



Sixth International Symposium on  
**ENERGY CHALLENGES  
AND MECHANICS**  
Towards a Big Picture

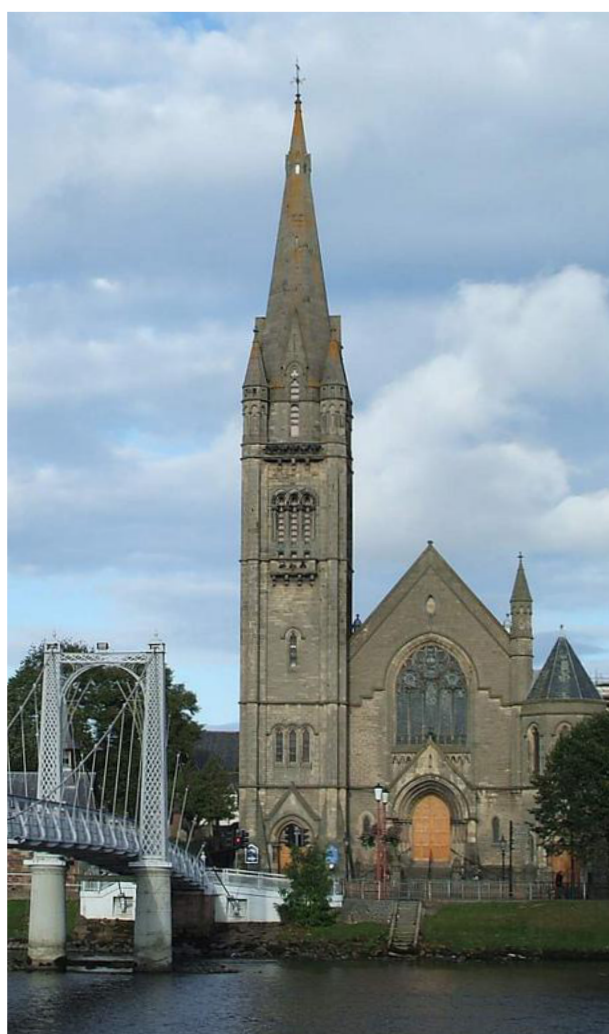
**Conference Guide**

Kingsmills Hotel, Culcabock Road  
Inverness IV2 3LP Scotland, UK

14 - 18 August 2016

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# A WELCOME LETTER

Distinguished Delegates,

Welcome to Inverness— the capital of the Scottish Highlands and the happiest place in Scotland according to recent surveys. In addition to your professional advancement over the course of our gathering, we hope you're able to fully experience the rich cultural and scenic offerings of this area.

The purpose of this symposium is to gain a big picture about energy challenges and their operating mechanics. This requires creative solutions and cross-disciplinary collaborations among you – the engineers, scientists, ecologists, regulators, administrators, and policy advisers gathering from many nations around the world. This is the call that brings us all here today.

On behalf of the scientific committee and planning team we thank you for being here— your commitment and passion could not be more evident. We look forward to observing the relationships that form this week and wish you a most productive and enjoyable conference.

Welcome to ISECM 2016!



Best Regards,

Dr. Henry Tan  
Conference Chairman  
University of Aberdeen

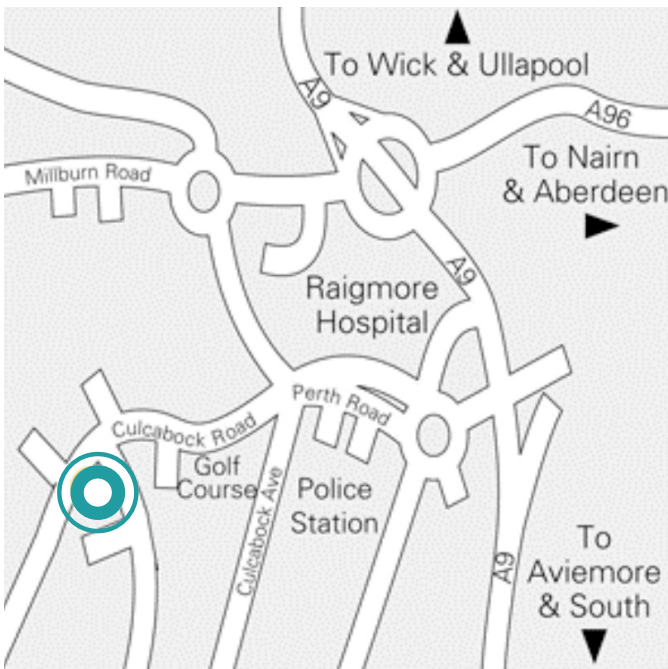
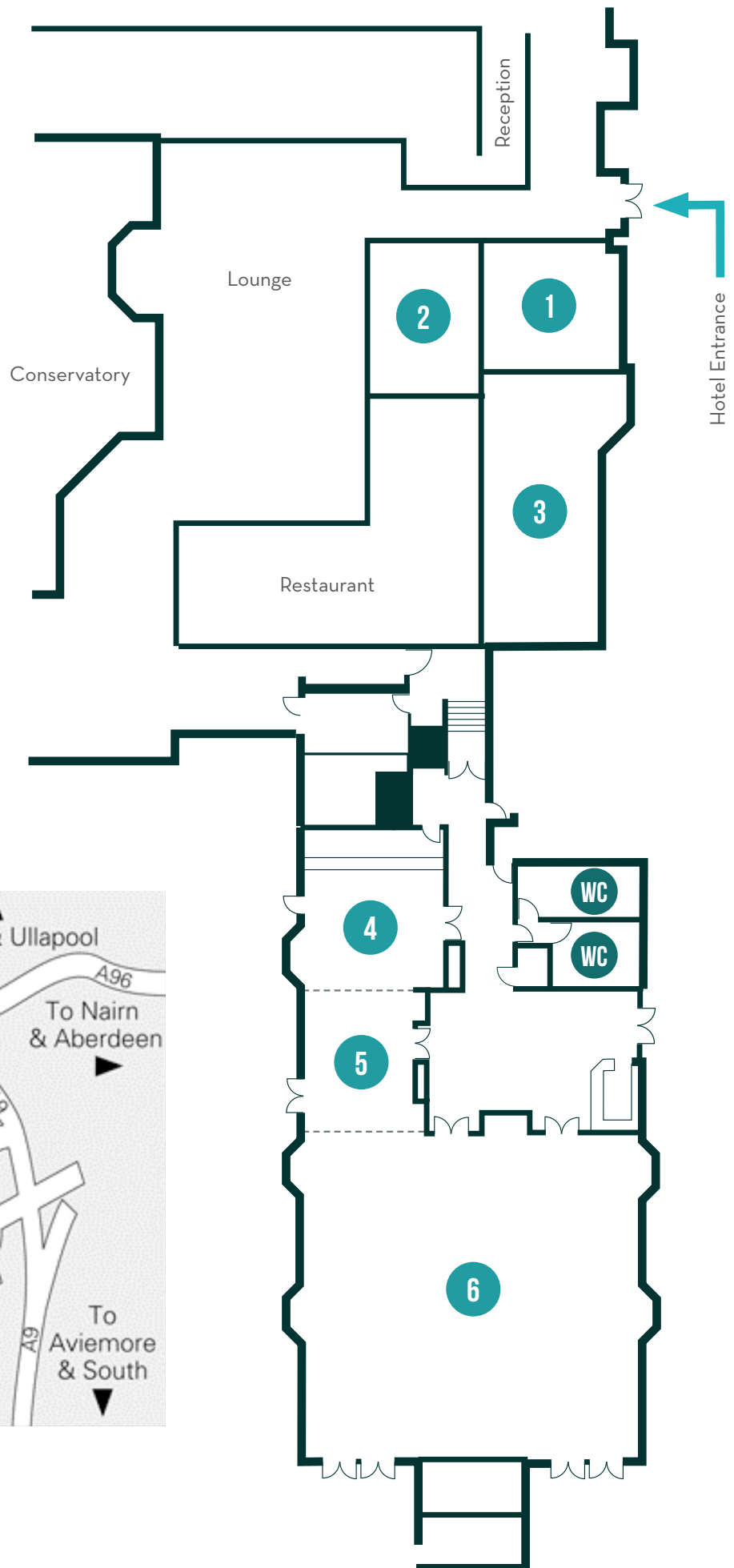


# CONFERENCE SCHEDULE

DAY 1 Monday, 15 August 2016	DAY 2 Tuesday, 16 August 2016	DAY 3 Wednesday, 17 August 2016	DAY 4 Thursday, 18 August 2016
<b>REGISTRATION</b> 8:00 – 9:00 <i>Macleod Room</i>	<b>PRINCIPAL LECTURE</b> 9:00 - 9:40 <i>Kingsmills Suite</i>	<b>PRINCIPAL LECTURE</b> 8:30 - 9:10 <i>Kingsmills Suite</i>	<b>AWARDS BANQUET &amp; CLOSING LECTURE*</b> 10:30 - 15:00 <i>The New Drumossie Hotel</i>  11:05 <i>Closing Lecture</i>  12:10 <i>Awards Banquet Entertainment by Fiona Kennedy</i>  Lunch included  13:40 <i>Closing Remarks</i>  14:00 <i>Group Photo</i>  <i>*Bus transportation to and from the Kingsmills Hotel will be provided.</i>
<b>OPENING REMARKS</b> 9:00 – 9:20 <b>OPENING LECTURE</b> 9:40 – 10:20 <i>Kingsmills Suite</i>	<b>BREAK</b> 9:40 - 10:00	<b>BREAK</b> 9:10 - 9:30	
<b>BREAK</b> 10:20 - 10:40	<b>PARALLEL D</b> 10:00 - 11:45	<b>PARALLEL G</b> 9:30 - 11:15	
<b>PARALLEL A</b> 10:40 - 12:25	<b>CATERED LUNCH</b> 11:45 - 13:00	<b>CATERED LUNCH</b> 11:15 - 12:20	
<b>CATERED LUNCH</b> 12:25 - 13:40	<b>PARALLEL E</b> 13:00 - 14:45	<b>CASTLE TRIP*</b> 12:30 - 18:30 Included With Full Registration  14:00 <i>Falconry Show, Castle Tour and Whisky Tasting by Gordon Muir</i>  17:15 <i>Departure Time</i>  <i>*Bus transportation to and from the Kingsmills Hotel will be provided.</i>	
<b>PARALLEL B</b> 13:40-15:25	<b>BREAK</b> 14:45 - 15:05		
<b>BREAK</b> 15:25-15:45	<b>PARALLEL F</b> 15:05 - 16:50		
<b>PARALLEL C</b> 15:45 - 17:30	<b>GROUP PHOTO</b> 16:50 - 17:20		
<b>WELCOME RECEPTION</b> 17:30 - 19:30 <i>Kingsmills Suite</i>  18:00 <i>Group Photo</i>  18:30 <i>Poster Exhibition</i>			

# VENUE MAP

1. MACLEOD ROOM
2. ADAMS ROOM
3. BURNS ROOM
4. CULCABOCK SUITE
5. DAMFIELD SUITE
6. KINGSMILLS SUITE





# IMPORTANT POINTS

## Getting Here

**Address:** Kingsmills Hotel  
Culcabock Road Inverness IV2 3LP  
**Tel:** 01224 313377

### Local Taxi Services:

01463 222555  
01463 222555  
01463 808080

## Conference Attire

All attendees are asked to wear business casual attire for the duration of the conference.

## Identification

All delegates must wear their lanyard name badge at all times. Your badge is your ticket and therefore gives you access to all sessions, lunch catering and the social programme.

Badges are strictly non-transferable. Please ensure you keep these safe. If you cannot provide a badge or identification to verify your booking then you may be asked to leave the event.

## Certificate Of Attendance

All delegates had the opportunity to request a certificate during the online booking process (see your registration packet). If you did not request a certificate during booking, an electronic version can be sent to you after the conference. Please notify the organisers at the Information Desk if you require an electronic certificate.

## Session Etiquette

**Speakers:** During the 20 minute break before your session slot, find your presentation room and upload your presentation files to the provided laptop. **Please ensure that you remain within your timeslot for your presentation and Q&A.** It is essential that the conference runs on time.

**Moderators:** Please arrive for your session at least 5 minutes in advance so you are prepared and ready to begin the session on time.

**Audience members:** Please note that the use of photography during presentations is strictly forbidden. **It is unethical to take photographs**

**without consent of a speaker** (you may be asked to delete images). Please respect the speakers and limit your photos to before/after the talks.

**Slide Copyright:** All slides presented at ISECM 2016 are the sole property of each speaker and cannot be copied or redistributed without permission.

## Presentation & Technology Tips

Each conference room is equipped with a laptop, projector, and clicker for controlling the PowerPoint presentations. Login information has been written on each laptop (this will allow you to access the guest account set up for this conference).

**(1) To access the Microsoft suite**, press the windows key (lower left on the keyboard). A start menu will appear where you can click the program you need.

Each laptop/projector will be pre-set to the "extend" display setting. This means the laptop will function as one screen and the projector will function as another. When you open a **PowerPoint presentation**, it will only appear on the laptop screen. **(2a) View the presentation in full screen mode in order to utilize both screens.** Choose full screen mode within the slideshow menu or by pressing the F5 key on the keyboard.

If you are using an **(2b) Adobe PDF presentation**, **move the whole PDF window onto the 2nd screen**, which is the projector. This is done by clicking and holding onto the title bar of the window and dragging it to the right until it appears onto the projector screen.

Please Note:

- » Our computers are not connected to the Internet and are unable to do so during presentations.
- » All presentations and data left on the Laptops after each day WILL be erased from the computer. However we strongly encourage all delegates to erase all data and material themselves.

## Photography Consent

There will be an official photographer during the conference. If you do not wish to have your photograph taken, please notify the organisers at the Information Table.

## OPENING PLENARY LECTURE



Avoiding Extinction

**Prof. Graciela Chichilnisky**

Department of Economics  
Columbia University, United States

As the Earth faces the possible melting of the North and the South poles and a rapid increase in the level of the oceans that can engulf hundreds of millions of people, the world needs carbon negative technology. Global Thermostat answers this critical challenge by profitably capturing atmospheric CO<sub>2</sub> for productive industrial use, creating abundant and low cost supply of CO<sub>2</sub> wherever needed. Through the building of carbon negative power plants, Global Thermostat can help achieve economic development that cleans the atmosphere.

## PRINCIPAL LECTURES



Graphene-based Electrochemical Capacitors

**Prof. Richard B. Kaner**

Department of Chemistry & Biochemistry  
University of California, Los Angeles, United States

Electrochemical capacitors, oftentimes called supercapacitors, are energy storage devices like batteries, yet they can be recharged a hundred to a thousand times faster. However, the low energy density of current carbon-based supercapacitors is the main impediment to realizing the full commercial potential of this technology. This has triggered tremendous research efforts in order to develop new electrode materials that are capable of providing a large amount of energy in a short period of time.



Nuclear-Power Waste and the Thorium-Fuel Option

**Dr. Alexander B. Cannara**

Thorium Energy Alliance  
Thorium Energy Silicon Valley, United States

Thorium is an abundant heavy metal, commonly associated with Rare-Earth containing minerals such as Monazite. It's about 4 times as abundant as Uranium and can fully be converted to fissile fuel via neutron capture, as in a standard fission reactor. Thorium fuel reduces waste radioactivity and half lives to those of fission products and lower.

## CLOSING PLENARY LECTURE



Marine Energy: What Now?

**Prof. Ian G. Bryden**

University of the Highlands and Islands, United Kingdoms

Twenty years ago, marine energy was of mainly academic interest, while only five years ago, we were hearing dramatic predictions that a significant proportion of the UK's electricity would be generated by waves and currents by 2020. Recently, however, changes in attitude by the UK government have limited enthusiasm for public support for the implementation of ambitious plans... How we can still achieve what we all know to be possible, namely a profitable marine energy industry?



## Smoking Policy

It is forbidden to smoke anywhere inside a building in the UK. Please smoke outside at a good distance from the hotel entrance and make use of disposal areas for cigarettes.

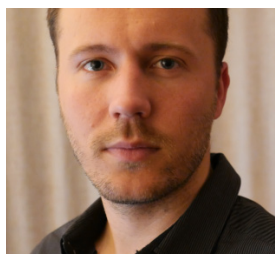
# SCHEDULE OVERVIEW

## Opening Remarks & Lecture

The ISECM Opening Remarks will be delivered by Dr. Henry Tan in the Kingsmills Suite at 9:00. This will be followed by a performance of the ECM theme song "We are the Light" sung by Nils Elders and Guest Mr. Paul O'Brien of Scottish Development International. The Opening Lecture will be delivered by Prof. Graciela Chichilnisky.

### About Nils Elders

Nils started playing piano at age 5 and began writing songs at age 10. Today he is a freelance composer/producer and multi-instrumentalist that has worked professionally for 15 years in radio, TV, and independent films. He has also done writing for major US networks such as NBC & CBS.



## Lunch

A lunch buffet will be served each day for all ISECM Participants. You will receive a lunch ticket during registration on day 1. Please ensure you retain this ticket for all three days

## Welcome Reception & A1 Poster Session

We welcome you to the conference with a reception in the Kingsmills suite on Day 1 at 17:30 where you can relax and network with your fellow delegates. Light refreshments, canapés, tea and coffee will be provided alongside a cash bar for additional beverages. All registration packages are welcome to attend.

An official ISECM 2016 group photo will be taken at 18:00 for all who wish to join. In addition, the poster session will begin at 18:30. Please take the opportunity to view these as part of your evening.

## Principal Lectures

The first Principal Lecture will be delivered at

9:00 on Day 2 by Prof. Richard B. Kaner. The second Principal Lecture will be given by Dr. Alexander B. Cannara on Day 3 at 8:30. Both lectures will be located in the Kingsmills Suite.

## Closing Lecture & Awards Banquet

The Closing Lecture by Prof. Ian G. Bryden and the Awards Banquet will take place on Day 4 at The New Drumossie Hotel. **Meet in the front car park at 10:20 to board the coaches.** We will depart promptly at 10:30, so please ensure you're on time.



### About Fiona Kennedy

The Luncheon's entertainment will feature Singer, Songwriter and Broadcaster Fiona Kennedy. Her several albums have received critical acclaim, and she has sung for Her Majesty The Queen and members of the Royal Family on a number of occasions.



# CASTLE TRIP

## Departure

For delegates attending the Castle tour, transportation to and from the Castle Trip will be provided on Day 3. **Meet in the front car park at 12:20 to board the coaches.** We will depart at 12:30 sharp, so please do not be late. **Your badge is your ticket** and must be worn at all times during the trip.

If you are unwell and/or unable to attend this part of the conference, please notify the organisers at the Information Desk.





## Castle Tour: Dunrobin Castle

Dunrobin Castle is the most northerly of Scotland's great houses and the largest in the Northern Highlands with 189 rooms. Dunrobin Castle is also one of Britain's oldest continuously inhabited houses dating back to the early 1300s, home to the Earls and later, the Dukes of Sutherland.

The Castle, which resembles a French château with its towering conical spires, has seen the architectural influences of Sir Charles Barry, who designed London's Houses of Parliament, and Scotland's own Sir Robert Lorimer. The Castle was used as a naval hospital during the First World War and as a boys' boarding school from 1965 to 1972.

A falconry show begins outdoors at 14:00. Guided tours and a whisky tasting event by Gordon Muir will take place from 13:45 - 16:45. Please dress for all weathers.

## Return Journey

Please board the coaches for our departure at 17:00. The coaches will depart from the Castle at 17:15 and return to the Kingsmills hotel.

## PROCEEDINGS

All presentation abstracts and speaker bios are available on our website:  
<http://www.nscj.co.uk/ecm6>

High quality papers will be selected for publication on the open access Journal of Energy Challenges and Mechanics:  
<http://www.nscj.co.uk/JECM>

## SESSION TOPICS

The following topics are arranged into Parallel Sessions:

- 01:** Energy Efficiency
- 02:** Sustainable Energy
- 03:** Safety and Integrity Management For Energy Industry
- 04:** Energy Security
- 05:** Energy And Environment
- 06:** Bioenergy
- 07:** Nuclear Energy
- 10:** For Clean Environment
- 11:** Energy Future
- 12:** New Energy Vehicles
- 15:** Renewable Energy Technologies
- 16:** Energy Harvesting and Storage
- 17:** Energy and Superconductivity
- 19:** Oil And Gas
- 20:** Energy Policy and Economy
- 23:** Smart Grid
- 24:** Energy, Water, and Human Survival

## THANK YOU

To all the delegates, committee members, and vendors of the sixth International Symposium on Energy Challenges and Mechanics: We thank you for your support! It is only through your dedication, commitment and tireless work that this conference could be a success.

And a special thank you to the Highland Council and Visit Inverness Loch Ness for providing financial support for ISECM 2016.

visit **Inverness**  
loch ness



# SCIENTIFIC COMMITTEE & ORGANISER

## Scientific Committee

Dr. Mark S D Read, UK  
Prof. Herminio Martínez-García, Spain  
Dr. Hilary McClafferty, MD, FAAP, USA  
Dr. Lixuan Hong, China  
Mr. Moty Kuperberg, Israel  
Dr. Lynnette D. Madsen, USA  
Dr. Sinikka Mynttinen, Finland  
Mr. Ibrahim Fahmy, UAE  
Prof. Ewen Ritchie, Denmark  
Dr. Alhussein Albarbar, United Kingdom  
Prof. Dr. Karl Ulrich Kainer, Germany  
Dr. Andres Fullana, Spain

## Organiser

North Sea Conference & Journal Ltd  
Aberdeen, Scotland, UK  
Emergency Contact Number:  
+44 (0)7898 700203

# PLAN YOUR SESSIONS

Use this section to plan your participation at ISECM 2016. Note which sessions you wish to attend or keep track of new colleagues.

## MY SESSION & LOCATION:

.....  
.....

## MY SESSION PICKS:

PARALLEL	SESSION NUMBER	ROOM
A	.....	.....
B	.....	.....
C	.....	.....
D	.....	.....
E	.....	.....
F	.....	.....
G	.....	.....

## MY NEW CONTACTS:

COLLEAGUE 1: .....  
.....

COLLEAGUE 2: .....  
.....

COLLEAGUE 3: .....  
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COLLEAGUE 4: .....  
.....

COLLEAGUE 5: .....  
.....

COLLEAGUE 6: .....  
.....

## NOTES







## RESEARCH IMAGE COMPETITION

Winner of the ISECM 6 Research Image Competition

### The Wind Way

**Authors: Herminio Martinez & Encarna Garcia**

Barcelona College of Industrial Engineering (EUETIB)

Technical University of Catalonia - BarcelonaTech (UPC), Spain

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