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ICEER2017@ISEP: energy and environment research challenges and opportunities

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1. Introduction

ICEER belongs to the Energy and Environment Research series of conferences from the SCIence and Engineering Institute (SCIEI). The ICEER2017@ISEP conference was a joint organization of *Instituto Superior de Engenharia do Porto*(ISEP) of the Polytechnic of Porto (P.Porto) and of SCIEI, and took place at ISEP and Porto, with collaboration and promotion of the CIETI and LEPABE research groups. This volume of Energy Procedia serves as proceedings of ICEER2017, the 4thInternational Conference on Energy and Environment Research, 17-20 July 2017, Porto, Portugal.

2. Conference topics

The ICEER conference series has focused in a broad scope of energy and environment topics in all sectors, particularly those related to the production, distribution and use of different types of energy, including renewable and non-renewable sources. ICEER2017@ISEP was a privileged space to discuss current matters related to Energy

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and the Environment, having explored emerging technologies and concepts in a collaborative way, bringing together engineers, researchers and professionals from different areas of research and professional activities. In fact, it could be perceived that the new and tighter targets towards sustainable development that have been set by several countriesare a sensitive matter concerning to each nation. Since these themes are multidisciplinary and beyond the present generation, it is thusfundamental to prepare and educate future young professionals having these concerns in mind.The conference was organized under five main topics:

- Advanced energy technologies;
- Education for sustainability;
- Energy and environment;
- Fuels and combustion;
- Renewable energy.

Specifically, ICEER2017 papers covered 12 themes, each of them forming at least one conference session:

- Biomass & biofuels production;
- Clima impacts and mitigation
- Combustion and biogas separation;
- Energy and environment management;
- Energy harvesting & storage;
- Energy systems modelling;
- Simulation, modelling and multi-criteria analysis
- Sustainability & health;
- Sustainable buildings and cities;
- Systems simulation and modelling;
- Water pollution and treatment;
- Wind and solar applications.

3. Organizing, scientific and technical committees

TheICEER2017Conference and Program chairs would like to express their deepest thanks to theHonour Committee, the Scientific and Technical Committee (STC), theLocal Committee and Staff. In order to guarantee the quality of the presented work, the ICEER2017 STC has decided to ask for the collaboration of a number of Invited Reviewers. The structure of organization was as follows:

Honour Committee

RosárioGambôa	President of Polytechcnic of Porto	PT
João Rocha	President of ISEP	PT
Carlos Mineiro Aires	*BastonáriodaOrdem dos Engenheiros*	PT
Joaquim Poças Martins	President of the *Região Norte da Ordem dos Engenheiros*	PT
Yves Y. Xie	SCIEI	CN

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Nídia Caetano	ISEP, LEPABE and CIETI	PT

Program Chair

Manuel Carlos Felgueiras	ISEP, CIETI	PT

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Manuel Carlos Felgueiras	ISEP, CIETI	PT
Nídia Caetano	ISEP, LEPABE and CIETI	PT

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Adriano Peres	Univ. Federal de Santa Catarina, UFSC Blumenau	BR	Arminda Alves	LEPABE - University of Porto	PT
Ahmad Abu-Jrai	DEE, College of Eng, Al-Hussein Bin Talal Univ.	JR	AyşegülAşkın	CED, Fac. Eng. Archit., Eskisehir Osmangazi Univ.	TR
Alírio Rodrigues	Emeritus Professor, U.Porto-FEUP-LSRE	PT	Barry A Benedict	MED, University of Texas at El Paso	US
Ana Meira Castro	DMA/ISEP, P.Porto, CERENA-Polo FEUP	PT	Cândida Vilarinho	University of Minho	PT
Anabela Leitão	AgostinhoNeto University, Luanda	AO	Carlos A.V. Costa	Emeritus Professor,University of Porto – LEPABE	PT

4. Conference statistics

The 4th edition of ICEER has received more than 200 submissions of authors from 46 countries from 5 continents in the world. After a thorough peer revision process of at least two reviews, 100 full papers and 20 abstracts have been accepted for oral/poster+oral flash and poster presentation, respectively.The distribution of participants (148) by country is shown below in Fig. 1.

As can be observed in Fig. 1, the highest number of participants (48, 32%) came from Portugal (which was the host country), followed by Korea (20, 14%), Algeria (16, 11%), China (9, 6%), Spain and Russia (6, 4%).

This distribution also confirms the extent of internationalization that this event has reached, once the most important delegations came from very different places in the world. Moreover, the multiculturality of the conference can be demonstrated by the number of participant countries. In spite of the difficulties in VISA obtaining by a number of authors, ICEER2017 received participants from 31 countries, from five continents, which justifies the increasing high internationalization of this conference series.

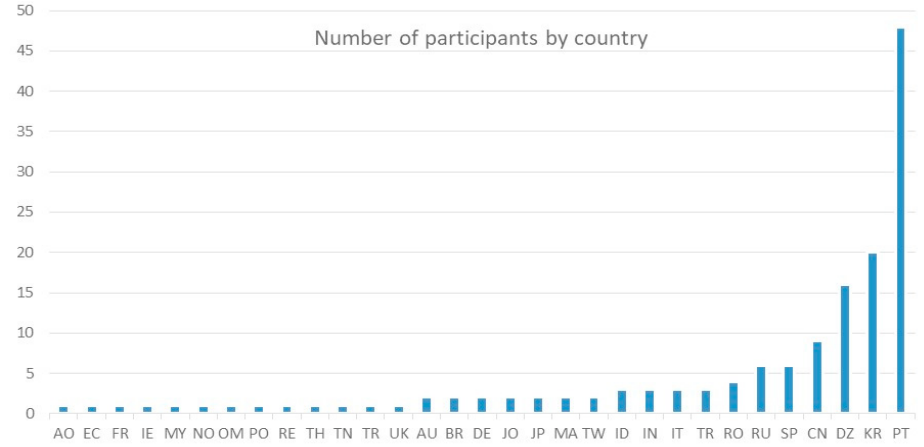

Fig. 1. Distribution of ICEER2017 participants by country.

Other relevant conference statistics is the number of papers presented within each theme, which can provide information related to the hot topics presently under study by researchers and practitioners (Fig. 2). Of the 12 themes, 11 had a significant number of participants (at least 6%). The biggest number of contributions was related to Energy and environment management, whereas the smallest one corresponded to Clima impacts and mitigation.

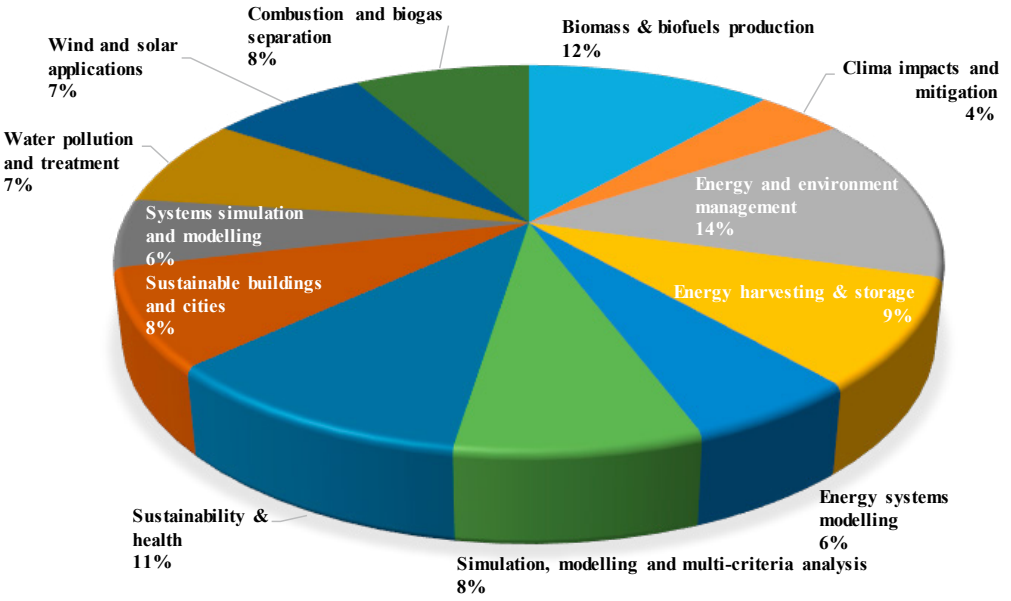

Fig. 2. Distribution of conference papers.

5. Keynote and Invited lectures of ICEER2017

Keynote lectures of ICEER2017 took place in the morning of the second and third days of the conference. Their purpose was to give participants of ICEER2017 the opportunity to listen to and interact with experts in different fields of energy and environment.The first three Keynote lectures, took place in the morning of July 18, whereas the fourth occurred in the morning of July 19, after which there was a networking event.

Hooman Farzaneh(1975) is a Jr. Associate Professor at the Institute of Advanced Energy, Kyoto University, Japan. In his Keynote Speech entitled *Clean energy development in Asian cities, challenges and opportunities*, Hooman Farzaneh presented a research project supported by the Unit of Academic Knowledge Integration Studies of Kyoto University and the Japan Society for the Promotion of Science (JSPS), aiming to demonstrate a new strategic planning mechanism for achieving multiple energy, environmental, public health and economic benefits of clean energy development strategies in Asian cities, together with a robust analytical framework that can be used to assess those benefits during the development and implementation process. Evaluation of potential clean energy policies with criteria that cut across the multiple benefits, allows localities to select options that expedite the achievement of multiple goals, therefore avoiding options that may hinder key priorities.

Adélio M. Mendes(1964) is a Full Professor at the Department of Chemical Engineering of the Faculty of Engineering of the University of Porto. His Keynote Speech entitled *Electricity from renewable sunlight: cheaper and cleaner,* showed that ideal city should comply with the Near Zero Energy Building (NZEB) directive and going beyond. In this sense, Photovoltaic (PV) electricity has proven already today the cheapest, if produced in countries with high solar irradiance. Recent technologies of Dye Sensitized Cells (DSC) and perovskite cells allow to produce electric energy with architectural advantages, together with increase of performance, even under diffuse conditions of radiation. Combined with new technology of flow batteries for energy storage, they can contribute towards the NZEB.

Gustavo R. Alves(1968) is an Adjunct Professor with the Department of Electrical Engineering, at ISEP (Instituto Superior de Engenharia do Porto), Polytechnic of Porto. His Keynote Speech was about *Remote labs in Higher Education: building multicultural and sustainable learning environments*, aiming to show that the conduction of many experiments by students while taking a degree in science and engineering areas can be achieved using several different approaches. The recent contribution of Information and Communication Technologies (ICT), allows that these experiments are done in remote labs, in addition to traditional hands-on labs and computer simulations. While there have been discussions around the effective educational value of remote experiments in comparison with hands-on experiments and computer simulations, in this keynote he focusedhis attention on two aspects: (i) how remote labs promote the creation of multicultural learning environments and (ii) how they address sustainability. In particular, he considered the three pillars associated with sustainability, i.e., economic practice, social integration, and environmental protection.

Barry A. Benedict has served on the faculty at eight institutions and has twenty years of academic leadership experience as a Dean or Vice President, being presently Professor of Mechanical Engineering at the University of Texas at El Paso. His Keynote Speech entitled *Integrated sustainable solutions that incorporate resilience and asset management*, was the last one of the ICEER2017 and therefore, through his vast experience he was able to frame his presentation linking together the previously presented Keynote Speeches. As mentioned before, sustainability requires consideration of environmental, economic, and social issues. Life cycle sustainability assessment (LCSA) includes environmental LCA (life cycle assessment), life cycle costs, and social LCA. His presentation outlined how to build upon the LCSA framework to include elements of uncertainty (and hence risk assessment) plus how to use the same features to assess resilience and asset management.

Invited lectures of ICEER2017 took place in the afternoon of the second and third days of the conference. Their purpose was to balance the scientific and professional perspectives of energy and environment themes. Participants of ICEER2017 could choose to listen to one academic researcher or active professional from the industry in each day.

Obulisamy P. Karthikeyan(1982) is a Research Assistant Professor from Sino-Forest Applied Research Centre for Pearl River Delta Environment, Department of Biology, Hong Kong Baptist University, Hong Kong. His Invited Lecture was about *Bio-refining of food waste for fuel and energy*, as food production and wastages constitute serious issue for the global economy and environment being responsible for waste disposal ~2.2 billion tons by 2025.

Considering its physiochemical and biological nature, the food waste can be used as a raw material for fuel and energy productions, which facilitates the bio-circular economy and reduces the environmental impacts. In his lecture, he proposed to use integrated bio-refinery approach to produce fuel precursors and bioenergy using food waste as viable source. This approach was proposed to meet the local need and policy.

Rui Rigueira is a Mechanical Engineer (ISEP) with professional activity as renewable energy trainer at CENFIM, ISQ, CICCOPN, CATIM, IEP. He has been developing professional activity as Solar Systems Project Designer (INETI), IR Thermograph, Infrared Training Center (ITC), being a project developer at LATENTO. His Invited Lecture, *PCM at DHW – A Successful Case*, discussed the Phase Change Materials (PCM), specifying the use of lower temperature PCM for thermal energy storage for DHW (Domestic Hot Water) use. The operating principle of the DHW energy storage tank with PCM and its specific design details was presented as well as a thermodynamic mechanical engineering success case using a thermal solar energy storage tank.

Helder Manuel Ferreira Santos is Adjunct Professor with the Mechanical Engineering Department, School of Technology and Management (ESTG), Polytechnic Institute of Leiria (IPLeiria), Leiria, Portugal. His Invited Lecture summarized major developments in vehicular emissions regulations and exhaust gas after treatment technologies for both gasoline and diesel ICE (internal combustion engine).The results of a research project dedicated to the study of the influence of the TWC (Three Way Catalyst) design parameters on the mass transfer and reaction resistances were presented, which allows an improved understanding of the catalyst-support interactions and to conclude about the most important design guidelines to further enhance TWC conversions.

Manuel Carlos Carvalhograduated in Electrical and Computer Engineering at the Faculty of Engineering of University of Porto (FEUP), and is presently the responsible by Health, Safety and Environment of the Car Multimédia Division of Bosch. In his Invited Lecture, *Bosch - Futuring a sustainable mobility*, Manuel Carvalho has shown the industry perspective on how connected mobility, smart home, smart cities, industry 4.0 and IoT can be used to prepare the future with sustainability.Four Pillars were addressed:Sustainable mobility; Energy efficiency; Renewable energies and Design for Environment.

Specifically, the Keynote Lectures, Invited Speeches as well as the Conference presentations allowed participants of ICEER2017 to have an overview of the challenges and opportunities that arise in the fields of Energy and Environment Research, having pointed out the main focus areas, the existing difficulties and possible ways to overcome them.

6. Other activities within ICEER2017

Conferences constitute privileged spaces to interact with researchers and professionals with different experiences and therefore acquire distinct views of similar problems. However, sometimes differences in culture and language can hinder fast interaction. To speed up the interaction process, a strategy of friendly reception promoted by the younger staff (affectionately called the *Green Teen Team*, Fig. 3) was adopted. These young students of several areas of engineering were responsible for the local reception and assistance to participants, namely by promoting visits to the ISEP Museum, as well as for program updates, directions for poster exhibition, welcome reception, coffee breaks, lunches, Conference Dinner, farewell event, among other. An ICEER2017 polo shirt was offered to each participant, with an invitation to wear it in the opening ceremony as well as in any other occasion of choice (Fig. 4). This was also part of our strategy to build one only big team, the ICEER2017@ISEP Team.

Fig. 3. The *Green Teen Team*.

Fig. 4. Opening Ceremony using the ICEER2017 polo shirt.

Another occasion chosen to enhance the interaction and break barriers, was created during the Conference Dinner (on the 18th July), when the "~~*Academy*~~*aComedy Awards*" were given to a number of authors/papers, for their most wild paper title, longest paper title, biggest number of authors, shortest number of authors, etc.

Once the ice had been broken, it was the time to promote networking session, were the participants of ICEER2017 were invited to share their doubts, ideas, needs and possibly find collaboration within 3 specific topics: (i) Sustainable cities: resources integration planning and management (water, energy, waste, etc.); (ii) Sustainable buildings: labs, schools, plants; and (3) Sustainable transportation: cars, railways, aerospace.

A conference in a joint organization of two internationally active research groups, hosted in an Higher Education Campus, is a privileged space to promote visits to research labs and therefore, to meet other researchers and their way of doing research. Therefore, it was also organized visits to the Research Labs of CIETI and LEPABE.

Finally, the ICEER2017 organization promoted the attribution of the Best Paper award, for each Session of oral presentations, having also been selected the Best Paper to the one that achieved the highest classification. Additionally, a Best Poster award was attributed by a Jury (Dr. Hooman Farzaneh, Dr. Obulisamy P. Karthikeyan and Prof. Florinda Martins) to the author of the Best Poster who also presented it as an Oral flash presentation.

A closing ceremony and a farewell event were organized, in which authors were distinguished byformal awards.

7. Acknowledgements

Dear participant in ICEER2017@ISEP,

First, we would like to thank you for having participated in the Conference, and shared with all of us the results of your work and your ideas.
We believe that the conference was a huge success due to your efforts.
We sincerely hope you have enjoyed your stay and the conference.

We would like to publicly thank the ISEP Dean, Prof. João Rocha, the Vice-Dean, Prof. J. Barros Oliveira – please extent our appreciation to the remaining staff.
We would like to publicly thank the P.Porto President, Prof.RosárioGâmboa, the Vice-President, Prof. Carlos Ramos.
We would like to publicly thank the *Bastonário da Ordem dos Engenheiros*, Engº Carlos Miniero Aires, and the President of the *Região Norte da Ordem dos Engenheiro*s, Engº JoquimPoças Martins.
We would also like to publicly thank the SCIEI organization, for their efforts and commitment to improve ICEER quality. Particularly the kind staff – Renne, Cindy, Amanda and Dr. Xie.

Now that we have finished the process of editing the Conference Proceedings in Energy Procedia – a Scopus Indexed journal from Elsevier – it is the time to count on your collaboration to finish the publication of the associated Special Issues of *Energies*, *ChemEngineering* and *Waste and Biomass Valorization*. This was our final contribution to continue increasing the scientific importance and impact of ICEER series.

The next ICEER conference (ICEER 2018) will take place in the 4th week of July 2018 – Save the Date, please!
We think you will just love your participation in our future event – website will soon be available with details and news.

Thank you all.
Next event will be even better!!!
We hope to meet you soon (again) in ***ICEER2018.***

The ICEER2017 Conference & Program Chairs

Nídia&Carlos

Save the date: 23-27 July, ICEER2018