèmes (LBMS),* **Jean-Matthieu Bourgeot** - *École Nationale d'Ingénieurs de Brest (ENIB) / Laboratoire Brestois de Mécanique et des Systèmes (LBMS),* **Mohamed El-Hachemi Benbouzid** *-Université de Bretagne Occidentale (UBO) / Laboratoire Brestois de Mécanique et des Systèmes (LBMS)*

11:40 10B3-4 **Use of wave forecast for the regulation of ISWEC**
Giovanni Bracco - *Politecnico di Torino,* **Adriana Carillo** - *ENEA,* **Ermanno Giorcelli** *-Politecnico di Torino,* **Luca Liberti** *- ENEA,* **Giuliana Mattiazzo** - *Politecnico di Torino,* **Gianmaria Sannino** - *ENEA,* **Giacomo Vissio** - *Politecnico di Torino*

12:00 10B3-5 **On wave energy exploitation with U-OWC devices in the West coast of France**
Felice Arena - *Mediterranea University*

Wave: resource characterization 5

Room Grasset – 10:40 – 12:20

Chairman: Gregorio Iglesias, **Co-Chairman:** Izan Le Crom

10:40 10B4-1 **Wave energy potential in the Sea of Iroise**
Nicolas Guillou - *Cerema, Georges Chapalain - Cerema*

11:00 10B4-2 **Assessment of the wave energy resource around the Ría de Vigo (NW Spain)**
Joan Pau Sierra - *Laboratori d'Enginyeria Maritima, Universitat Politecnica de Catalunya - BarcelonaTech,* **Cesar Mösso** - *Laboratori d'Enginyeria Maritima, Universitat Politecnica de Catalunya - BarcelonaTech,* **Marc Mestres** *-Laboratori d'Enginyeria Maritima, Universitat Politecnica de Catalunya - BarcelonaTech,* **Maria Griñó** - *Laboratori d'Enginyeria Maritima, Universitat Politecnica de Catalunya - BarcelonaTech*

11:20 10B4-3 **Resource Mapping of Wave Energy Production in Europe**
Flemming Schlütter - *DHI,* **Ole Svenstrup Petersen** - *DHI,* **Lotte Nyborg** *-DHI*

11:40 10B4-4 **A new world map for wave power with a focus on variability**
John Ringwood - *Centre for Ocean Energy Research, Maynooth University, Ireland,* **Gabriel Brandle** - *Ecole Centrale de Nantes, Nantes, France*

12:00 10B4-5 **Wave climate analysis for scaled test sites off the US West Coast**
Philip Balitsky - *Virginia State and Polytechnic University Advanced Research Center,* **George H Hagerman** - *Virginia State and Polytechnic University Advanced Research Center*

Farewell lunch and Closing Ceremony

Lunch Area -12:20 – 14:30

Next AWTEC 2016 organizer, Dr. Narasimalu Srikanth, Singapore
Next EWTEC 2017 organizer, Tony Lewis, University College Cork

INORE Workshop: Does size matter in Marine Renewables? Is bigger better?

Room Girard - 14:30 – 18:30

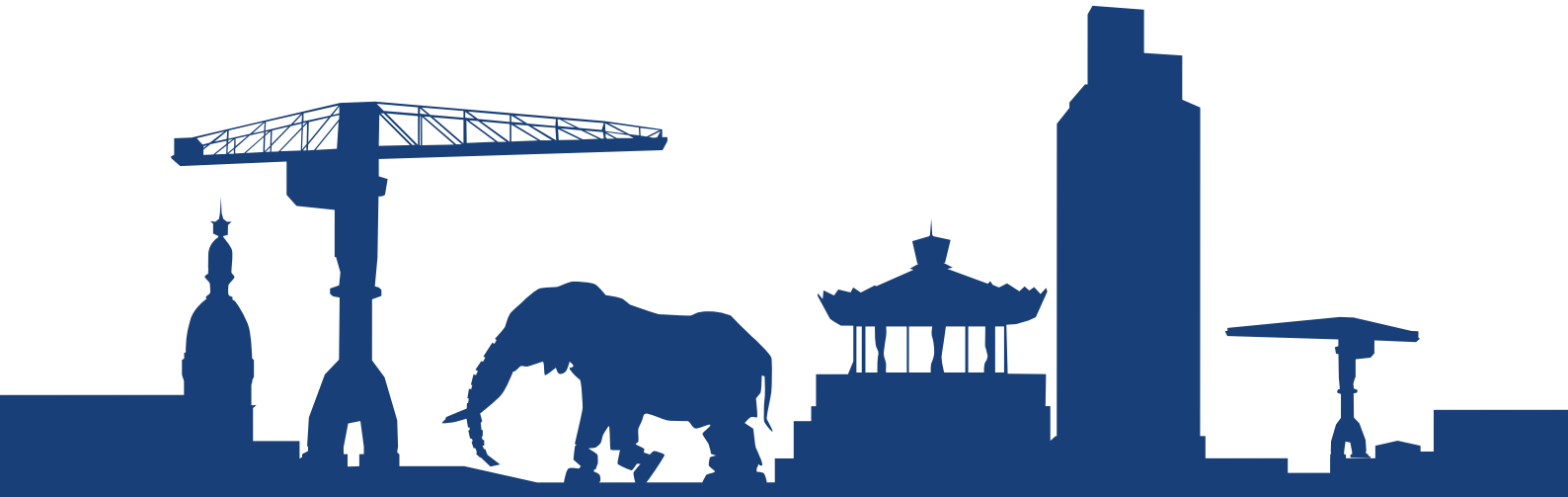
INORE (International Network on Offshore Renewable Energy) is an international association of early-stage researchers working in the fields of offshore wind, wave, tidal and ocean thermal energy conversion. Hosted by the 2015 EWTEC Conference, INORE is organizing a workshop about the topic "Does size matter in Marine Renewables? Is bigger better?"
In the first part of the workshop, a group of panelists composed of the most well-known experts in the field will share their ideas about the topic with the audience. After the break, the audience will be divided into several groups which will be assigned a panelist who will answer more specific questions related to the general topic. To register for the event visit: (http://inore.org/events/inore-ewtec-2015/).

MARINET Workshop

Room Boisnoer - 14:30 – 18:30

MARINET

The MARINET Experience Exchange: Shared Value by collaboration on common challenges.
MARINET users and Facility Managers share experience and exchange ideas on collaboration.



TECHNICAL TOURS AND VISITS

ECN facilities visit: Thursday 10 September (fully booked tour)

Visit to the LHEEA laboratory facilities: the Ocean Engineering wave basin (30m x 50m x 5m) equipped with 48 wave generators and a directional wind blower, the Towing Tank (150m x 5m x 3m) equipped with a 8m/s carriage.

An opportunity to meet the team in their workspace and to talk with them of any possible tank trials in the future, or any topic related to wave and tidal experiments on models.

Meeting point: 14:15, Nantes Congress Center
Departure by tram (do not miss the opportunity to buy your tram pass at a reduced rate of 40% discount at the registration desk upon arrival)

Address: Ecole Centrale de Nantes - 1, Rue de la Noë - 44300 Nantes

Acces by Tramway: from Cite des Congrès,

1 - walk to the tramway stop «Duchesse Anne - Chateau» (just in front of Nantes Castle) (5min)

2 - take Tramway line 1 in Direction: «François Mitterrand» (to the left when you are facing the Castle) stop at station «Commerce»

3 - at station «Commerce» take tramway line 2 (red line) , in Direction «Orvault Grand Val». (check the direction on the first carriage , as line 2 and 3 share the same railway and platform in «Commerce station») - exit at station «Ecole Centrale , Audencia»

4 - walk to Ecole Centrale de Nantes main entrance (1 min). from here follow the EWTEC posts to the LHEEA facilities building.

Post Tour Mont Saint Michel, Saint Malo and La Rance 240MW tidal plant
10-11 September 2015

Take a trip through the Normandy & the Brittany regions. Explore the charming medieval village of the Mont Saint Michel and take a walk on the Ramparts of Saint Malo city. Friday will be dedicated to the discovery of the Power plant of The Rance river through the visit of an interactive exhibition.

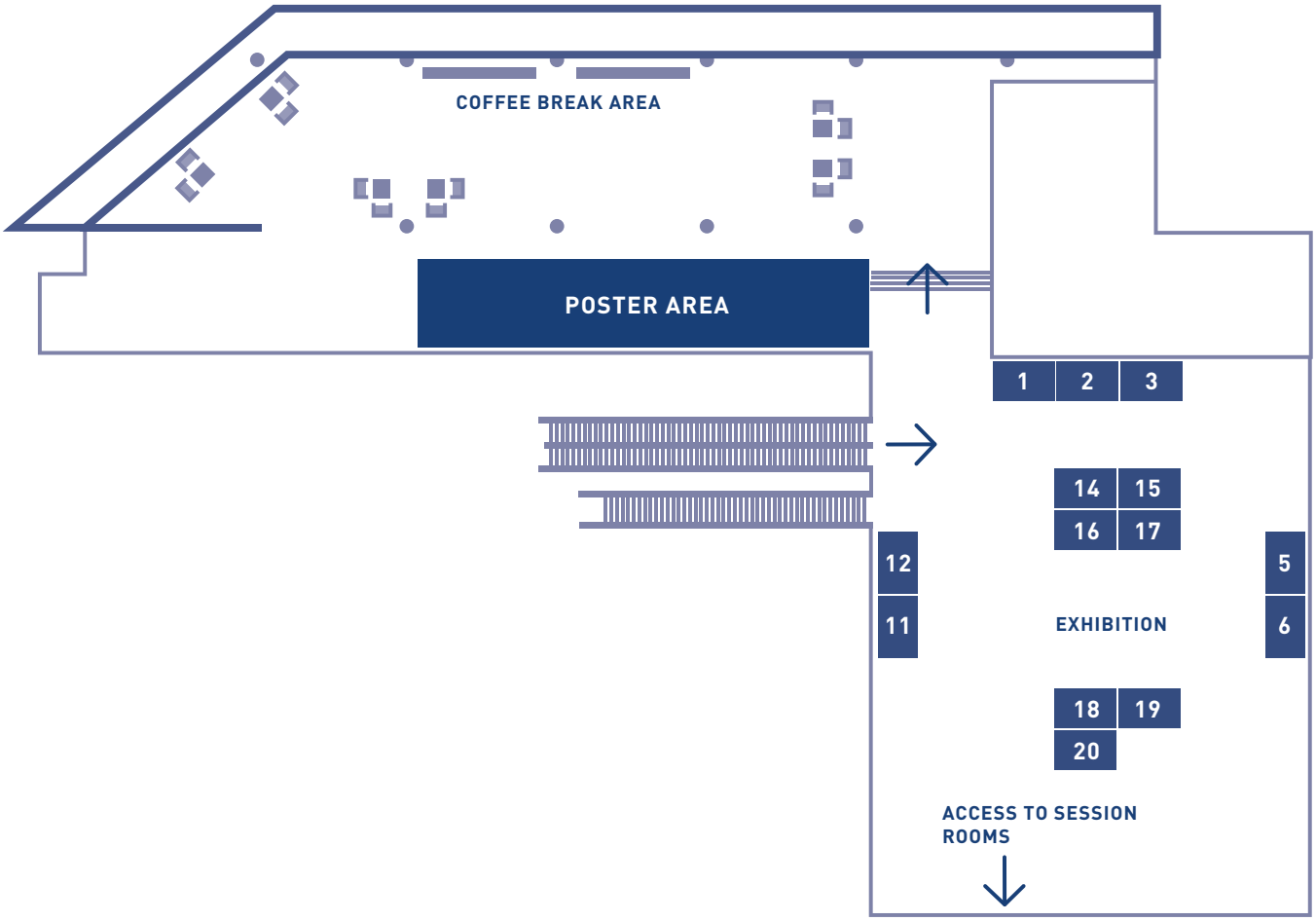
Visit of the interactive exhibition, the EDF Discovery Space is a free visiting space.

An accurate reproduction of a turbine (the bulb group), interactive kiosks, models, videos and information boards allow visitors to discover how the tidal power station really works, its history and its environment.

Meeting point: 14:30
Departure from the Nantes Congress Centre by private coach.

TECHNICAL EXHIBITION

First Floor



Exhibitors and sponsors list

ALSTOM — BRONZE PARTNER

Contact Person: Sandy Allen
Phone: 01 41 49 20 00 - **Email:** renewable-power-communications@alstom.com - **Website:** www.alstom.com
Address: 4 avenue André Malraux - **Zip Code:** 92309 - **City:** Levallois-Perret Cedex - **Country:** France

Having successfully tested two 500kW and 1 MW turbines(1), Alstom developed the efficient, cost-effective and easy to maintain Oceade™18–1.4MW tidal technology and was chosen with ENGIE to supply equipment to the raz Blanchard pilot farm. We now offer a unique Oceade™ tidal platform concept to maximise the use of the resource.

ANNEX IV - OES (OCEAN ENERGY SYSTEMS) — GOLD PARTNER

Company/Organisation Name: Pacific Northwest National Laboratory
Contact Person: Andrea Copping
Phone: 01 425 750 1956 - **Email:** andrea.copping@pnnl.gov - **Website:** www.pnnl.gov
Address: 1100 Dexter Ave N, Suite 400 - **Zip Code:** 98109 - **City:** Seattle, WA - **Country:** USA

Pacific Northwest National Laboratory (PNNL) is a US Department of Energy national laboratory, specializing in research on energy and environment, national security, and basic sciences across a range of topics, including marine sciences. PNNL implements the Annex IV initiative on potential environmental effects of marine energy development.

BLOG LES ENERGIES MARINES — BOOTH N°3

BUREAU VERITAS — BOOTH N°6

Contact Person: Laura-Mae Macadré
Phone: +33 (0)1 55 24 74 76 - **Email:** laura-mae.macadre@bureauveritas.com - **Website:** www.bureauveritas.com
Address: 67/71, Boulevard du Château - **Zip Code:** 92200 - **City:** Neuilly-sur-Seine - **Country:** France

Founded in 1828, Bureau Veritas is a world leader in Testing, Inspection, Certification and Technical Assistance. Over the past years, Bureau Veritas has worked with a large number of MRE technology developers through its involvement both in research projects and commercial contracts.

CENTRALE NANTES — BOOTH N°1

Contact Person: Valérie Chilard
Phone: +33 2 40 37 10 00 - **Email:** contact@ec-nantes.fr - **Website:** www.ec-nantes.fr
Address: Ecole Centrale de Nantes, 1 rue de la Noe, BP 92101 - **Zip Code:** F-44321 Cedex 3 - **City:** Nantes - **Country:** France

Centrale Nantes is one of the top graduate French Schools of engineering with strong industrial partnerships. It rolls out an academic and applied research to the highest European standards and supports MRE technologies from early innovative stage to large scale validation in real sea conditions.

CEREMA — BRONZE PARTNER

Contact Person: Philippe SERGENT
Phone: +33 3 44 92 60 00 - **Fax:** +33 3 44 20 06 75 - **Email:** contact@cerema.fr - **Website:** www.cerema.fr
Address: Direction Technique Eau, mer et fleuves - 134 rue de Beauvais - CS 60039 - **Zip Code:** 60280 - **City:** Margny-Lès-Compiègne - **Country:** France

Cerema is a public body and a resource centre acting in support of national and local authorities in the field of sustainable development. Therefor, Cerema mobilise multidisciplinary research, technical expertise and transverse know-how.

DHI — BOOTH N°18

Contact Person: Mrs Valérie Banneville
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Address: 2/4 rue Edouard Nignon, CS 47202 - **Zip Code:** 44372 - **City:** Nantes Cedex 3 - **Country:** France

DHI is a global leader in solving the world's toughest challenges in water environments – using knowledge gained from more than 50 years of dedicated research and real-life experience in 140 countries.

EDF — BRONZE PARTNER

Contact Person: Laurence SEETEN
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Address: 13 allée des Tanneurs, CS 61201 - **Zip Code:** 44012 - **City:** NANTES CEDEX 1 - **Country:** FRANCE

As the world's biggest electricity generator, the EDF Group covers every sector of expertise, from generation to trading and transmission grids. EDF builds on the expertise of its people, its R&D and engineering skills, its experience as a leading industry operator and the attentive support of its customers to deliver competitive solutions that successfully reconcile economic growth with climate protection.

ELSEVIER LIMITED — PARTNER

Contact Person: Katie Eve
Phone: +44 1865 843171 - **Email:** k.eve@elsevier.com - **Website:** elsevier.com/locate/ijome
Address: The Boulevard, Langford Lane - **Zip Code:** OX5 1GB - **City:** Oxford - **Country:** UK

Elsevier publishes over 40 quality journals in the field of energy, including International Journal of Marine Energy (IJOME). IJOME deals with fundamental and applied research and case studies relevant to renewable energy emanating from the marine environment, with a focus on wave and tidal energy.

EMERA INC. — BOOTH N°14/15

Contact Person: Paul Laberge
Phone: +1 902-240-0894 - **Fax:** +1 902-428-6112 - **Email:** paul.laberge@emera.com - **Website:** www.emera.com
Address: 1223 Lower Water Street - **Zip Code:** B3J 3S8 - **City:** Halifax, Nova Scotia - **Country:** Canada

I lead Emera Inc.'s tidal program that includes the planned deployment of two grid connected 16 meter 2 MW turbines in the Bay of Fundy in 2015 to be followed in subsequent phases totaling up to 300 MW total capacity. I also am a Director of OpenHydro Group.

ENGIE — SILVER PARTNER

Contact Person: Amélie AUBIN
Phone: 0438750635 - **Email:** amelie.aubin@gdfsuez.com - **Website:** engie.com
Address: 1 place Samuel de Champlain, Faubourg de l'Arche - **Zip Code:** 92930 - **City:** Paris la Défense cedex
Country: France

GDF SUEZ, a committed player in the field of Marine Renewable Energies

GDF SUEZ is a major player in the field of Renewable Energies. In France, the Group is leader in Onshore Wind and operates ¼ of the national hydraulic production. The Group also has ambitious objectives in terms of development. For example, in Europe where the Group plans to double its installed capacity of Renewable Energy over the next 10 years. Building upon these positions and skills, the Group is also working on numerous Marine Renewables projects. At the end of 2014, the Group was selected by the French Government for the construction of a pilot tidal turbine project in the raz Blanchard site in Basse Normandie. This success followed the selection of the Group at the beginning of 2014 for the two national Call for Tenders for Offshore Wind projects, at the Treport and the Îles d'Yeu & Noirmoutier sites, for a total installed capacity of 1000 MW.

FLOWAVE OCEAN ENERGY RESEARCH FACILITY — PARTNER

Contact Person: Jamie Grimwade
Phone: +44 (0)131 651-3553 - Email: jamie.grimwade@flowave.co.uk - **Website:** www.flowave.co.uk
Address: FloWave Ocean Energy Research Facility, The University of Edinburgh, Max Born Crescent, King's Buildings, Edinburgh, EH9 3BF - **Zip Code:** EH9 3BF - **City:** Edinburgh - **Country:** Scotland (UK)

FloWave's 25 metre circular test tank is the most sophisticated ocean simulator in the world. Designed for testing MRE devices & projects at scales between 1/10th and 1/40th, FloWave is a vital tool to help developers refine performance and de-risk devices before deployment at sea.

GUINARD ENERGIES — PARTNER

Contact Person: V. Mariette
Phone: +33 (0)6 08 60 79 48 - **Email:** v.mariette@guinard-energies.com - **Website:** www.guinard-energies.com
Address: 24 quai de la douane - **Zip Code:** 29200 - **City:** Brest - **Country:** France

In situ measurement to evaluate the real hydrokinetic resource. Higly efficient ducted marine current turbine for estuaries (seabed turbines) and rivers (floating turbines)

HYDROCEAN — BOOTH N°6

Contact Person: Laëtitia Beauzée
Phone: +33 (0)2 40 84 44 88 - Email: laetitia.beauzee@hydrocean.fr - **Website:** www.hydrocean.eu
Address: 8 bd Albert Einstein CS 32327 - **Zip Code:** 44323 - **City:** Nantes - **Country:** France

HydrOcean offers design support in the MRE field, enabling the evaluation and optimisation of MRE devices performances. Throughout a complete numerical tank, we propose a large range of services, covering the evaluation and optimisation of tidal turbines, wave energy converters, wave loads, modelling of installation phases, ship operability on farms...

INNOSEA — BOOTH N°5

Contact Person: Hakim MOUSLIM
Phone: +33 2 53 35 50 90 - **Fax:** +33 2 53 35 50 91 - **Email:** contact@innosea.fr - **Website:** www.innosea.fr
Address: 1 rue de la Noë - CS 12102 - **Zip Code:** 44321 - **City:** NANTES cedex 03 - **Country:** France

INNOSEA is an engineering firm specialized in MRE: offshore wind, tidal, wave and ocean thermal energies.

We conduct studies to improve the profitability of production farms: aerodynamics of turbines and wind farms, hydrodynamics of offshore structures, structural calculations, geotechnical analysis.

MARINE RENEWABLES CANADA — BOOTH N°14/15

Contact Person: Amanda White, Operations Director
Phone: +1 (902) 717-0716 - **Email:** amanda@marinerenewables.ca - **Website:** www.marinerenewables.ca
Address: 1690 Hollis Street, 10th Floor - **Zip Code:** B3J-1V7 - **City:** Halifax - **Country:** Canada

Marine Renewables Canada aligns industry, academia and government to ensure that Canada is a leader in providing ocean energy solutions to a world market.

MOJO MARITIME FRANCE SAS — BOOTH N°17

Contact Person: Maxime Morandeau
Phone: (+33) 2 40 99 00 41 - **Email:** maxime.morandeau@mojomaritime.com - **Website:** www.mojomaritime.fr
Address: 1 rue Du Guesclin BP 61905 - **Zip Code:** 44019 - **City:** Nantes - **Country:** France

Mojo Maritime France specialises in Project Management, Engineering and Consultancy services for the Marine Renewable Energy industry. The key themes of our work involve risk and cost reduction through the use of experience, innovation and technical rigour. Our experienced team of analysts, engineers, naval architects and master mariners has built a successful track record supporting many high profile projects in the offshore wind, wave and tidal energy industries.

NOVA SCOTIA DEPARTMENT OF ENERGY — BOOTH N°14/15

Contact Person: Shawna Eason, Business Development Executive, Renewable Energy
Phone: +1 (902) 717-0906 - **Email:** shawna.eason@novascotia.ca - **Website:** http://energy.novascotia.ca/
Address: 1690 Hollis Street, 12th Floor - **Zip Code:** B3J-1V7 - **City:** Halifax - **Country:** Canada

The Nova Scotia Department of Energy works towards delivery of maximum economic, social, and environmental benefits from the energy sector by creating partnerships with governments, industry and local communities to develop and manage the province's energy resources.

PLYMOUTH UNIVERSITY MARINE INSTITUTE — BOOTH N°12

Contact Person: Mrs Jo Thompson-Byrne
Phone: 01752 584953 - **Email:** jbyrne@plymouth.ac.uk - **Website:** www.plymouth.ac.uk/marine
Address: Drake Circus, Plymouth - **Zip Code:** PL4 8AA - **City:** Plymouth - **Country:** England

Institute represents a large pool of world-leading experts whose breadth of marine knowledge and expertise is second-to-none in the UK, enabling us to understand relationships between human activities and our seas. We work and collaborate with businesses and research communities globally delivering sustainable and practical solutions.

REGION PAYS DE LA LOIRE — INSTITUTIONAL PARTNER / BOOTH N°2

Contact Person: Etienne POURCHER
Phone: 02 40 48 81 45 - **Email:** emr@agence-paysdelaloire.fr - **Website:** www.emr-paysdelaloire.fr
Address: 1 rue de la Loire - **Zip Code:** 44966 - **City:** NANTES - **Country:** France

Pays de la Loire French region. The unique advantages of Pays de la Loire make this region the key place for the development of Marine Renewable Energy (MRE) in France and in Europe: a long seaboard with major port infrastructure, state of the art research and training centres, as well as an industrial sector specialising in large-scale maritime equipments.

SAMS RESEARCH SERVICES LTD (SRSL) — BOOTH N°16

Contact Person: Mr Christopher Allen
Phone: 0044 1631 559470 - **Fax:** 0044 1631 559001 - **Email:** info@srsl.com - **Website:** www.srsl.com
Address: Lismore Suite, Malin House, The European Marine Science Park - **Zip Code:** PA37 1SZ - **City:** Oban
Country: Scotland, UK

SAMS Research Services Ltd (SRSL) provides independent, multi-disciplinary marine consultancy and survey services to the marine renewables sector. Part of a learned society comprising a 130-year old oceanographic research institute, customers benefit from the latest scientific approaches.

THE EMBASSY OF CANADA IN FRANCE — BOOTH N°14/15

Contact Person: Denis TROTTIER, Trade Commissioner
Phone: +33 (0)1 44 43 23 82 - **Fax:** +33 (0)1 44 43 29 98 - **Email:** denis.trottier@international.gc.ca
Website: www.canadainternational.gc.ca/france/index.aspx?lang=fra
Address: 35 avenue Montaigne - **Zip Code:** 75008 - **City:** Paris - **Country:** France

I am facilitating business transactions between Canadian and French enterprises in the following sectors: traditional and renewable energies; infrastructure; civil engineering; construction; natural resources; sustainable technologies, clean tech & the environment.

UNIVERSITY COLLEGE CORK. (MAREI) MARINE AND RENEWABLE ENERGY IRELAND — BOOTH N°19

Contact Person: Contact Person: Gerry Sutton
Phone: 0035321 4250041 - **Fax:** 00353214321003 - **Email:** gerry.sutton@ucc.ie **Website:** www.marinet.eu
Address: Beaufort Building, Ringaskiddy, Co. Cork. - **Zip Code:** NA - **City:** Cork - **Country:** Ireland

The aim of MaREI to secure Ireland's position as a global leader in Marine Renewable Energy (MRE) by focussing on technological breakthroughs, delivered through cutting-edge science and engineering research. MaREI works towards innovative solutions to reduce costs and time to market, covering all aspects of technology development: energy conversion & storage; transmission & integration, enabling ICT technologies and environmental considerations.

UNIVERSITY OF THE HIGHLANDS AND ISLANDS (UHI) — BOOTH N°11

Contact Person: Damian Collins
Phone: 00 44 1463 279586 - **Fax :** 00 44 1463 279001 - **Email:** damian.collins@uhi.ac.uk
Website: www.uhi.ac.uk/merika
Address: 12b Ness Walk - **Zip Code:** IV3 5SQ - **City:** Inverness - **Country:** UK

UHI is located in the North of Scotland where much of Europe's Wave and Tidal energy resource can be found. Our research focus is marine energy and the environment; in particular 1) resource assessment and risk 2) understanding the effects of marine renewable devices on the environment and ecology.

WAVEC-OFFSHORE RENEWABLES — BOOTH N°20

Contact Person: Soraya Hamawi
Phone: +351218482655 - Fax: +351218481630 - **Email:** soraya@wavec.org - **Website:** www.wavec.org
Address: Rua Dom Jerónimo nº11, 1º andar - **Zip Code:** 1400-119 Lisboa - **City:** Lisboa - **Country:** Portugal

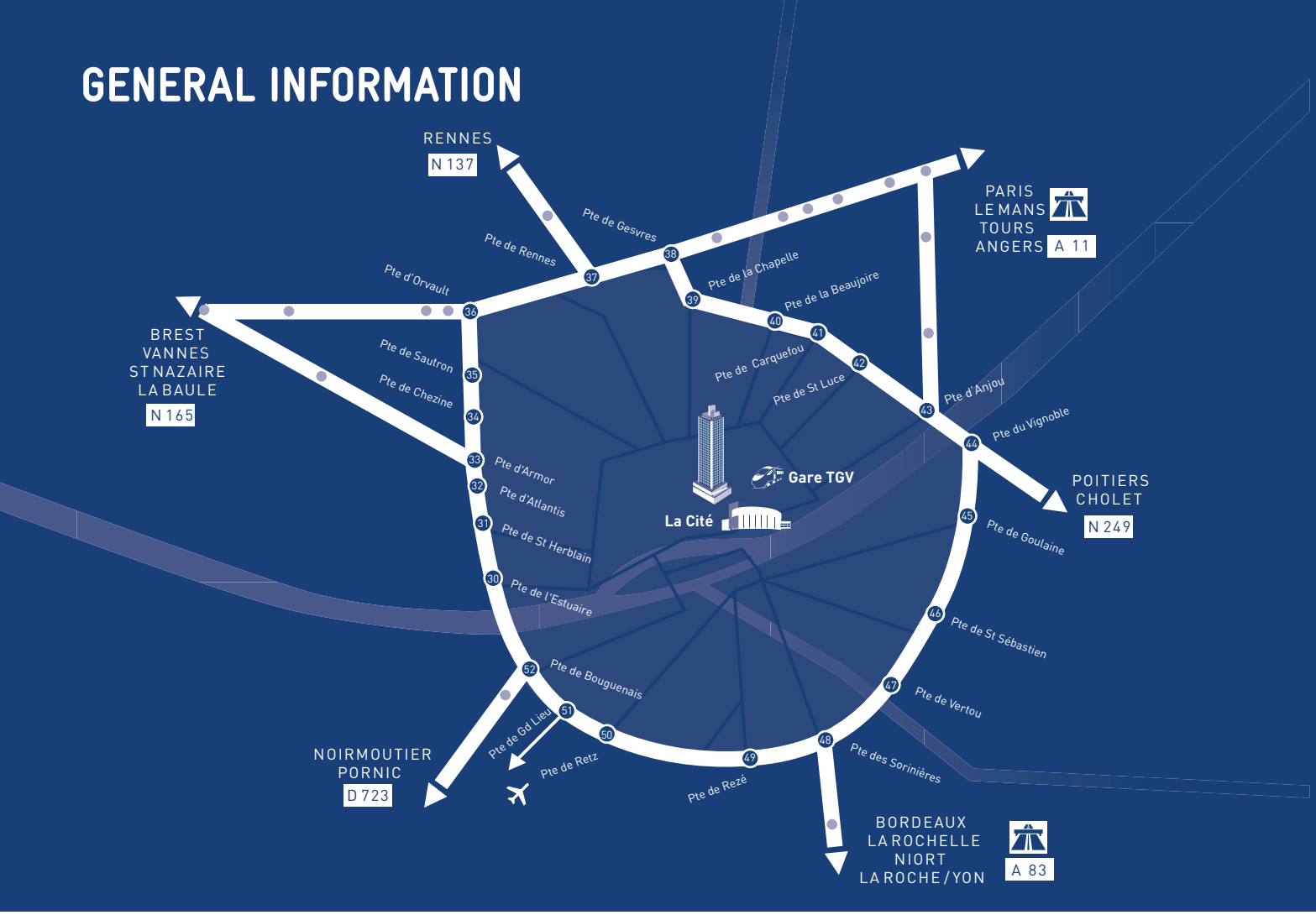
WavEC Offshore Renewables is a private non-profit association developing its activities in dissemination and promotion of marine renewable energy, among companies, the public administration and the general public, and the training of young people within curricular internship and advanced training.

WEST ATLANTIC MARINE ENERGY CENTER — BOOTH N°1

Contact Person: Christian Berhault
Phone: +33 2 40 37 15 96 - **Email:** christian.berhault@ec-nantes.fr - **Website:** www.weamec.fr
Address: Ecole Centrale de Nantes, 1 rue de la Noe, BP 92101 - **Zip Code:** F-44321 Cedex 3 - **City:** Nantes - **Country:** France

Weamec is an initiative to organize and increase the dynamics of Marine Renewable Energy regional context, support its jobs and give it greater visibility. Decided by research, training and innovation stakeholders, it is steered by Centrale Nantes, University of Nantes, EMC2 pole, and IRT Jules Verne.

GENERAL INFORMATION



Conference Date & Venue

The 11th EWTEC will be held from 6 September, 2015 to Thursday 10 September 2015 at:
The Cité Internationale des Congrès 5 rue de Valmy, 44041 Nantes – France

Access

Several practical means of transport are at your disposal to get to the meeting place:

- **TRAM:** line 1 - « Duchesse Anne - Château des Ducs de Bretagne » tram stop, one stop from the TGV railway station (North exit).
- **AIRPORT / CITY CENTRE SHUTTLE BUS:** every half hour - « Cité Internationale des Congrès » stop.
- **BUSWAY:** line 4 - « Cité Internationale des Congrès » stop.
- **BICLOO SELF-SERVICE BIKES AND MARGUERITE SELF-SERVICE CARS:** stations at La Cité.
- **450 PARKING SPACES ARE AVAILABLE** underneath La Cité and 2,000 additional parking spaces in close walking distance. Exhibitors are allocated a temporary parking area with direct access to la Cité's exhibition areas.

There will be no shuttle buses organized by the Conference.
«One week ticket» for all public transportations (buses, tram) available at reduced rate (40%) at the registration desk

Official Language

The official language of the conference is English.
There will be no simultaneous translation except for the opening session (from French to English)

Conference office

Before and after the meeting:
EWTEC 2015 c/o MCI France - 24, rue Chauchat - 75009 Paris - France
Phone: + 33 (0)1 70 39 35 54 - **Fax:** + 33 (0)1 53 85 82 83 - **Email:** info@ewtec2015.org

Welcome desks opening hours:

- **Sunday, 6 September, 2015:** from 16:30 to 19:00
- **Monday, 7 September, 2015:** from 08:00 to 19:00
- **Tuesday, 8 September, 2015:** from 08:00 to 19:00
- **Wednesday, 9 September, 2015:** from 08:30 to 19:00
- **Thursday, 10 September, 2015:** from 08:30 to 15:00

REGISTRATION

Access to all conference activities is subject to registration

Onsite registration Fees

Rates are in € and include VAT at 20%.

- **Delegate:** 950 euros
- **Student:** 950 euros
- **Day registration fee*:** 400 euros

**Monday 7 Sept., Tuesday 8 Sept., Wednesday 9 Sept., Thursday 10 Sept.*

IMPORTANT: please kindly note that the onsite registration fees DO NOT INCLUDE:

- The Conference Dinner (optional additional ticket at 120 euros, according to availability)
- The lunches for the onsite day registration fee

The onsite delegate and student registration fees include:

- Access to all congress sessions and exhibition from 7 to 10 Sept. 2015, at the Cité Internationale des Congrès, Nantes
- Congress Portfolio, Final program, USB key (including all full papers)
- Welcome Reception, on Sunday, 6 Sept. 2015 (17:30 – 19:00), at the Cité Internationale des Congrès, Nantes
- Coffee breaks, on 7, 8, 9 and 10 Sept. 2015, at the Cité Internationale des Congrès, Nantes
- Lunches, on 7, 8, 9 and 10 sept. 2015 at the Cité Internationale des Congrès, Nantes - **according to availability.**

The onsite day registration fees (available only onsite) include:

- Access to all congress sessions and exhibition on the chosen day , at the Cité Internationale des Congrès, Nantes
- Congress Portfolio, Final program, USB key (including all full papers)
- Coffee breaks, on the chosen day (morning and afternoon), at the Cité Internationale des Congrès, Nantes

Registration Cancellation Policy

All cancellations must be notified in writing (by mail, fax or email) to the Conference Office according to the following conditions and reimbursement will be processed AFTER the Congress:

- **Up to 30 June 2015:** 100 Euros will be withheld for administrative fee
- **After 30 June 2015:** no refund

Terms of Payment

The Organizing Committee has given mandate to MCI for the organization of its 11th European Wave & Tidal Energy Conference (EWTEC 2015). MCI is the sole competent company to receive payments for this Congress.

Payments may be made either:

- by credit card (Visa / Master Card / Eurocard / American Express)
- by cheque to the order of EWTEC 2015
- in cash

ACCOMMODATION

If you have used the conference office services to handle your reservation, please do not hesitate to ask the staff for information/assistance.

Please remember:

Without any information from participants, no shows on the first night will automatically cancel the entire reservation and involve the loss of the entire deposit. Should your arrival be delayed, please advise the conference office immediately.

Hotel reservation cancellation policy – for individual reservations

All cancellations must be notified in writing (by mail, fax or e-mail) to the Congress Office according to the following conditions:

- **Up to 10th of July 2015:** 50% will be refund
- **After 10th of July 2015:** no refund

PRACTICAL INFORMATION
In alphabetical order

Abstracts
Abstracts will be published electronically on the Conference Mobile Application.

Cellular phones
Participants are kindly requested to turn on silent mode their mobile phones when entering the meeting rooms and in the posters and exhibition areas.

Certificate of attendance
A certificate of attendance will be provided to all preregistered and on-site delegates.

Cloakroom
A cloakroom is located on the ground floor. Please make sure that no personal belongings are left after sessions closing each day.

Cloakroom is free of charge

Opening hours:

- **Sunday, 6 September, 2015:** from 16:30 to 19:15
- **Monday, 7 September, 2015:** from 08:30 to 19:15
- **Tuesday, 8 September, 2015:** from 08:30 to 19:15
- **Wednesday, 9 September, 2015:** from 09:00 to 19:15
- **Thursday, 10 September, 2015:** from 09:00 to 15:00

Conference Portfolio
A Conference Portfolio will be distributed to all delegates at the welcome desk. These portfolios are made of PET

Disabled persons access
A lift for disabled people is available at each level of the Cité Internationale des Congrès. Should you need further assistance, please do not hesitate to contact any of the Conference Staff.

Duplication, recording, photos
Photography, audio-taping, video-recording, digital taping or any other form of duplication is strictly prohibited in the session rooms and poster area. In the exhibition area, pictures or film are allowed if permitted by the concerned exhibitor.

First aid
For assistance, please contact any of the staff member.

Insurance and Liability disclaimer
The Centre National de la Recherche Scientifique (CNRS) – Délégation Bretagne et Pays de la Loire – and MCI cannot be held liable for any hindrance or disruption of Congress proceedings arising from political, social, health or economic events or any other unforeseen incidents beyond their control.

The congress cancellation conditions shall apply in any case. Registration of a participant entails acceptance of the cancellation conditions. It is recommended that participants obtain adequate cover for travel, health, accident and cancellation insurance before they depart from their countries.

The Centre National de la Recherche Scientifique (CNRS), Délégation Bretagne et Pays de la Loire and MCI as organizers will accept no liability for personal injuries sustained by or for loss or damage to property belonging to congress participants and accompanying persons either during or as a result of the Congress or during all tours and events.

Full papers
Full papers are available on the conference flash drive delivered to all registered delegates.
The collection of all papers will be permanently accessible on EWTEC website after the Conference.

Internet access
The Conference organizers have made available to the participants a WIFI access. This access is free of charge and is provided for the duration of the event.

Lost and found
Lost items should be returned to the Conference Welcome Desk (groundfloor). Should you lose anything, please report to this desk for assistance.

Lunches & Breaks
Lunches and breaks are included in the registration fees except for one day onsite registrations (lunches not included).

Smoking policy
Please note that smoking is prohibited by-Law within the Conference premises.

Rehearsal Room (Room M) - Level 4
A rehearsal room is at the disposal of speakers to review their slides.
Opening hours: same as welcome desks.

Telephones
For international calls to France, dial the international code followed by 33 and the correspondent's number (without the leading 0).

Transportation
The network of buses, tramway and busway is very dense in Nantes.
Visit the site of the public transport company **TAN** www.tan.fr and download the TAN mobile application

Delegates will have the opportunity to buy tram passes at a reduced rate (40% discount) directly at the registration desk. Limited number of passes. First come-first served!

Tourist Information – Voyage à Nantes
For touristic information and booking of tours, please address to the Voyage à Nantes desk located in the welcome area.

Opening hours:

- **Sunday, 6 September:** 16:30 to 19:00
- **Monday 7 September:** 08:00-16:00
- **Tuesday 8 September and Wednesday 9 September:** 10:00-12:00
- **Thursday 10 September:** 10:00-12:00

Useful telephone numbers
For each service below:
- first number can be dialled from landlines in mainland France
- second number can be dialled from abroad (a landline or with non-French mobile network operators)

- **Nantes Atlantique Airport:** + 33 8 92 56 88 00
- **Orly Airport:** + 33 8 92 56 39 50
- **Roissy-Charles de Gaulle Airport:** 3950 / + 33 1 70 36 39 50
- **Air France :** 3654/ + 33 8 92 702 654
- **SNCF** (French National Railways) : 36 35/ +33 8 92 35 35 35
- **Allo taxi nantes:** +33 2 40 69 22 22

SUSTAINABILITY COMMITMENT

The 11th EWTEC integrates sustainable actions throughout its organization. It therefore aims to minimize the negative impacts of the event on the environment and to increase the positive social and economic benefits of the event for the Nantes region. In supporting local associations PP Plastic Pickup and the Transformeurs, the 11th EWTEC is willing to contribute to the protection of the ocean environment and to encourage waste limitation and valorization.

Eco-responsible actions cover the following fields:

• **VENUE SELECTION:** La Cité, Nantes Event Center is an eco-responsible venue. It is highly supporting Ewtec organizers in the eco-design approach of the conference (waste management, recycling, energy saving)

• **TRANSPORTATION:** Encouragement to use public transportation: EWTEC is offering participants the opportunity to by a tram pass at a reduced rate of 40%. EWTEC will provide one return tram ticket to reach the gala dinner place. Encouragement to walk: get some fresh air, a little exercise and see a little more of the surroundings! Encouragement to offset through the registration website carbon emission

• **WATER SAVING:** Limitation of waste of water (water will be served in pitchers)

• **CATERING :** choice of local, seasonal or fair-trade products

• **DELEGATES MATERIAL:** selection of eco-friendly products. Lanyards and portfolio are made of PET, a fabric made from recycled plastic bottles, USB Flash drives made of biodegradable corn, pads and pens made of recycled paper

• **COMMUNICATION:** use of digital support, effort to reduce paper. Programme badges printed on FSC certified paper

• **ACCOMMODATION:** selection of hotels located close the conference venue and committed to sustainable development

• **RAISING OF AWARENESS:** About ocean pollution in supporting the ocean structure project.

What is the OCEAN Structure Project?

This project is an initiative by PP Plastic Pickup, a non-profit organization based in Nantes, France. Plastic Pickup's main objectives are to raise public awareness about marine pollution and to encourage waste collection by the public. Plastic Pickup organizes clean-up actions at a local and national level in cooperation with other associations such as Surfrider Foundation and Let's do it France.

The project is simple: it will consist in the OCEAN word in large metal letters, that will be used to contain and display all the plastic trash collected by volunteers during and after clean-up actions. With such an imposing and visible metal structure, the association aims to surprise, challenge, raise awareness and to educate the public about the impact of waste on nature and on the urgent need to fight against pollution.

Thanks to your donations, the OCEAN structure will be presented for the first time at the Cité Internationale des Congrès of Nantes as part of the 11th EWTEC exhibition.

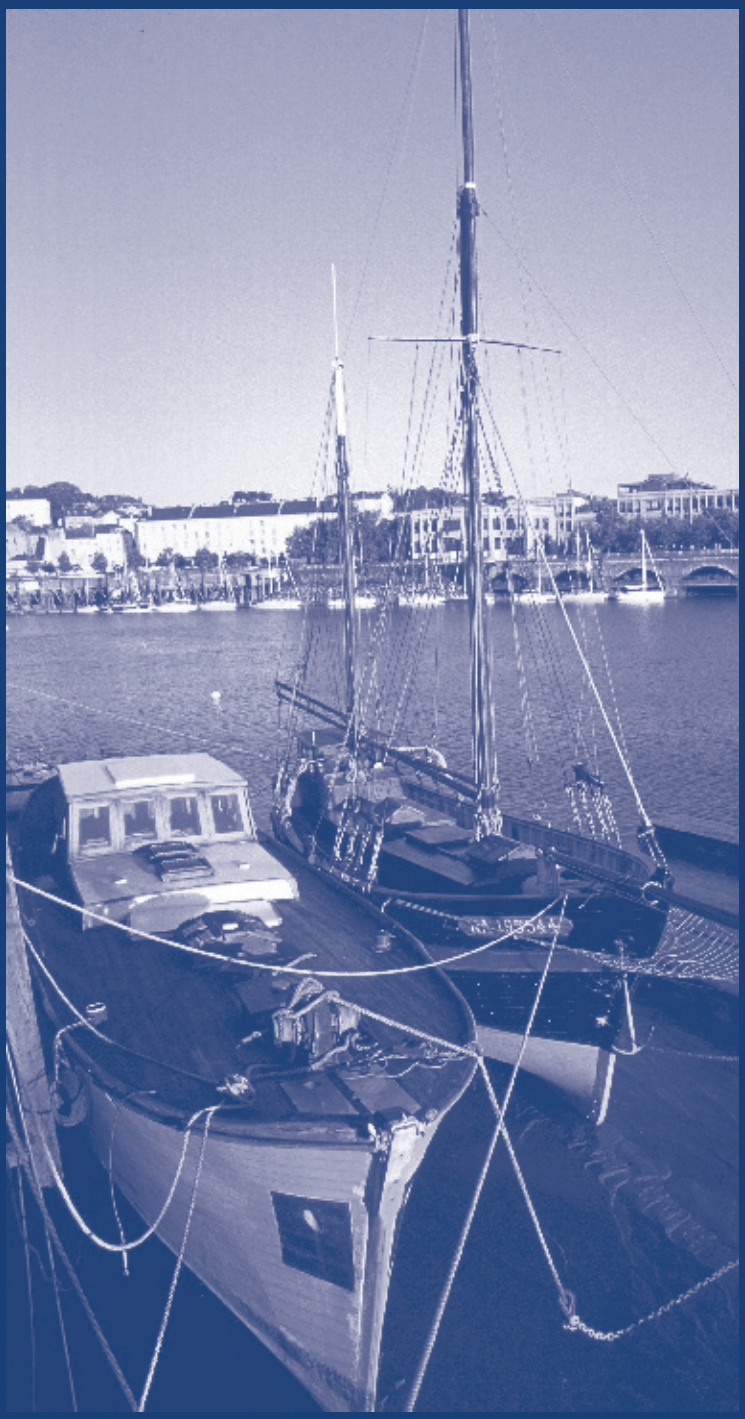
The OCEAN structure is an artistic upcycling creation by the Transformeurs, a local association that offers an innovative and responsible second life to used objects and materials.

YOU WANT THE OCEAN STRUCTURE TO BE THE LEGACY OF THE CONGRESS?

Donate to Plastic Pickup

PP PLASTIC PICKUP ASSOCIATION (Non profit organization)
Address: 5, rue Julien Douillard, 44400 Rezé
Contact: Laurent Authier, **Email:** contact@plastiques.eu
Web: www.plastiques.eu

plastiques.eu
PP Plastic Pickup



SOCIAL PROGRAMME

The Local Organizing Committee has set up a specific social events programme for the 11th European Wave & Tidal Energy Conference attendees.

The different activities will be good opportunities for congress delegates and exhibitors to meet and renew old acquaintances or establish new links.

1st EWTEC REGATTA - Sunday 6 September

On Sunday the 6th, before beginning the serious work program, a sailing afternoon in the bay de la Baule is organized. The EWTEC Local Organizing Committee has set up the First EWTEC Regatta on J80 sailing ships. Departure from the Nantes Convention Center at 10:00, and return at 18:00, just in time to take part in the EWTEC 2015 Welcome Reception.

WELCOME RECEPTION - Sunday 6 September
Cité Internationale des Congrès, ground floor, 17:30 – 19:00

This reception is kindly sponsored by Elsevier

A Welcome Reception will be offered to all attendees within the premises of the Congress Center.
Do not miss this get together party. Delegates, accompanying persons and exhibitors are most welcome.
You will enjoy a tasting of regional products, food and wines and good music.

The Conference registration desk will be open to permit advanced registration of all EWTEC delegates.

Included in the registration fees




Musical entertainment

The BLUE QUINTET, composed of musicians from the Nantes University Jazz Orchestra, proposes a repertoire centered on the traditional jazz. The group proposes tunes from the dixieland style and well-known standards of the middle jazz period. This cheerful repertoire, punctuated by hot solos and rousing collectives, will create a pleasant, lively and even dance atmosphere.



PERSONAL:
Saxophones : Rodolphe VAGNER
Guitare : Mathieu LAGRAULA
Trompette : Jean-François PETIOT
Orgue : Bruno DENIS
Batterie : Franck RAYMOND

GALA DINNER - Wednesday 9 September
"Les Machines de l'Ile", 19:30 – 23:30

Nantes has a sparkling lively art scene. One of the most famous company «Les Machines de l'île» is a totally unprecedented artistic project. Born from the François Delarozière and Pierre Orefice's imagination, it is at crossroads of Jules Verne's «invented worlds», of the mechanical universe of Leonardo da Vinci, and of Nantes' industrial history, on the exceptional site of the former shipyard. Our Gala dinner will take place in the heart of this amazing building surrounded by the most impressive art installations.

The «Galerie des Machines» entertainment is kindly sponsored by ALSTOM

Pratical information:
- No transportation provided
- Get the official invitation and access map from the social events desk
- **Dress code :** casual chic

A few seats remain available!

Subject to availability; Inquire at the social event desk

Included in the delegate registration fees
Extra ticket: 120 € VAT for onsite registrations, accompanying person and exhibitors

PUBLIC EXHIBITION ON EMERGING MARINE RENEWABLE ENERGIES

On the occasion of the EWTEC 2015 conference, the LHEEA lab (Ecole Centrale de Nantes/CNRS) will organize a public exhibition on Marine Renewable Energies.

The exhibition will take place from 6 to 10 September in the main hall of the Cité des Congrès of Nantes.

It will be open from Sunday to Wednesday from 13:00 to 18:00. Access will be free.

The exhibition aims to introduce the public to the different types of emerging marine renewable energies, describing the operating principles and the maturity of the technologies, highlighting the remaining technological and scientific challenges.

The exhibition will be organized in eight areas:

- Floating Offshore Wind
- Tidal energy
- Wave energy conversion
- Hybrid platforms
- Grid connection
- Economic and environmental impacts
- Experimental and numerical research tools
- Training and education on Marine Renewable Energies in Region Pays de la Loire

Posters, models and videos will highlight the key aspects on these topics in an exhibition area over 300 sqm. Guided tours can be organized for subscribers from Monday to Wednesday. PhD students and researchers LHEEA will lead these visits (lasting about 1 hour).

Sponsors: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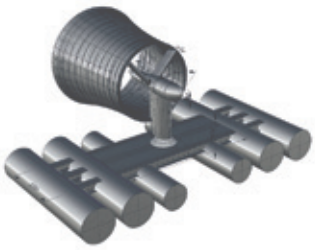
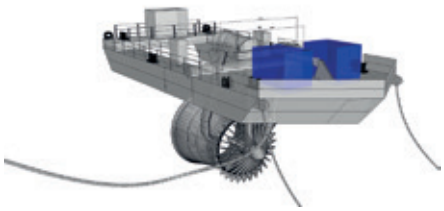
- ERDF project - Brittany region
- 4m turbine on seabed
- Free slewing with tide flow
- Etel estuary - France
- 2016/2017



Rivers - floating turbines

- H2020 E.U. project
- 4m floating turbine
- Connected to the national grid
- Danube - Romania
- 2017/2018



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