

# **INTERNATIONAL JOURNAL OF ENERGY AND ENVIRONMENT**

**Official Journal of the International Energy and  
Environment Foundation**

ISSN 2076-2895 (Print) ISSN 2076-2909 (Online)

**Volume 2, Issue 5, 2011**

© 2011 International Energy and Environment Foundation. All rights reserved

## Aims and Scope

The International Journal of Energy and Environment (IJEE) is the official journal of the International Energy and Environment Foundation providing an international forum for the fields of Energy and Environment. The journal aims to provide the most complete and reliable source of information on current developments in the field. The emphasis will be on publishing quality articles rapidly and making them freely available to researchers worldwide. The journal has a distinguished editorial board with extensive academic qualifications, ensuring that the journal will maintain high academic standards and has a broad international coverage. There are no page charges and all articles are indexed by the major indexing media therefore providing the maximum exposure to the articles. The scope of the journal includes the following:

### Energy

- Fuel cells.
- Hydrogen energy.
- Solar energy conversion and photovoltaics.
- Wind energy.
- Hydro energy.
- Micro- and nano-energy systems and technologies.
- Biofuels and alternatives.
- Hybrid / integrated energy systems.
- Energy conversion, conservation and management.
- Energy efficient buildings.
- Energy storage.
- Energy and sustainable development.
- Advanced visualization techniques, virtual environments and prototyping.

### Environment

- Energy and environmental impact.
- Assessment of risks from water, soil and air pollution; effective and viable remedies.
- Evaluation and management of environmental risk and safety.
- Environment and sustainable development.
- Environmental education and training.
- Analysis of contaminants.
- Contaminant source characterization, transport and deposition.
- Multi-media sampling / monitoring (air, soil, water, sediment).
- Quality assurance / control.
- Legislative issues and guidelines.
- Remediation.
- Climate change.

### A note to authors

#### *Submission of articles*

Articles submitted to the Review should be original contributions, not previously published, and should not be under consideration for any other publication at the same time. The submitting author is responsible for obtaining agreement of all co-authors as well as any sponsors' required consent before submitting a paper. Responsibility for the content of a paper lays on the Authors and not on the Editors or the Publisher.

Formatting instructions can be found on author guidelines and must be strictly followed or else your paper will not be published. The paper template represents the basic guidelines and desired layout final manuscript of International Journal of Energy and Environment (IJEE). It's compulsory to use the template for the preparation of your paper. Full instructions can be found on the web site (<http://www.IJEE.IEEFoundation.org>).

### Your Submitted Article

- Your article will be peer-reviewed and published very fast.
- Your biography will appear at the end of your article.
- Your article will be published free of charge. Free use of colour where this enhances the article.
- Your article can be read by potentially millions of readers, which is incomparable to publishing in a traditional subscription journal. All interested readers can read, download, and/or print your article at no cost!
- Your article will obtain more citations.
- Moreover, all articles are indexed by the major indexing media therefore providing the maximum exposure to the articles.

# INTERNATIONAL JOURNAL OF ENERGY AND ENVIRONMENT



*Official Journal of the International Energy & Environment Foundation*

*Journal homepage: [www.IJEE.IEEFoundation.org](http://www.IJEE.IEEFoundation.org)*

---

## **Editor-in-Chief**

**Maher A.R. Sadiq Al-Baghdadi**

*President of the International Energy and Environment Foundation (IEEF), Al-Najaf, P.O.Box. 39, Iraq.*

## **Associate Editor**

**Hashim R. Abdol Hamid**

*Vice President of the International Energy and Environment Foundation (IEEF), Al-Najaf, P.O.Box. 39, Iraq.*

## **Editorial Advisory Board**

### **Tarek Abdel-Salam**

*Center of Sustainable Energy, Department of Engineering, East Carolina University, 207 Slay Bldg., Greenville, NC 27858-4353, USA.*

### **Amitava Bandyopadhyay**

*Department of Chemical Engineering, University of Calcutta, 92, A.P.C.Road, Kolkata 700 009, India.*

### **Angelo Basile**

*Institute on Membrane Technology of the Italian National Research Council, ITM-CNR, c/o University of Calabria, via P. Bucci, cubo 17/C, 87030 Rende (CS), Italy.*

### **Eloy Velasco Gomez**

*ETS Ingenieros Industriales, Universidad de Valladolid, Paseo del Cauce, no 59, 47011 Valladolid, Spain.*

### **Arunachala Nadar Kannan**

*Department of Engineering Technology, TECH 156, Arizona State University, 7001 E Williams Field Rd, Mesa, AZ 85212, U.S.A.*

### **T. Lu**

*School of Mechanical and Electrical Engineering, Beisanhuan East Road, Chaoyang District, Beijing 100029, P.R.China.*

### **A. Mani**

*Refrigeration and Air-conditioning Laboratory, Department of Mechanical Engineering, Indian Institute of Technology Madras, Chennai 36, Pincode 600 036, India.*

### **Meng Ni**

*Department of Building and Real Estate, The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong.*

### **S-J Park**

*Department of Chemistry, Inha University, 253 Yonghyun-dong, Nam-gu 402-751, Korea (south).*

### **Md. Mujibur Rahman**

*Department of Mechanical Engineering, College of Engineering, Universiti Tenaga Nasional, Km 7, Jalan Kajang-Puchong, 43009 Kajang, Selangor, Malaysia.*

### **Julien Ramousse**

*Polytech'Savoie, Université de Savoie, Campus scientifique, Savoie Technolac, 73376 Le Bourget, du Lac, CEDEX, France.*

### **Teemu Rasanen**

*Research Group of Environmental Informatics, Department of Environmental Sciences, University of Kuopio, FI-70211 Kuopio, Finland.*

### **Marc A. Rosen**

*University of Ontario Institute of Technology, Faculty of Engineering and Applied Science, 2000 Simcoe Street North, Oshawa, Ontario, L1H 7K4, Canada.*

### **David Michael Rowe**

*Cardiff School of Engineering, Queen's Buildings, Newport Road Cardiff CF24 1XF, U.K.*

**Hisham M. Sabir**

Kingston University, Faculty of Engineering, Friars Avenue, London SW15 3DW, U.K.

**Suresh Babu Sadineni**

Center for Energy Research, Department of Mechanical Engineering, Howard R. Hughes College of Engineering, University of Nevada, Las Vegas (UNLV) 89154-4027, U.S.A.

**Bidyut Baran Saha**

Department of Mechanical Engineering, National University of Singapore, 9 Engineering Drive 1, 117576, Singapore.

**Vicente Salas**

Department of Electronic Technology, Universidad Carlos III de Madrid, Avda. de la Universidad, 30, 28911 Leganes, Madrid, Spain.

**Amin U. Sarkar**

School of Business, Alabama A&M University, Normal (Huntsville), AL 35762, U.S.A.

**Joop Schoonman**

Department DelftChemTech: Materials for Energy Conversion and Storage, Delft University of Technology, Julianalaan 136, 2628 BL Delft, The Netherlands.

**Tomonobu Senjyu**

University of the Ryukyus, Faculty of Engineering, 1 Senbaru Nishihara-cho Nakagami Okinawa 903-0213, Japan.

**Jose Ramon Serrano**

Universidad Politécnic de Valencia, CMT-Motores Térmicos, Camino de Vera s/n, 46022 Valencia, Spain.

**Rajnish N. Sharma**

Department of Mechanical Engineering, University of Auckland, Private Bag 92019, Auckland 1142, New Zealand.

**S.A. Sherif**

HVAC Laboratory, Department of Mechanical and Aerospace Engineering, University of Florida, 232 MAE Bldg. B, Gainesville, Florida 32611-6300, U.S.A.

**Shailendra Kumar Shukla**

Department of Mechanical Engineering, Institute of Technology, B.H.U., Varanasi-221005, India.

**Rayan Slim**

Center for Energy and Processes, Ecole des Mines de Paris, 104 Bobillot Street, 75013 Paris, France.

**Laizhou Song**

Department of Environmental and Chemical Engineering, Yanshan University, Qinhuangdao City, Hebei Province, P.R.China.

**Adnan Sozen**

Department of Mechanical Education, Gazi University, Technical Education Faculty 06500 Teknikokullar, Ankara Turkey.

**Roland Span**

Lehrstuhl für Thermodynamik, Ruhr-University Bochum, D-44780 Bochum, Germany.

**Anurag K. Srivastava**

Electrical and Computer Engineering, Mississippi State University, 216 Simrall Hall, Hardy Road, Mississippi State, MS 39762, U.S.A.

**Rosetta Steeneveldt**

Research Centre Trondheim, StatoilHydro, Arkitekt Ebbells vei 10, N 7005 Trondheim, Norway.

**Athina Stegou-Sagia**

School of Mechanical Engineering, Department of Thermal Engineering, National Technical University of Athens, 9 Iroon Polytechniou Str. Zografou 157 80, Athens, Greece.

**Peter Stigson**

School of Sustainable Development of Society and Technology, Mälardalen University, 721 23 Västerås, Sweden.

**Anna Stoppato**

Department of Mechanical Engineering, University of Padova, via Venezia, 1-35131 Padova, Italy.

**Michael Stoukides**

Department of Chemical Engineering, Aristotle University of Thessaloniki, Thessaloniki 54124, Greece.

**Jian-Feng Sun**

College of Food Science and Technology, Agricultural University of Hebei, Baoding City, Hebei Province, 071000 P.R.China.

**Stanislaw Szwaja**

Department of Engineering Mechanics, Michigan Technological University, 1400 Townsend Drive, Houghton, MI, 49931, U.S.A.

**David S-K. Ting**

Mechanical, Automotive & Materials Engineering, University of Windsor, Windsor, Ontario, N9B 3P4, Canada.

**G. N. Tiwari**

*Centre for Energy Studies, Indian Institute of Technology Delhi, Hauz Khas, New Delhi - 110 016, India.*

**Bor-Jang Tsai**

*Department of Mechanical Engineering, Chung Hua University, No. 707, Sec. 2, Wu Fu Rd., Hsinchu 300, Taiwan.*

**Athanasios Tsolakis**

*School of Mechanical Engineering, University of Birmingham, Edgbaston, Birmingham, B15 2TT, U.K.*

**Per Tunestal**

*Department of Energy Sciences, Lund University, SE-221 00 Lund, Sweden.*

**Aynur Ucar**

*Department of Mechanical Engineering, Firat University, Elazig, Turkey.*

**Despina Vamvuka**

*Department of Mineral Resources Engineering, Technical University of Crete, University Campus, Hania 73100, Crete, Greece.*

**Virendra Kumar Vijay**

*Centre for Rural Development and Technology, Indian Institute of Technology Delhi, Hauz Khas, New Delhi 110016, India.*

**Shengwei Wang**

*Department of Building Services Engineering, The Hong Kong Polytechnic University, Hong Kong.*

**Yi-Ming Wei**

*Center for Energy and Environmental Policy Research (CEEP), Beijing Institute of Technology, No.5 South Zhongguancun Street, Haidian District, Beijing 100081, P.R.China.*

**Gwomei Wu**

*Chang Gung University, 259 Wen Hua 1st Road, Kweisan, Taoyuan 333, Taiwan.*

**Anke Weidlich**

*SAP Research, SAP AG, Vincenz-PrieBnitz-Str. 1, D-76139 Karlsruhe, Germany.*



## Contents

<b>Prospects of concentrating solar power to deliver key energy services in a developing country.</b>	771-782
<i>Charikleia Karakosta, Charalampos Pappas, John Psarras</i>	
<b>Experimental investigations and CFD study of temperature distribution during oscillating combustion in a crucible furnace.</b>	783-796
<i>J. Govardhan, G.V.S. Rao, J. Narasaiah</i>	
<b>Cooling load and COP optimization of an irreversible Carnot refrigerator with spin-1/2 systems.</b>	797-812
<i>Xiaowei Liu, Lingen Chen, Feng Wu, Fengrui Sun</i>	
<b>Optimal cost and allocation for UPFC using HRGAPSO to improve power system security and loadability.</b>	813-828
<i>Marouani I., Guesmi T., Hadj Abdallah H., Ouali A.</i>	
<b>Online performance assessment of heat exchanger using artificial neural networks.</b>	829-844
<i>C. Ahilan, S. Kumanan, N. Sivakumaran</i>	
<b>Energy efficiency and cost analysis of canola production in different farm sizes.</b>	845-852
<i>S. H. Mousavi-Avval, S. Rafiee, A. Jafari, A. Mohammadi</i>	
<b>Multi criteria analysis in environmental management: Selecting the best stormwater erosion and sediment control measure in Malaysian construction sites.</b>	853-862
<i>Ibrahiem Abdul Razak Al-Hadu, Lariyah Mohd Sidek, Mohamed Nor Mohamed Desa, Noor Ezlin Ahmad Basri</i>	
<b>A capillary-based method determining the permeability of sand layer for geothermal applications.</b>	863-870
<i>Huajun Wang, Hongjie Zhao, Chengying Qi</i>	
<b>Enhancement of emission characteristics of a direct injection diesel engine through porous medium combustion technique.</b>	871-876
<i>C. Kannan, P. Tamilporai</i>	
<b>MPPT control of wind generation systems based on FNN with PSO algorithm.</b>	877-886
<i>Chih-Ming Hong, Whei-Min Lin, Chiung-Hsing Chen, Ting-Chia Ou</i>	
<b>Status and prospects for household biogas plants in Ghana – lessons, barriers, potential, and way forward.</b>	887-898
<i>Edem Cudjoe Bensah, Moses Mensah, Edward Antwi</i>	

- Performance and emission characteristics of diesel engine run on biofuels based on experimental and semi analytical methods.** 899-908  
*Donepudi Jagadish, Puli Ravi Kumar, K. Madhu Murhty*
- Ecological optimization of endoreversible chemical engines.** 909-920  
*Dan Xia, Lingen Chen, Fengrui Sun*
- Comparative thermal analysis of theoretical and experimental studies of modified indirect evaporative cooler having cross flow heat exchanger with one fluid mixed and the other unmixed.** 921-932  
*Trilok Singh Bisoniya, S.P.S. Rajput, Anil Kumar*
- Energy storage in field operations of sunflower production using data envelopment analysis approach.** 933-944  
*S. H. Mousavi-Avval, S. Rafiee, A. Jafari, A. Mohammadi*
- Effect of heat source on MHD free convection flow past an oscillating porous plate in the slip flow regime.** 945-952  
*S. S. Das, L. K. Mishra, P. K. Mishra*