



This project is funded by the European Union



# REDEC 2012

## International Conference on Renewable Energy for Developing Countries

November 28-29, 2012

Le Commodore Hotel, Hamra district, Beirut  
LEBANON



Jointly with the Renewable Energies for Arab Regions  
event organized by ESCWA on November 27, 2012

## A Welcome Message from the Conference General Chairs

It is with great pleasure that we announce the “first International Conference on Renewable Energies for Developing Countries”. The conference will be held in Beirut, capital of Lebanon where multiculturalism is respected, on 28-29 November 2012, jointly with the Renewable Energies for Arab Regions event organized by ESCWA on November 27, 2012. We take this opportunity to thank all the parties that are supporting this event in terms of logistic and financial assistance. Special thanks also to the RESSOL MEDBUILD European project which, without it, it wouldn't be possible to organize such an important and great scientific forum, and to the IEEE Lebanon Section and the CAS/PE/PEL Chapter for their technical and financial support.

The main objective of the conference is to make developing countries benefit from international experience in the domain of renewable energies. Governments of these countries are gathering all the way and all the time economical and scientific means in order to allow their citizens to enjoy a free and healthy life in a safe environment (as stated by Mr. Kofi Annan, former Secretary General of the United Nations). Most of these regions of the world are subject to economical constraints and this is why they can't afford investing in cost-effective “green” projects. Therefore, we encourage researchers from all over the world to participate and submit their original ideas and results in order to be discussed in a way to see how they could be applied for developing countries.

The organizing committee worked hard for the success of the conference. They have contacted worldly-known researchers in the domain of renewable energies for inviting them to be part of the scientific committee. Some financial support is available for inviting keynote speakers to present studies they have led for such purpose. Social programs will be organized to make participants benefit from their stay in Beirut.

The success of this first international conference is a very important issue for the organization of other REDEC activities. REDEC'12 will be hopefully followed with other projects and meetings in order to make sense of the conference outcomes.

Finally, we hope that you will find the conference enjoyable and valuable, and also you will be able to benefit from your stay in Beirut.



Prof. Imad Mougharbel



Prof. Kamal Al-Haddad

# General Information

## Conference Venue:

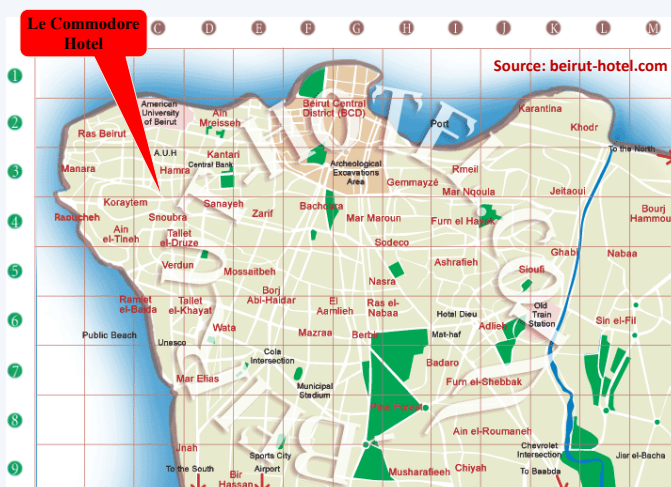
Science, art, culture and entertainment give an insight into the social life of the capital of Lebanon, Beirut. This wonderful city is a melting pot of several cultures. Arabic traditions, oriental and western influences offer a perfect blend of a specific society in the world. Art has formed an integral part of Beirut's history. The oldest universities in the Middle East region were established in this city. Le Commodore Hotel located in Hamra, one of the famous streets of Beirut, will host the conference on November 28-29, 2012. For more information on the hotel, please visit the website: [www.lecommodorehotel.com](http://www.lecommodorehotel.com). A joint event on Renewable Energies for Arab Regions is organized by ESCWA ([www.escwa.un.org](http://www.escwa.un.org)) on November 27, 2012.



Map 1: The Middle-East region



Map 2: Lebanon



Map 3: The city of Beirut



Map 4: Hamra district



## Conference Objectives:

Some developing countries are actually active in the domain of exploiting renewable energies. They are doing efforts in order to progress towards a green future. They tend to be in conformity with international requirements to protect the environment. Also, some projects are implemented in these countries in order to reduce their external energy dependence. Although the willingness for introducing renewable energies is apparent, there are still important economical constraints preventing them from investing in this hot area.

National strategies in these countries need to be enforced with more appropriate technical solutions and more accurate data acquisition of resources. A common vision among national stakeholders in the domain of renewable energies should be considered. Laws and regulatory issues need to be more adapted. The conference aim is to benefit from international experience and discuss innovative scientific solutions adapted to the developing countries situations. Researchers from local and foreign universities will suggest during this conference solutions for specific problems. Professionals will find the opportunity to know about the most efficient way for investing in renewable energies in these countries. Case Studies on successful solutions and on supporting programs will be presented. The adaptation of laws and regulations will be discussed for an easy penetration of renewable energies in developing countries.

## Conference Topics:

1. Renewable Energy resources in developing countries (wind, solar, biomass, hydraulic, geothermal, waves, tidal...)
2. Technologies related to Renewable Energy sources in developing countries (state of the art, technological solutions, successful applications, lowered barriers...)
3. Energy saving and energy efficiency measures (energy conversion, power electronic conversion and compensation, energy storage, energy efficient buildings...)
4. Energy management (simulation software, smart buildings, smart grids...)
5. Policy, regulations and laws related to an effective penetration of Renewable Energies in developing countries (solutions, incentive measures, successful examples, investment and financial mechanisms, released constraints...)
6. Capacity and institutional building for the specific needs of Renewable Energy penetration in developing countries (knowledge transfer, development of institutional structures...)
7. Educational and research programs in the domain of Renewable Energies (technical, undergraduate, master, higher education, research...)
8. Regional & International supporting programs for renewable energies penetration in developing countries (CTF, UFM, EC-Paving the Way for the MSP, MEDGRID, DESERTEC, RESSOL, CLEAN ENERTEC, ALGUE...)

## Oral Presentations:

Follow please the following instructions:

- Each author/presenter is allowed for 20 minutes maximum for each paper. The length of the presentation is restricted to 15 minutes, plus 5 minutes for questions.
- REDEC 2012 presenters are required to meet their session chairman in the session room, 15 minutes before starting the session in order to download from a USB memory their power point or PDF presentation to the computer.
- Each author/presenter has to make sure that the session chairman is provided with a very short biography on the presenter if not it will be hand written on the spot.
- Each author/presenter must assure that all fonts needed for his presentation are compatible with Microsoft Office 2007 (it is not recommended to use its own computer in order to save time).

## Registration:

Registration fees for all accepted papers will be covered by RESSOL-MEDBUILD project (Hotels and travel accommodation are not included). Authors of accepted papers should present their work in the conference. The deadline for registering accepted papers to be presented is November 11, 2012. All authors who have sent to the conference secretary their camera-ready paper before this deadline are scheduled on the conference program and they are asked to pick up their conference set at the registration desk.

## REDEC 2012 Committees

### HONORARY CHAIRS

Fadi Comair, Ministry of Energy and Water, Lebanon  
Fadi Géara, Saint-Joseph University, Lebanon  
Elias Nassar, Notre Dame University, Lebanon  
Zeinab Saad, Lebanese University, Lebanon

### GENERAL CHAIRS

Kamal Al-Haddad, Ecole de Technologie Supérieure, Canada  
Imad Mougharbel, Lebanese University, Lebanon

### ORGANIZING COMMITTEE

Kostas Anagnostopoulos, CRES, Greece  
Christophoros Perakis, CRES, Greece  
Tony Matar, ALMEE, Lebanon  
Said Chehab, ALMEE, Lebanon  
Semaan Georges, Notre-Dame University, Lebanon  
Talal Salem, Notre Dame University, Lebanon  
Hadi Kanaan, Saint-Joseph University, Lebanon  
Adel Mourtada, ALMEE, Lebanon  
Adnan Jouni, ALMEE, Lebanon  
Khalil Khoury, Lebanese University, Lebanon  
Mazen Ghandour, Lebanese University, Lebanon  
Christine Weber, Fraunhofer ISE, Germany

### CONFERENCE SECRETARY

Hoda El-Halabi, Lebanon

### SCIENTIFIC COMMITTEE

Gerard-André Capolino, Université de Picardie, France  
Youssef Ibrahim, Monash University, Australia  
Carlo Cecati, University of L'Aquila, Italy  
Leopoldo Garcia Franquelo, University of Sevilla, Spain  
Abdelwahab Aitouche, Ecole des Hautes Etudes d'Ingénieur, France  
Georges Giannakidis, CRES, Greece  
Anna Raquel Petry Elias, Fraunhofer ISE, Germany  
Samir Allal, IUT de Mantes, France  
Michel Hayek, Notre-Dame University, Lebanon  
Evangelos Rikos, CRES, Greece  
Maamar Bettayeb, University of Sharjah, United Arab Emirates  
Stefan Henninger, Fraunhofer ISE, Germany  
Benoit Robyns, Ecole des Hautes Etudes d'Ingénieur, France  
Maarouf Saad, Ecole de Technologie Supérieure, Canada  
Adrian Ilinca, Université du Québec à Rimouski, Canada  
Mohammad Salah, Hashemite University, Jordan  
Mohamed Chaabane, Tunisia

Rabih Jabr, American University of Beirut, Lebanon  
Richard Sarkis, Lebanon  
Walid Deghaili, ESCWA, Lebanon  
Philippe Malbranche, Institut National de l'Energie Solaire, France  
Matthias Schick Tanz, Fraunhofer ISE, Germany  
Mohamed Djemai, Université de Valenciennes, France  
Richard Maroun, Saint-Joseph University, Lebanon  
Peter Schossig, Fraunhofer ISE, Germany  
Jochen Döll, Fraunhofer ISE, Germany  
Pierre Michel, ENTPE, France  
Stathis Tselepis, CRES, Greece  
Mohamed El-Menkibi, ENTPE, France  
Rafik Missaoui, ALCOR, Tunisia  
Mahieddine Emziane, Masdar Institute of Science and Technology, UAE  
Alexander Morgenstern, Fraunhofer ISE, Germany  
Edo Wiemken, Fraunhofer ISE, Germany  
Maurice Fadel, ENSEEIHT-LAPLACE, France  
Cristian Nichita, Université du Havre, France  
Longya Xu, Ohio State University, USA  
Farhat Fnaiech, ESSTT, Tunisia  
Hassan Noura, UAE University, United Arab Emirates  
Mounir Yehia, NEEDS, Lebanon  
Gerrit Földner, Fraunhofer ISE, Germany  
Dimitris Papastefanakis, CRES, Greece  
Assaad Zoughaib, Ecole des Mines ParisTech, France

## REDEC 2012 Conference at a Glance

### Wednesday, November 28, 2012

Time	ROOM A	ROOM B
08:30 – 09:00	Registration	
09:00 – 09:15	Welcome speech	
09:15 – 10:00	Honorary chairs elocutions	
10:00 – 10:30	Keynote speaker	
10:30 – 11:00	Coffee break	
11:00 – 12:40	Oral session 1.1 Solar Radiation and PV Applications	Oral session 1.2 Solar Thermal and Geothermal Energy
12:40 – 14:30	Lunch	
14:30 – 15:00	Keynote speaker	
15:00 – 16:20	Oral session 2.1 Solar Cells Technology	Oral session 2.2 Wind Energy and Wind Generators
16:20 – 16:40	Coffee break	
16:40 – 18:00	Oral session 3.1 Solar PV Control Systems	Oral session 3.2 Biomass and Hydro Power
18:00 – 20:30	Break	
20:30 – 23:00	Gala dinner	

### Thursday, November 29, 2012

Time	ROOM A	ROOM B
08:30 – 09:00	Registration	
09:00 – 09:30	Keynote speaker	
09:30 – 10:50	Oral session 4.1 Hybrid and Distributed Generation Systems	Oral session 4.2 Fuel Cells Technology and Applications
10:50 – 11:30	Coffee break	
11:30 – 12:50	Oral session 5.1 Power Grids Issues and Energy Efficient Solutions	Oral session 5.2 Energy Efficiency in Green Buildings
12:50 – 14:30	Lunch	
14:30 – 15:00	Keynote speaker	
15:00 – 16:20	Oral session 6.1 Energy Management and Planning	Oral session 6.2 Renewable Energy Education and Policy
16:20 – 16:30	Closing session	



## REDEC 2012 Conference Program

### Wednesday, November 28, 2012

- 08:30 – 09:00      Registration
- 09:00 – 09:15      Welcome speech by the Conference Chair  
Imad Mougharbel, *Lebanese University, Lebanon*
- 09:15 – 10:00      Honorary Chairs elocutions  
Zeinab Saad, *Lebanese University, Lebanon*  
Fadi Geara, *Saint-Joseph University, Lebanon*  
Elias Nassar, *Notre-Dame University, Lebanon*  
Fadi Comair, *Ministry of Energy and Water, Lebanon*
- 10:00 – 10:30      Keynote speaker  
**Stefan Weiers**, *European Commission*  
Co-operation between EU and Mediterranean Partner Countries  
in the frame of the Research Potential Program
- 10:30 – 11:00      Coffee break
- 11:00 – 12:40      Oral sessions
- Session 1.1:      Solar Radiation and PV Applications
- Room:              A
- Session Chairs:      Michel Hayek, *Notre-Dame University, Lebanon*  
Khalil Khoury, *Lebanese University, Lebanon*
- 11:00 – 11:20      **Development of a Mathematical Correlation for Predicting Solar Radiation in Benghazi-Libya**  
Awad Bodalal, *Benghazi University, Libya*
- 11:20 – 11:40      **Removal of Air Blown Dust from Photovoltaic Arrays Using Forced Air Flow of Return Air from Air Conditioning Systems**  
Ali Assi, *Lebanese International University, Lebanon*  
Ahmad Hassan, *UAE University, United Arab Emirates*  
Maitha Al-Shamisi, *UAE University, United Arab Emirates*  
Hassan Hejase, *UAE University, United Arab Emirates*
- 11:40 – 12:00      **Effects of Shadow and Different Connections of Photovoltaic Panels on Maximum Power Output**  
Maryam Torabi Milani, *Shahid Beheshti University, Iran*  
Hossein Kazemi Karegar, *Shahid Beheshti University, Iran*

12:00 – 12:20 **Optimal Sizing of off-Grid Photovoltaic Systems in Algeria: Application for remote areas**

Adel Mellit, *Jijel University, Algeria*

12:20 – 12:40 **MATLAB Tool for Predicting the Global Solar Radiation in UAE**

Maitha H. Al Shamisi, *UAE University, United Arab Emirates*

Hassan A.N. Hejase, *UAE University, United Arab Emirates*

Ali Assi, *Lebanese International University, Lebanon*

Session 1.2:           Solar Thermal and Geothermal Energy

Room:                B

Session Chairs:     Adel Mourtada, *ALMEE, Lebanon*

Talal Salem, *Notre-Dame University, Lebanon*

11:00 – 11:20 **Central Receiver Power Plant – A Feasibility Study Based on the Central Receiver Technology**

Adel Mourtada, *ALMEE, Lebanon*

Ali Hajjar, *ALMEE, Lebanon*

11:20 – 11:40 **Preliminary Geological Prospects on the Geothermal Water in Lebanon**

Amin Shaban, *National Council for Scientific Research, Lebanon*

Layla Khalaf-Kairouz, *Notre-Dame University, Lebanon*

11:40 – 12:00 **CSP Potential in Lebanon – A Feasibility Study Based on the Parabolic Trough & Stirling Dish Technologies**

Jad Jaber, *Lebanese University, Lebanon*

Hassan Shukor, *Lebanese University, Lebanon*

Adel Mourtada, *ALMEE, Lebanon*

12:00 – 12:20 **Colored Absorbers for Solar Thermal Collectors**

Talal Salem, *Notre-Dame University, Lebanon*

12:20 – 12:40 **Solar Chimney – Electricity from the Sun**

Ahmad Nzaih Arkahdan, *Lebanese University, Lebanon*

Adel Mourtada, *ALMEE, Lebanon*

Youssif Mohammad Karout, *Lebanese University, Lebanon*

12:40 – 14:30       Lunch

14:30 – 15:00       Keynote speaker

**Ansgar Kiene**, *World Future Council Foundation*

Meeting Africa's Energy Needs through Successful Renewable Energy Feed-in Tariff Policies

15:00 – 16:20 Oral sessions

Session 2.1: Solar Cells Technology

Room: A

Session Chairs: Ali Assi, *Lebanese International University, Lebanon*  
Kostas Anagnostopoulos, *CRES, Greece*

15:00 – 15:20 **Enhancement Photovoltaic of Si Micro and Nano-Structures Solar Cells via Ultrafast Laser Texturing**

Falah A.-H. Mutlak, *University of Baghdad, Iraq*

Tariq J. Alwan, *University of Stansiriyah, Iraq*

Ala F. Ahmed, *University of Baghdad, Iraq*

K. A. Al.Naimee, *University of Baghdad, Iraq*

15:20 – 15:40 **Enhancement of Electrical Performance of Acid Textured Multi Crystalline Solar Cells**

Ali Assi, *Lebanese International University, Lebanon*

Mohammad Al-Amin, *Technology Group Microsol, United Arab Emirates*

15:40 – 16:00 **Characterization of Au/PS/p-Si Solar Cell Heterojunction**

Issam M. Ibrahim, *University of Baghdad, Iraq*

Estabraq T. Abdullah, *University of Baghdad, Iraq*

16:00 – 16:20 **Electrospun Semiconducting Nanofibers as an Attractive Material for Renewable Energy Applications**

Kaleem Ahmad, *King Saud University, Saudi Arabia*

Session 2.2: Wind Energy and Wind Generators

Room: B

Session Chairs: Eric Monmasson, *Université de Cergy-Pontoise, France*  
Mazen Ghandour, *Lebanese University, Lebanon*

15:00 – 15:20 **Impact of New Wind Farms on Power Distribution Networks (Derna Wind Project Case Study)**

Abdussalam Elansari, *Renewable Energy Authority of Libya, Libya*

Abdullatif Musa, *Tripoli University, Libya*

Alssalheen Alssnoui, *Renewable Energy Authority of Libya, Libya*

15:20 – 15:40 **Analytical Modelling and Representation of Wind Energy Resources**

Hadi C. Matar, *University of Edinburgh, Lebanon*

15:40 – 16:00 **Effect of Resolution Value on Wind Resource Assessment and Micrositing: A Case Study in Izmir, Turkey**

Baris Ozerdem, *Bahcesehir University, Turkey*

**16:00 – 16:20 Repetitive Control of an Unbalanced Standalone Doubly-Fed Induction Generator**

Eliane Jeitani, *Lebanese University, Lebanon*

Georges Salloum, *Lebanese University, Lebanon*

Rita Mbayed, *Lebanese University, Lebanon*

Eric Monmasson, *Université de Cergy-Pontoise, France*

16:20 – 16:40 Coffee break

16:40 – 18:00 Oral sessions

Session 3.1: Solar PV Control Systems

Room: A

Session Chairs: Imad Mougharbel, *Lebanese University, Lebanon*  
M. Emziane, *Masdar Institute of Science and Technology, UAE*

**16:40 – 17:00 Dual Functioning Converter Utilizing Flyback Structure Used in Solar Energy Generation**

Hossein Kazemi Karegar, *Shahid Beheshti University, Iran*

Zeinab Sudi, *Shahid Beheshti University, Iran*

Sasan Sodeifi, *Shahid Beheshti University, Iran*

Erfan Mohagheghi, *Shahid Beheshti University, Iran*

**17:00 – 17:20 Fuzzy Maximum Power Control of PV System**

Elkhatib Kamal, *Hautes Etudes d'Ingénieur – LAGIS, France*

Abdel Aitouche, *Hautes Etudes d'Ingénieur – LAGIS, France*

Mohammed Oueidat, *Lebanese University, Lebanon*

Adnan Jouni, *ALMEE, Lebanon*

**17:20 – 17:40 Optimal Solution for the Connectivity of PV Systems on a Scheduled Availability of the Grid**

Imad Mougharbel, *Lebanese University, Lebanon*

Ahmad Makkawi, *Lebanese University, Lebanon*

Hassan Ghazal, *Lebanese University, Lebanon*

**17:40 – 18:00 A Single-Stage DC-AC Boost Topology and Control for Solar PV Systems supplying a PMSM**

Hassan Moussa, *Lebanese University, Lebanon*

Maurice Fadel, *ENSEEIH-T-LAPLACE, France*

Hadi Kanaan, *Saint-Joseph University, Lebanon*

Session 3.2: Biomass and Hydro Power

Room: B

Session Chairs: Richard Maroun, *Saint-Joseph University, Lebanon*  
Tony Matar, *ALMEE, Lebanon*

16:40 – 17:00 **An Experimental Investigation on Performance and Exhaust Emissions of Compression Ignition Engine Fuelled with Palm Oil Methyl Ester Blends**

Duraïd F. Maki, *University of Baroda, India*

P. Prabhakaran, *University of Baroda, India*

17:00 – 17:20 **Fuzzy Logic Based Reactive Controller for Heaving Wave Energy Converters**

Mohammed Jama, *UAE University, United Arab Emirates*

Addy Wahyudie, *UAE University, United Arab Emirates*

Hassan Noura, *UAE University, United Arab Emirates*

Ali Assi, *Lebanese International University, Lebanon*

17:20 – 17:40 **Valorization of industrial waste using energy saving procedures. Phenolic compounds purification from grape by-products by Accelerated Solvent Extraction (ASE)**

Hiba N. Rajha, *Saint-Joseph University, Lebanon*

Nada El Darra, *Saint-Joseph University, Lebanon*

Nicolas Louka, *Saint-Joseph University, Lebanon*

Richard G. Maroun, *Saint-Joseph University, Lebanon*

Walter Ziegler, *Technical University of Graz, Austria*

Herbert Böchzelt, *Technical University of Graz, Austria*

17:40 – 18:00 **Biogas Production Potential in Algeria: Waste to Energy Opportunities**

Bilal Abderezzak, *Khemis Miliana University, Algeria*

Benyoucef Khelidj, *Khemis Miliana University, Algeria*

Ahmed Kellaci, *Khemis Miliana University, Algeria*

20:30 – 23:00 Gala dinner



## Thursday, November 29, 2012

08:30 – 09:00 Registration

09:00 – 09:30 Keynote speaker  
**Jean-Claude Turret**, *Institute of the Mediterranean*  
Thermal Restoration of Buildings

09:30 – 10:50 Oral sessions

Session 4.1: Hybrid and Distributed Generation Systems

Room: A

Session Chairs: Nazih Moubayed, *Lebanese University, Lebanon*  
Adrian Ilinca, *Université du Québec à Rimouski, Canada*

09:30 – 09:50 **Evaluation and Design of an Optimal Standalone Solar/Wind Hybrid System for Rural Poultry Farm in Ethiopia**

Tsehay Endris Amanu, *Adama University, Ethiopia*

Getachew Biru Worku, *Ethiopian Aviation Academy, Ethiopia*

09:50 – 10:10 **A new multi-hybrid power system for grid-disconnected areas**

Tammam Basbous, *Université du Québec à Chicoutimi, Canada*

Adrian Ilinca, *Université du Québec à Rimouski, Canada*

Rafic Younes, *Lebanese University, Lebanon*

Jean Perron, *Université du Québec à Chicoutimi, Canada*

10:10 – 10:30 **A PMU Based Anti-Islanding Protection of Synchronous Generators**

Tohid Soleimani Aghdam, *Shahid Beheshti University, Iran*

Hossein Kazemi Karegar, *Shahid Beheshti University, Iran*

Sasan Sodeifi, *Shahid Beheshti University, Iran*

10:30 – 10:50 **Economic Optimization of Sources of Energies Using Wind/PV Hybrid System**

Ahmad El-Ayoubi, *Lebanese University, Lebanon*

Nazih Moubayed, *Lebanese University, Lebanon*

Session 4.2: Fuel Cells Technology and Applications

Room: B

Session Chairs: Tilda Akiki, *Holy Spirit University of Kaslik, Lebanon*  
Abdel Aitouche, *Hautes Etudes d'Ingénieur – LAGIS, France*

09:30 – 09:50 **Modeling the effects of mechanical solicitations and their influence on the power production of a polymer electrolyte membrane fuel cell**

Tilda Akiki, *Holy Spirit University of Kaslik, Lebanon*

Gilbert Accary, *Holy Spirit University of Kaslik, Lebanon*

Willy Charon, *UTBM, France*

Marie-Christine Iltchev, *UTBM, France*

09:50 – 10:10 **PEM fuel Cell Modeling and Simulation via the Takagi-Sugeno Fuzzy Model**

Abdel Aitouche, *Hautes Etudes d'Ingénieur – LAGIS, France*

Serverus Olteanu, *Hautes Etudes d'Ingénieur – LAGIS, France*

Mohamad Oueidat, *Lebanese University, Lebanon*

Adnan Jouni, *ALMEE, Lebanon*

10:10 – 10:30 **Reactive sputtering DC magnetron-deposited TiO<sub>2</sub> thin films intended for photoelectrolysis of water for hydrogen production**

Smain Boukrouh, *University Center of Mila, Algeria*

Djahida Kerdoud, *University Center of Mila, Algeria*

Farida Medjani, *University Center of Mila, Algeria*

Tahar Kezai, *Catholic University of Louvain, Belgium*

Rachid Segni, *University Mentouri of Constantine, Algeria*

10:30 – 10:50 **Fuel Cell diagnosis using Takagi-Sugeno Observer Approach**

Abdel Aitouche, *Hautes Etudes d'Ingénieur – LAGIS, France*

Serverus Olteanu, *Hautes Etudes d'Ingénieur – LAGIS, France*

Mohamad Oueidat, *Lebanese University, Lebanon*

Adnan Jouni, *ALMEE, Lebanon*

10:50 – 11:30 Coffee break

11:30 – 12:50 Oral sessions

Session 5.1: Power Grids Issues and Energy Efficient Solutions

Room: A

Session Chairs: Hadi Y. Kanaan, *Saint-Joseph University, Lebanon*  
Semaan Georges, *Notre-Dame University, Lebanon*

11:30 – 11:50 **Model Predictive Coordinated Secondary Voltage Control of Power Grids**

Arvin Morattab, *Ecole de Technologie Supérieure, Canada*

Asber Dalal, *Institut de Recherche d'Hydro-Québec, Canada*

Ouassima Akhrif, *Ecole de Technologie Supérieure, Canada*

Marouf Saad, *Ecole de Technologie Supérieure, Canada*

Serge Lefebvre, *Institut de Recherche d'Hydro-Québec, Canada*

11:50 – 12:10 **Case Study of Using LED Lamps as Energy Efficient Components**

Patrick Hajje, *Notre-Dame University, Lebanon*

Nancy Kanbar, *Notre-Dame University, Lebanon*

Semaan Georges, *Notre-Dame University, Lebanon*

12:10 – 12:30 **A Study on the Impact of a Massive Integration of Compact Fluorescent Lamps on Power Quality in Distribution Power Systems**

Antoine F. Hanna Nohra, *ISAE-CNAM, Lebanon*

Hadi Y. Kanaan, *Saint-Joseph University, Lebanon*

Kamal Al-Haddad, *Ecole de Technologie Supérieure, Canada*

12:30 – 12:50 **Studying Emergency Demand Response Programs based on Exponential Modeling in Smart Grids**

Mehdi Nikzad, *Islamic Azad University, Iran*

Shoorangiz Shams Shamsabad Farahani, *Islamic Azad University, Iran*

Session 5.2: Energy Efficiency in Green Buildings

Room: B

Session Chairs: Adnan Jouni, *ALMEE, Lebanon*  
Christine Weber, *Fraunhofer ISE, Germany*

11:30 – 11:50 **GRASS – A New Building Rating System for Lebanon**

Farah Mneimneh, *Lebanese University, Lebanon*

Haneen Hamdan, *Lebanese University, Lebanon*

Adel Mourtada, *ALMEE, Lebanon*

- 11:50 – 12:10 **Use of Natural Ventilation in Reducing Building Energy Consumption in Single-Family Housing in Brazil**  
 Francisco Massucci Silveira, *University of Campinas, Brazil*  
 Lucila Chebel Labaki, *University of Campinas, Brazil*
- 12:10 – 12:30 **Net Zero Energy Buildings: Application in Lebanon on a typical residential Building**  
 Tarek Samarji, *Lebanese University, Lebanon*  
 Adnan Jouni, *ALMEE, Lebanon*  
 Ali Karaki, *ALMEE, Lebanon*
- 12:30 – 12:50 **Numerical Analysis to Identify the Quantity of Heat Flow through Building Floor with Outer Horizontal Edge Insulation**  
 Naser Sanoussi, *College of Mechanical Engineering Technology, Libya*
- 12:50 – 14:30 Lunch
- 14:30 – 15:00 Keynote speaker  
**Joachim Koschikowski**, *Fraunhofer ISE, Germany*  
 Solar Desalination Plants & Processes for Developing countries
- 15:00 – 16:20 Oral sessions
- Session 6.1: Energy Management and Planning
- Room: A
- Session Chairs: Christoforos Perakis, *CRES, Greece*  
 Saïd Chéhab, *ALMEE, Lebanon*
- 15:00 – 15:20 **Advancements and external assistance in the fields of renewable energy and energy efficiency in Lebanon**  
 Christoforos Perakis, *CRES, Greece*  
 Kostas Anagnostopoulos, *CRES, Greece*  
 Adnan Jouni, *ALMEE, Lebanon*
- 15:20 – 15:40 **Smart Home Energy Management Design Based on Power line Communication**  
 Fawzi M. Al-Naima, *Nahrain University, Iraq*  
 Ramzy S. Ali, *Basrah University, Iraq*  
 Ahmed J. Abid, *Institute Foundation of Technical Education, Iraq*
- 15:40 – 16:00 **Fault Detection and Diagnosis of Renewable Energy Systems: An Overview**  
 Hiba Al-Sheikh, *Lebanese International University, Lebanon*  
 Nazih Moubayed, *Lebanese University, Lebanon*

**16:00 – 16:20 Generation Expansion Planning under Wide-Scale RES Energy Penetration**

Kostas Tigas, *CRES, Greece*

John Mantzaris, *CRES, Greece*

Georgios Giannakidis, *CRES, Greece*

Christos Nakos, *CRES, Greece*

Nikos Sakelaridis, *CRES, Greece*

Eleftheria Pyrgioti, *University of Patras, Greece*

Antonios Alexantridis, *University of Patras, Greece*

**Session 6.2: Renewable Energy Education and Policy**

**Room: B**

**Session Chairs:** Samir Allal, *IUT de Mantes, France*  
Walid Deghaili, *ESCWA, Lebanon*

**15:00 – 15:20 Training of Building Technicians on Energy Efficiency and Renewable Energy Sources (RES) – The REE\_TROFIT Project**

Antonis Tsikalakis, *Technological Education Institute of Crete, Greece*

E. Karapidakis, *Technological Education Institute of Crete, Greece*

Anastasia Katsamaki, *Technological Education Inst. of Crete, Greece*

Yiannis Katsigiannis, *Technological Education Inst. of Crete, Greece*

Spyros Apostolakis, *Technological Education Inst. of Crete, Greece*

**15:20 – 15:40 Sustainability initiatives in Developing Countries: Green Buildings in Lebanon**

Nancy Kanbar, *Notre-Dame University, Lebanon*

Charbel Bassil, *Notre-Dame University, Lebanon*

Marise Raad, *Notre-Dame University, Lebanon*

**15:40 – 16:00 The New Energy Policy in the Russian Federation (law on energy conservation and energy efficiency)**

Sergey Kulagin, *Energy Center Ltd, Russia*

**16:00 – 16:20 Development, Water and Energy within the Context of Climate Change in the Southern Mediterranean countries**

Stéphane Quéfélec, *Université d'Aix-Marseille, France*

Samir Allal, *IUT de Mantes, France*

**16:20 – 16:30 Closing session**



## List of Reviewers

ABDEREZZAK	Bilal	Khemis Miliana University	Algeria
ABOURIDA	Simon	OPAL-RT	Lebanon
AFIF	Charbel	Saint-Joseph University	Lebanon
AITOUCHE	Abdelwahab	Ecole des Hautes Etudes d'Ingénieur	France
AKIKI	Tilda	Holy Spirit University of Kaslik	Lebanon
ANAGNOSTOPOULOS	Kostas	Centre for Renewable Energy and Sources	Greece
ASMAR	Claude	Saint-Joseph University	Lebanon
ASSAD (AL)	Joseph	Holy Spirit University of Kaslik	Lebanon
ASSI	Ali	Lebanese International University	Lebanon
BOU DAGHER KHARRAT	Magda	Saint-Joseph University	Lebanon
CHÉHAB	Saïd	ALMEE	Lebanon
DEGHAILI	Walid	ESCWA	Lebanon
DJEMAI	Mohamed	Université de Valenciennes	France
DÖLL	Jochen	Fraunhofer Institute for Solar Energy Systems	Germany
EMZIANE	Mehieddine	Masdar Institute of Science and Technology	UAE
FADEL	Maurice	ENSEEIH - LAPLACE	France
FALLAHA	Charles	Rolls-Royce	Canada
FRANCIS	Clovis	Lebanese University	Lebanon
FÜLDNER	Gerrit	Fraunhofer Institute for Solar Energy Systems	Germany
GEORGES	Semaan	Notre-Dame University	Lebanon
GHADDAR	Nesreen	American University of Beirut	Lebanon
GHANDOUR	Mazen	Lebanese University	Lebanon
GIANNAKIDIS	George	Centre for Renewable Energy and Sources	Greece
HAJJ SHEHADEH	Nader	Lebanese Center for Energy Conservation	Lebanon
HANNA NOHRA	Antoine	ISAE-CNAM	Lebanon
HARKOUSS	Youssef	Lebanese University	Lebanon
HAYEK	Michel	Notre-Dame University	Lebanon
HENNINGER	Stefan	Fraunhofer Institute for Solar Energy Systems	Germany
ILINCA	Adrian	Université du Québec à Rimouski	Canada
JABR	Rabih	American University of Beirut	Lebanon
JOUNI	Adnan	ALMEE	Lebanon
KAMALI	Walid	Al-Manar University	Lebanon

KANAAN	Hadi	Saint-Joseph University	Lebanon
KATSIGIANNIS	Ioannis	Technological Educational Institute of Crete	Greece
KHOURY	Khalil	Lebanese University	Lebanon
KHOURY (EL)	Pierre	Lebanese Center for Energy Conservation	Lebanon
LEGRAND	Jack	GEPEA – Université de Nantes	France
LOUKA	Nicolas	Saint-Joseph University	Lebanon
MAROUN	Richard	Saint-Joseph University	Lebanon
MICHEL	Pierre	ENTPE	France
MONMASSON	Eric	Université de Cergy-Pontoise	France
MORGENSTERN	Alexander	Fraunhofer Institute for Solar Energy Systems	Germany
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MOUBAYED	Nazih	Lebanese University	Lebanon
MOUGHARBEL	Imad	Lebanese University	Lebanon
PERAKIS	Christoforos	Centre for Renewable Energy and Sources	Greece
PETRY ELIAS	Anna Raquel	Fraunhofer Institute for Solar Energy Systems	Germany
RAHHAL	Mohsen	Saint-Joseph University	Lebanon
RAHMANI	Salem	Université de Tunis El-Manar	Tunisia
RIKOS	Evangelos	Centre for Renewable Energy and Sources	Greece
SAAD	Maarouf	Ecole de Technologie Supérieure	Canada
SALAMEH	Dominique	Saint-Joseph University	Lebanon
SALEM	Talal	Notre-Dame University	Lebanon
SCHICKTANZ	Matthias	Fraunhofer Institute for Solar Energy Systems	Germany
TSIKALAKIS	Antonis	Technological Education Institute of Crete	Greece
TURPIN	Christophe	Université de Toulouse - LAPLACE	France
WEBER	Christine	Fraunhofer Institute for Solar Energy Systems	Germany
WIEMKEN	Edo	Fraunhofer Institute for Solar Energy Systems	Germany
WORKU	Getachew Biru	Ethiopian Aviation Academy	Ethiopia
ZOUGHAIB	Assaad	Ecole des Mines ParisTech	France

# ESCWA in Brief

Stability and prosperity are the watchwords of the United Nations Charter. They are prerequisites for sound and cordial relations between nations, based on respect for the principle of equal rights that ensures and provides equality self-determination of opportunity to pursue a higher standard of living and employment for all through consistent economic growth and social development.

The five regional commissions were created by the United Nations in order to fulfill the economic and social goals set out in the United Nations Charter by promoting cooperation and integration between the countries in each region of the world. Those commissions are: the Economic Commission for Europe (ECE, established in 1947); the Economic and Social Commission for Asia and the Pacific (ESCAP, 1947); the Economic Commission for Latin America and the Caribbean (ECLAC, 1948); the Economic Commission for Africa (ECA, 1958); and the Economic and Social Commission for Western Asia (ESCWA, 1973).

## ESCWA

The Economic Commission for Western Asia (ECWA) was established on 9 August 1973 pursuant to the Economic and Social Council's resolution 1818 (LV). The purpose of setting up the Commission was to raise the level of economic activity in member countries and strengthen cooperation among them. It was also intended to meet the need of the countries in Western Asia for the services of a regional economic commission to promote the development efforts in the region.

In recognition of the social component of its work, the Commission was entrusted with new responsibilities in the social field by virtue of Economic and Social Council resolution 69/ 1985 of July 1985. Its name therefore became the Economic and Social Commission for Western Asia (ESCWA).

ESCWA has been located in a number of Arab capitals. It started in Beirut (1974- 1982), moved to Baghdad (1982- 1991), then to Amman (1991- 1997), and returned to Beirut in 1997, its permanent headquarters.

## Membership

ESCWA comprises 17 Arab countries in Western Asia: Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Saudi Arabia, The Sudan, The Syrian Arab Republic, Tunisia, The United Arab Emirates and Yemen.

## Objectives

- To support economic and social development in the countries of the region.
- To promote cooperation between the countries of the region.
- To encourage interaction between member countries and promote the exchange of experience, best practice and lessons learned.
- To achieve regional integration between member countries, and to ensure interaction between Western Asia and other regions of the world.
- To familiarize the outside world with the circumstances and needs of the countries in the region.

## Mission

ESCWA provides a framework for the formulation and harmonization of sectorial policies for member countries, a platform for congress and coordination, a home for expertise and knowledge, and an information observatory. ESCWA activities are coordinated with the divisions and main offices of the Headquarters of the United Nations, specialized agencies, and international and regional organizations, including the League of Arab States and its subsidiary bodies, and the Gulf Cooperation Council.



## The RESSOL-MEDBUILD Project

(<http://www.ressol-medbuild.eu>)

RESearch Elevation on Integration of SOLar Technologies into MEDiterranean BUILDings (RESSOL - MEDBUILD) is a Support Action that is co-funded by the European Commission under EU Framework Program 1 (FP7), Capacities, and Research Potential. It is running for three years from January 2010 to December 2012. The project aims at enhancing the scientific and research capacity as well the human resources and infrastructure of two existing Mediterranean organizations, the National Energy Research Center (NERC) of Jordan and the Lebanese Association for Energy Saving and Environment (ALMEE), by providing capacity building derived from the efforts of two established research entities located in EU's convergence regions and EU Member States countries, namely the Center for Renewable Energy Sources (CRES) and Fraunhofer Institute for the Solar Energy Systems (ISE).

In Jordan and Lebanon, countries with little indigenous energy resources, the problems of security of supply, satisfaction rising of electricity demand and the protection of the environment are challenging. However, these countries are blessed with abundant solar radiation, an energy source with is valuable to cover their energy needs and provide a renewable energy source.

In order to exploit efficiently this natural gift, the capacities of the NERC of Jordan and the ALMEE are elevated under the framework of the RESSOL-MEDBUILD project. The strategic goal of this project is to strengthen the capacities of NERC and ALMEE in order to engage in high quality research, implement research projects and provide scientific services in the fields of a) technological integration of solar heating and cooling and PV technologies (grid-connected and stand-alone) in buildings, b) simulation models and optimization of solar heating and cooling systems and PV technologies into building operations and c) energy modeling and decision support regarding the energy planning in local and regional scale emphasizing the adoption of PV and solar thermal technologies in buildings and oriented to support energy policy formulation. The capacity build will be provided by the CRES and the Fraunhofer ISE.

The capacity building will aim at improving scientific knowledge through secondments and training, recruiting of researchers, enhancing equipment, creating partnerships and disseminating at EU, Mediterranean, national and international level. The capacity building will result in making the Mediterranean partners capable of conducting high-level research in PVs, solar thermal systems, and energy modeling, formulate energy policy in solar technologies, conduct energy planning, provide scientific services and exploit their research products.



# REDEC 2012

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## INTERNATIONAL CONFERENCE ON RENEWABLE ENERGIES FOR DEVELOPING COUNTRIES



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