CORE 2016

2nd International Conference on Offshore Renewable Energy

12 — 14 September 2016

Glasgow City Hotel
Cambridge St, Glasgow
G2 3HN
UK

- Drinks Reception and Conference Dinner
- Workshop on Offshore Floating Wind Turbines—Support Structures
- Keep up to date with Offshore Renewable Energy Resources & Systems

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Conference Programme Day One: 12th September

08:25 — 08:55 **Delegate Registration**

08:55 — 09:00 **Welcome Address**

09:00 — 09:40 Keynote Paper: **Wave and Tidal Energy R&D - Achievements and Direction**, Professor Robin Wallace, The University of Edinburgh, UK

09:40 — 10:20 Keynote Paper: **Status of Marine Energy**, Professor AbuBakr S Bahaj, The University of Southampton, UK

10:20 — 10:40 Invited Paper: **Tribology issues in Tidal Turbine Technologies**, M. Stack, University of Strathclyde, UK

10:40 — 11:10 Break

11:10 — 11:30 Invited Paper: **Tides and tidal power from a historical perspective**, A. Borthwick, The University of Edinburgh, UK

11:30 — 11:50 **The Multi Rotor Solution for Large Scale Offshore Wind Power**, P. Jamieson, University of Strathclyde, UK

11:50 — 12:10 **Reliability based format for the design of wind turbine jacket pile foundations,** P.K. Das; M.R. Notley, E Padayattil; I. Cortizo; T. Hodgson; G. McCann; T. Camp, ASRANet Ltd, UK; Atkins Global, UK & DNV GL, UK

12:10 — 12:30 **50 MW test scheme for new offshore wind technologies**, B. Bizet, Danish Ministry of Energy, Utilities and Climate, Denmark

12:30 — 14:00 Lunch

10:20 — 12:30 Parallel Session

10:20 — 10:40 **The SeaWEED energy converter: an introduction,** W. Qui, A. Vogler, T. Gardiner, B. Lundrigan, H. Peng, University of the Highlands and Islands, UK, Memorial University of Newfoundland, Canada

10:40 — 11:10 **Break**

11:10 — 11:30 **An environmental assessment of wave energy converter arrays and their effect on the surrounding wave field,** B. Elsaesser, Queen's University Belfast, UK

11:30 — 11:50 **Fatigue life assessment of existing offshore wind turbines,** W. Weijtjens, N.Noppe, T.Verbelen & C.Devriendt, Universiteit Brussel, Belgium

11:50 — 12:10 **Project schedule assessment with a focus on different input weather data sources**, D. Bendlin, T. Panteleon; J.Buschmann; S. Parker, Fraunhofer IWES, Bremerhaven, Germany

12:10 — 12:30 **An experimental study of "Jellyfish" ocean Wave Energy Converter,** M. Masoumi; R. Maramara; Y. Masurekar, State University of New York, Stony Brook, USA, Brimes Energy, USA

12:30—14:00 **Lunch**

14:00—17:30 **Workshop — See Page 10 for more details**

Workshop on Offshore Floating Wind Turbine: Support Structures, Dr Maurizio Collu, Cranfield University, UK

15:00– 15:30 **Break**

Conference Programme Day One: 12th September

14:00 — 14:20	**Resource Assessment of Offshore Wind Farm Operation In the Caribbean**, C. Cassar, ASRANet Ltd, UK
14:20 — 14:40	**The Subhub Tidal Foundation Platform**, J. Smith**,** QED Naval, UK
14:40 — 15:00	**Assessment of tidal energy potential along the Gulf of Khambhat, Gujarat, India**, S. Kumar; B. Ramakrishan; Vengatesan, Indian Institute of Technology Bombay, India; The University of Edinburgh
15:00 — 15:30	**Break**
15:30 — 15:50	**Increased ROI from Offshore Wind turbines through Minimisation of Blade Angle Deviation and Rotor Imbalance**, C. Heilmann; A. Grunwald; M. Melsheimer, BerlinWind, Germany
15:50 — 16:10	**Design of a small wind generator for the experimental study of floating offshore wind turbines** , J. Guichard, M. Hann, D. Greaves, G. Iglesias, D. Simmonds, Plymouth University, UK
16:10 — 16:30	**Resurrection of the VAWTs**, E. Mak, New Forest, UK
16:30 — 16:50	**Mesoscale Models as Alternatives to Meteorological Masts,** P. Argyle; S. Watson, Loughborough University, UK
14:00—17:30	**Workshop — See Page 9 for more details** **Workshop on Offshore Floating Wind Turbine: Support Structures**, Dr Maurizio Collu, Cranfield University, UK
15:00– 15:30	**Break**
19:00	**Civic Reception: Glasgow City Chambers**, George Square, G2 1DU

Conference Programme Day Two: 13th September

8:40— 9:20	**Keynote Paper: The importance of understanding the flow impedance of tidal stream channels and how this might change turbine design and increase estimates of the tidal steam resource** Professor Stephen Salter, The University of Edinburgh, UK
9:20— 10:00	**Keynote Paper: Offshore Wind: The Cost Reduction Journey,** Dr Ignacio Marti, ORE Catapult, UK
10:00—10:20	**Robotized manufacturing of rubber components for commercialization of the Uppsala University Wave Energy Converter Concept**, E. Hultman, M. Leijon, D. Salar and E. Åberg, Uppsala University, Sweden
10:20 — 10:40	**Experimental testing of tidal turbines in realistic & idealised conditions**, B. Elsaesser; C. Frost; P. Jeffcoate, Queen's University Belfast, UK & Sustainable Marine Energy Ltd, UK
10:40 — 11:10	**Break**
11:10 — 11:30	**Fuzzy Modelling and Identification for Sustainable Control Design of an Offshore Wind Farm**, S. Simani; S. Farsoni; P. Castaldi, University of Ferrara, Italy; University of Bologna, Italy
11:30 — 11:50	**Performance Evaluation Of An Innovative Device To Transform Wave Power Into Electric Energy In Ports And Harbours,** A. Danelli; M. Peviani, Research on Energy Systems, Italy
11:50 — 12:10	**Fatigue performance of GFRP composite tidal turbine**, H. Gonabadi, Newcastle University, UK
12:10—12:30	**Development and commercialisation of a floating wind and wave hybrid,** C. McConville, Floating Power Plant, Denmark
12:30 — 14:00	**Lunch**
10:00 — 12:10	**Parallel Session**
10:00—10:20	**Brief Study about Wind Energy as Renewable Energy: History, Sustainability And Impacts**, M. M. Custodio, C. C. Lima, Escola Superior Dom Helder Câmara, Minas Gerais, Brazil
10:20—10:40	**Experimental verification of a back-to-back 2L-3L grid connection system for a marine current energy converter,** S. Apelfrojd; K. Thomas; M. Leijon, Uppsala University, Sweden
10:40 — 11:10	**Break**
11:10 — 11:30	**Pneumatic orifice calibration, investigation into the influence of test rig characteristics on calibration results**, P. Benreguig; F. Thiebaut; J. Murphy, University College Cork, Ireland
11:30 — 11:50	**Risk assessment of an offshore wind turbine and remaining useful life estimation of the power converter. Improving availability by prioritising failures with higher risk to operation**, M. Sepulveda; P. Davies; M. Spring; J. Shek; P. Thies; E. Oterkus, The University of Edinburgh, UK & Lloyd's Register, UK
11:50—12:10	**Non-floating Non-submersible sea wave energy converter,** G. Bharathi, Central Leather Research Institute, Chennai
12:30—14:00	**Lunch**

Conference Programme Day Two: 13th September

14:00 — 14:20	**All Electric PTO with Magnetic Gearing for Wave Energy Converters**, M. Cowie, M. Wilson, D. Rodger, H.C. Lai, C. Britton, M. Brand and P. Brewster, Ecosse Subsea Ltd, Bathwick Electrical Design Ltd, Supply Design Ltd and Pure Marine Gen Ltd UK
14:20 — 14:40	**The effect of wave-current interactions with Tidal Stream Turbines on 3D flow measured with Particle Image Velocimetry in a laboratory flume**, L. Jordan; S. McLelland; B. Murphy; D. Parsons, University of Hull, UK
14:40 — 15:00	**Numerical Investigation of Wave Excitation Forces on a Submerged Pressure Differential Wave Energy Converter,** C. Windt, J. Tchoufag, M. R. Alamm, TU Hamburg
15:00 — 15:30	**Break**
15:30 — 15:50	**Coupled RANS-VOF modelling of floating tidal stream**, E. Ransley; S. A. Brown; D. M. Greaves; S. Hindley; P. Weston; E. Guerrini, Plymouth University, UK; Mojo Maritime Ltd, UK; A&P Group Ltd, UK & Modular Tide Generators Ltd, UK
15:50 — 16:10	**Study on utilisation of the amplified wave height inside a perforated chamber by a heaving plate model,** P Krishnendu; R.Balaji, Indian Institute of Technology Bombay, India
16:10 — 16:30	**Actuator-Line CFD Modelling of Tidal Stream Turbines**, D. Apsley; P.K. Stansby; T. Stallard, The University of Manchester, UK
16:30 — 16:50	**A Lookup Table Approach to Determining Wind Turbine Operational Fatigue Loading from Wind Field Measurements**, E. Hart; M. Keegan; D. McMillan, University of Strathclyde, UK
14:00—16:50	**Parallel Session**
14:00 — 14:20	**Offshore renewable energy in Canary Islands. Energy resource and testing activities**, J. González; V. Monagas; X. Remírez; E. Hernández-Brito; O. Llinás, PLOCAN, Spain
14:20 — 14:40	**Analysis of End-Stop Parameters on the Performance Heaving Point Absorber Wave Energy Converters**, C. Wright, V. Pakrashi, J. Murphy, University College Cork, Ireland
14:40 — 15:00	**Non-Linear Numerical Simulation of a Point Absorber Type Wave Energy Converter**, S. Jin, B. Guo, R. Patton, J. Gilbert & M. Abdelrahman University of Hull, UK
15:00 — 15:30	**Break**
15:30 — 15:50	**A Methodology for representing the effect of vertical-axis turbines on the flow,** V. T. Nguyen; S. S. Guillou; J. Thiebot; A. S. Cruz, Normandy University, UNICAEN, LUSAC, France, Hanoi University of Mining and Geology, Vietnam
15:50 — 16:10	**Reducing the Levelised Cost of Energy on Tidal Energy converters through an Adaptive Control System Optimisation,** J. P. Echenique, The University of Edinburgh, UK
16:10 — 16:30	**An Innovative Electromechanical Ocean Energy Converter,** E. Renzi, M. Discacciati, Loughborough University, UK
16:30 — 16:50	**Selection of the most appropriate Life Extension Strategy for Offshore Wind Turbines using Multiple Criteria Decision-Making Technique,** M. Shafiee; I. Animah, Cranfield University, UK
19:00	**Conference Dinner:** Glasgow City Hotel, Cambridge St, Glasgow , G2 3HN , UK

Conference Programme Day Three: 14th September

09:30 — 9:55 **Invited Paper : The Hydrodynamics of floating air-filled bags for wave energy conversion ,** D. Greaves, Plymouth University, UK

9:55 — 10:20 **Applicability of Vertical Microstructure Profiler measurements in high current streams**, S. Guillou; E. Poizot; Y. Méar; M. Shahsavarifard; A. H. Birjandi; E. L. Bibeau, LUSAC, University of Caen, France; University of Manitoba, Canada

10:20 — 10:40 **Combined loads of wind and waves on offshore floating wind turbines**, J. Guichard, Plymouth University, UK

10:40 — 11:10 **Break**

11:10 — 11:30 **Performance of A Point Pivoted WEC Equipped with a Linear Ball Screw Generator in Regular Wave Conditions,** A. Vogler; D. Coiro; G. Troise; F. De Luca; L. Castellini; G. Alessandri; C. Greenwood, University of the Highland and Islands, UK; University of Naples, Italy; Seapower Scrl, Italy & UMBRA Cuscinetti S.p.A., Italy

11:30 — 11:50 **A Simulation Tool to Enable design for Reliability for Tidal Turbine**, C. Bittencourt, B. Waldron, A. Zymaris, N. Kakalis, DNV GL, Greece; UK

11:50—12:10 **Adaptive Fault Detection and Tracking for a Wind Turbine Generator using Kalman Filter Raed**, K. Ibrahim; A. Daniyan; S. J. Watson, Loughborough University, UK

12:10—12:30 **Optimization of the trade-off between the life-cycle costs and reliability of wind turbine**, A. H. Nithin, P. Omenzetter, University of Aberdeen, UK

12:30 — 14:00 **Lunch**

09:40 — 12:30 **Parallel Session**

09:40 — 10:00 **Steel / concrete connections for floating wave energy converters**, L. Ewart; D. Findlay; N. Barltrop; P.R.Thies; T.Stratford, The University of Edinburgh, UK; Albatern, UK; University of Strathclyde; University of Exeter, UK

10:00 — 10:20 **Assessing the full scale performance of tension pile foundations under monotonic and cyclic shearing using direct shear tests**, S. Donohue; P. Bergamo, Queen's University Belfast, UK

10:20—10:40 **Life Extension for Wind Turbine Structures and Foundations,** T. Rubert; P. Niewczas; D. McMillan, University of Strathclyde, UK

10:40 — 11:10 **Break**

11:10 — 11:30 **Hydrodynamic Response Of Three And Four Column Floater For Vertical Axis Wind Turbine,** K. Rajeswari; S. Nallayarasu, IIT Madras, India

11:30 — 11:50 **Development of an economical and insured TLP substructure for a 6MW wind turbine – use of steel concrete composite material,** F. Adam**,** GICON Consult GmbH, Germany

11:50—12:10 **Developing a commercial scale Salter's Duck WEC device**, R. Maramara; M. Masoumi, Brimes Energy, USA, State University of New York, Stony Brook, USA

12:10—12:30 **Scada-Based Thrust Force Estimation of an Offshore Wind Turbine,** N. Noppe, A. Iliopoulos, W. Weijtjens, C. Devriendt, Offshore Wind Infrastructure lab (OWI-lab), Belgium

12:30—14:00 **Lunch**

Conference Programme Day Three: 14th September

14:00 — 14:20	**Choices of Turbulent Closure Model for Hydrodynamics Simulation in the Pentland Firth**, A. Rahman; V. Venugopal, The University of Edinburgh, UK
14:20 — 14:40	**Empirical Analysis of the Wave Climate at the Danish Wave Energy Centre**, A. Têtu; J. P. Kofoed, Aalborg University, Denmark
14:40 — 15:00	**An overview of the monitoring activities of OWI-lab in the Belgium offshore wind-farms for the optimization of design, O&M and life-time assessment**, J. Helsen, C. Devriendt, W. Weijtjens, P. J. Jordaens, S. Milis, OWI-lab, Belgium
15:00 — 15:30	**Break**
15:30 — 15:50	**The Articulated Wind Column (AWC) as a cost effective solution for mid to deep water environments**, G. Lees, ODE Limited, UK
14:00 — 15:50	**Parallel Session**
14:00 — 14:20	**Development of Heat-Activated Powder Epoxies for Manufacturing of Thick-Section Wind and Tidal Turbine Blades using Vacuum-Bag Only Processes**, A. Lafferty; J. M. Maguire, A. S. Roy, C. M. Ó. Brádaigh, University of Edinburgh and University of Limerick, UK & Ireland
14:20 — 14:40	**Message Passing for Optimising Electricity Distribution**, E. Harrison, D. Saad, K. Y. Michael Wong, Aston University, UK
14:40 — 15:00	**Challenges in Representing Tidal Turbine Using Actuator Disc Concept for Large Scale Ocean Modelling**, A. Rahman; V. Venugopal; J. Thiebot, The University of Edinburgh, UK & Normandie University, France
15:00 — 15:30	**Break**
15:30 — 15:50	**Calibration of wave fatigue conditions in coupled wind-wave analysis of Offshore WTG Substructures**, T. Hodgson, N. Sampathkumar, I. Cortizo, ATKINS, UK
15:50	**Conference Close**

About Keynote Speakers

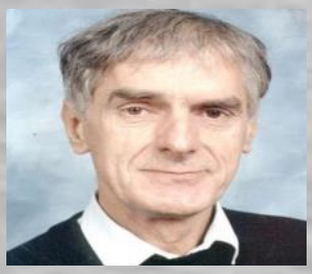
Dr Ignacio Marti

Ignacio joined the ORE Catapult Management team as part of the merger with Narec, where he was Chief Technology Officer. Prior to joining Narec in November 2012, Ignacio had spent 20 years working in the renewables industry in Spain, latterly at CENER where he worked up to the executive position of Technical Director for Research & Development (R&D). After completing an MSc in Physics at the University Complutense of Madrid in 1994, he began work as a researcher in the Wind Energy Department of Ciemat, a Spanish Research Centre, specialising in energy and the environment. Ignacio then worked on private and EU funded R&D programmes before moving on to head-up the Wind Resources Assessment and Forecasting Research Group at Ciemat. Between 2002 and 2009, as Head of Wind Resources and Forecasting Service at CENER. In October 2013, he was elected Vice Chair of the "Implementing Agreement on Wind Energy" Executive Committee of the International Energy Agency

Prof Robin Wallace

Prof. Robin Wallace graduated B.Sc. in 1976 and Ph.D. in 1990 at the University of Edinburgh. Between these times he worked for Parsons Peebles Motors and Generators project-engineering turnkey power generation systems around the world, mainly in small-hydro. He holds a personal chair in Renewable Energy Systems and founded The Institute for Energy Systems in the School of Engineering at the University of Edinburgh where he is now Dean International in the College of Science and Engineering. His research interests include marine energy development and smart-grids, specifically the interaction of distributed renewable energy generation with the autonomous electricity networks. He has has supervised 18 PhD students to completion, while publishing over 100 papers. He is Executive Director of the EPSRC SuperGen UK Centre for Marine Energy Research, a Director of the FloWave Ocean Energy Research Facility and a founding Co-Director of the Scottish Energy Technology Partnership. He has established research collaborations between the Institute and partner universities in many countries including USA, Canada, India, Taiwan, China and Chile. He is a Fellow of the Royal Society of Edinburgh and The Institution of Engineering and Technology and is a Chartered Electrical Engineer.

Prof Stephen Salter



Stephen Salter is Emeritus Professor of Engineering Design at Edinburgh University. After an apprenticeship in the aircraft industry as fitter and toolmaker on hovercraft and the Black Knight rocket he did a degree at Cambridge. He has worked on noise recording from birds eggs, astronomical instruments, robots, energy from wind, waves and tidal streams, desalination, voter-friendly traffic congestion, computer-controlled hydraulics, flood prevention, mine clearance, suppressing explosions, increasing the capacity of road bridges and now on the design of seagoing hardware to reverse global warming by making clouds whiter. Reports of his retirement are exaggerated. He likes very short introductions.

Prof AbuBakr Bahaj

AbuBakr Bahaj leads the 55-strong Energy and Climate Change Division at the University of Southampton, where he completed his PhD, progressing from a researcher to a Personal Chair in Sustainable Energy. For more than 25 years, Professor Bahaj has pioneered sustainable energy research and established the energy theme within the University. His major research programmes can be found at www.energy.soton.ac.uk. These include Marine Energy, Solar Photovoltaics, Cities and Infrastructure, Data and Modelling, Energy and Behaviour, Energy and Buildings, Energy for Development, Environmental Impacts, and Microgeneration Technologies. Professor Bahaj's work has resulted in over 270 articles, published in academic refereed journals and conference series of international standing. He founded the International Journal of Marine Energy (IJOME) which he is the Editor-in-Chief. In 2012, Prof Bahaj was appointed Chief Scientific Advisor to Southampton City Council—believed to be the first such appointment in the UK and in 2014, the UK's Science Council named him as one of the UK's 100 leading practising scientists.

Workshop on Offshore Floating Wind Turbine: Support Structures

Course Overview

The need to further harness offshore wind resources to increase renewable energy generation is pushing offshore wind turbine projects into waters deeper than 50 m, where floating support foundations are more economically viable than fixed support foundations. After a number of prototypes deployed offshore, the first offshore floating wind farms have been approved and are being developed (such as Oregon WindFloat Pacific's floating wind farm and Hywind Scotland Pilot Park4).

The novelty of the fields is raising a lot of questions: why floating? Which floating support structure is the most suitable? How to perform their conceptual design taking into account the complex set of requirements? In this workshop, we will explain first of all why floating wind turbines can be advantageous, and which one are the main challenges.

We will then see how floating wind turbine systems are classified, covering the fundamentals, and we will propose a methodology to choose the most suitable floating support structure for a given wind turbine and location, exploring the design driving criteria.

To finish, we will see a preliminary design methodology for floating wind turbines.

You Will Learn To:

- Explain what are the main advantages and challenges for offshore floating wind turbines and why the industry is moving toward floating wind turbines
- Understand the methodology used to classify offshore floating wind turbine systems, and recognize the main advantages and disadvantages of each type
- Develop and use a flexible multi-criteria decision methodology to determine the most suitable floating support structure, for a given wind turbine and location
- Fundamental steps for the conceptual design of an offshore floating wind turbine

Course Outline

- Introduction
- Why floating?
- Main floating support structure types, and classification
- A multi-criteria decision methodology to choose the most suitable floating support structure
- Understand the basic steps of the conceptual design of a floating support structure for an offshore floating wind turbine

Material Provided

The attendants will be provided with a copy of the presentation, and copies of relevant journal and conference papers authored and co-authored by the instructor.

Instructor

Dr. Maurizio Collu is Senior Lecturer in Dynamics of Offshore Structures at Cranfield University, CEng, MRINA, FHEA, MEI. He is also the Course Director of the 5 MScs in Offshore and Ocean Technology at Cranfield University. Working in the Offshore Renewable Energy Engineering Centre, he is leading the conceptual and preliminary design of offshore support structures for the emerging floating wind turbine industry.

He collaborates with renewables start-up and SME performing the conceptual and preliminary designs of floating support structures for the offshore renewable devices.

He had been in charge of the conceptual design of the floating support structure in the £2.8m ETI funded project NOVA, and coordinated the development of a coupled model of dynamics for floating wind turbines for the EU funded FP7 project H2Ocean.

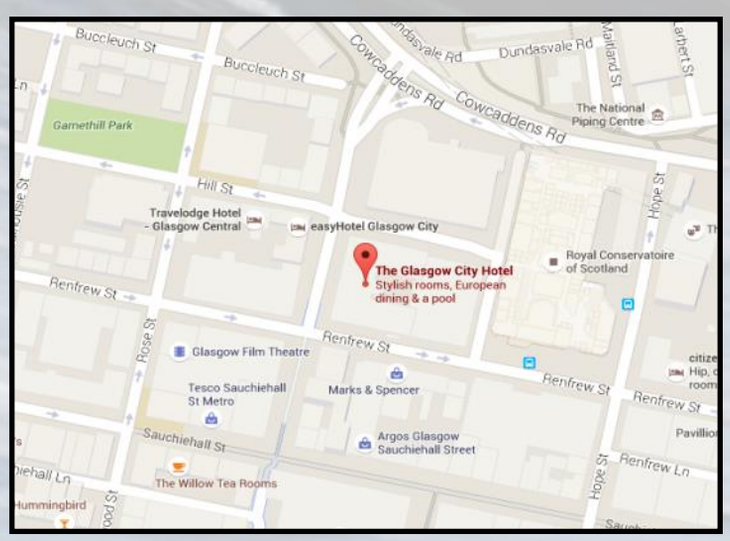
He is serving on the ITTC Ocean Engineering Committee from September 2014, and he regularly presents his work at international seminar and peer-reviewed conferences on the topic (OMAE, EWEA, ISOPE). Maurizio sits in the OMAE Ocean Renewable Energy technical committee since 2012. He regularly publishes on the topic on international, peer-reviewed journals, and is reviewer for a number of ocean engineering and energy international journals. He wrote the chapter on "Design of Offshore Floating Wind Turbines" in a new multi — contributor Elsevier book entitled "Offshore Wind Farms: Technologies, Design & Operation" to be released in March 2016.

CORE 2016 Venue

Conference Venue

The Venue for the conference will be located in the heart of Glasgow city centre at The Glasgow City Hotel. With a central location in the heart of Glasgow City Centre, and only 15 minutes from Glasgow International Airport, Glasgow City Centre Hotel is a popular choice for both business visitors and leisure travellers alike. You really are in the heart of the city and you will find this luxury Glasgow hotel is the ideal base from which to explore the historic, sporting and leisure attractions of a former European Capital of Culture.

The Glasgow City Hotel
Cambridge Street,
Glasgow - G2 3HN

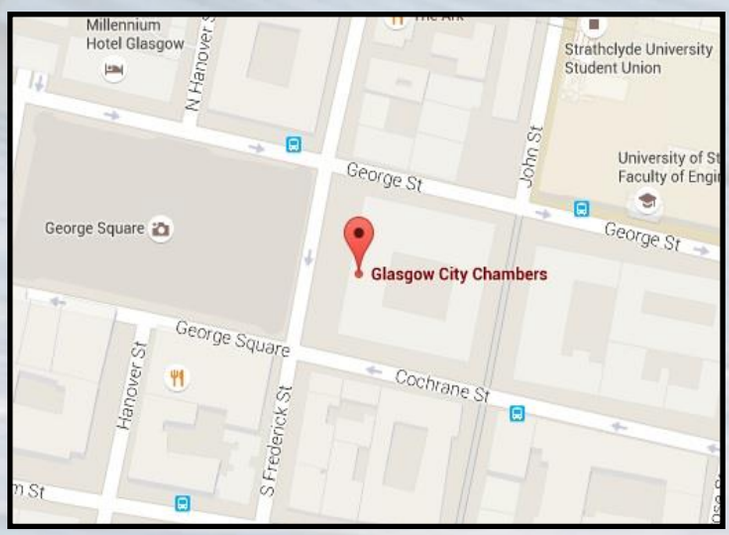


Conference Dinner:
13th September 2016
19:00

Civic Reception Venue

CORE 2016 Delegates will also be treated to a Civic Reception in Glasgow's Picturesque City Chambers. Built in the 19th Century, the building is eminent example of Victorian Architecture. Famous visitors, including the British Royal family have signed the visitor book here.

Glasgow City Chambers
George Square
Glasgow - G2 1DU



Civic Reception:
12th September 2016
19:00

Registration

You can register for the CORE 2016 Conference by sending us the below given form or register online at http://www.asranet.co.uk/Conferences/OffshoreRenewableEnergy

Name (PLEASE PRINT) _____

Designation _____

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Address _____

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☐ **I wish to register for the Conference at a normal cost of £450 [£300 for students only] plus VAT (UK only)**

☐ **Please invoice me at the above address**

☐ **Please send me information on local hotels**

Signature _____

Date _____

The completed forms together with a cheque in pounds sterling payable to ASRANet Ltd. should be sent to us by post or email:

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5 St Vincent Place
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Sponsorship & Exhibition Space

Sponsorship

Cost £2,250

Package Includes

- 2 Free Delegate Registration
- Company Logo in the Conference Programme
- Company Logo in the Book of Abstracts
- Company advert in the Book of Abstract (A4 Size)
- Advert in the Conference Proceedings (USB)

Exhibition

Cost £1,125

Package Includes

- 1 Free delegate registration
- 1 Display table (1800 x 1200 mm)
- Display material: Published material, Structural component
- Display Banners

Contact

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