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# **Advances in Energy Planning, Environmental Education and Renewable Energy Sources**

\* **4<sup>th</sup> WSEAS International Conference on Energy Planning,  
Energy Saving, Environmental Education (EPESE '10)**

\* **4<sup>th</sup> WSEAS International Conference on  
Renewable Energy Sources (RES '10)**

**Kantaoui, Sousse, Tunisia, May 3-6, 2010**

**Sponsor and Organizer:  
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**Preface**

This year the 4th WSEAS International Conference on ENERGY PLANNING, ENERGY SAVING, ENVIRONMENTAL EDUCATION (EPESE '10) and the 4th WSEAS International Conference on RENEWABLE ENERGY SOURCES (RES '10) were held in Kantaoui, Sousse, Tunisia, May 3-6, 2010. The conferences remain faithful to their original idea of providing a platform to discuss energy planning studies, environmental management, conservation and management of ecological areas, nuclear energy and environmental protection, soil and agricultural issues, forestation, wind energy, hydrogen energy, biomass, solar energy - photovoltaic systems, geothermal energy, hydroelectric energy - small hydro plants etc. with participants from all over the world, both from academia and from industry.

Their success is reflected in the papers received, with participants coming from several countries, allowing a real multinational multicultural exchange of experiences and ideas.

The accepted papers of these conferences are published in this Book that will be indexed by ISI. Please, check it: [www.worldses.org/indexes](http://www.worldses.org/indexes) as well as in the CD-ROM Proceedings. They will be also available in the E-Library of the WSEAS. The best papers will be also promoted in many Journals for further evaluation.

Conferences such as these can only succeed as a team effort, so the Editors want to thank the International Scientific Committee and the Reviewers for their excellent work in reviewing the papers as well as their invaluable input and advice.

The Editors





# Table of Contents

<a href="#"><u>Plenary Lecture 1: Sustainability of Buildings</u></a>	12
<i>Corneliu Bob</i>	
<a href="#"><u>Plenary Lecture 2: Energy Transformations and Flows Related to Exergy Conversion and Losses in Electric Train Braking</u></a>	13
<i>Cornelia Aida Bulucea</i>	
<a href="#"><u>Plenary Lecture 3: Thermoeconomical Performance Criteria in Using Biofuels for Internal Combustion Engines</u></a>	14
<i>Krisztina Uzuneanu</i>	
<a href="#"><u>Energy Saving and the Contribution of Green Marketing to Behavioural Change</u></a>	15
<i>Arminda Do Paco, Lilia Varejao</i>	
<a href="#"><u>Upgrading of a Heating Plant for Energy Savings</u></a>	24
<i>Ioan Sarbu, Emilian Valea</i>	
<a href="#"><u>Energy Efficiency of Low Temperature Central Heating Systems</u></a>	30
<i>Ioan Sarbu</i>	
<a href="#"><u>Exergetic Approach of Interruption Processes in Generator Circuit Breaker</u></a>	36
<i>Cornelia A. Bulucea, Doru A. Nicola, Gheorghe Manolea, Serghie Vlase</i>	
<a href="#"><u>Contribution to the Knowledge of Wind Characteristics and Wind Power Potential of a Region</u></a>	43
<i>Mario Ar Talaia</i>	
<a href="#"><u>Measuring and Evaluating Degree of Awareness and Behaviors of Electricity Conservation at King Saud University</u></a>	48
<i>Essam A. Al-Ammar</i>	
<a href="#"><u>Waste Materials Used For Building Construction</u></a>	54
<i>Catalin Badea, Corneliu Bob, Liana Iures</i>	
<a href="#"><u>Self Compacting Concrete as a Friendly Environmental Material</u></a>	60
<i>Liana Iures, Corneliu Bob, Catalin Badea</i>	
<a href="#"><u>Some Solutions for Rehabilitation of a Bridge</u></a>	64
<i>Mihaela-Teodora Toadere, Corneliu Bob, Adrian Bota</i>	
<a href="#"><u>Sustainability of Buildings</u></a>	69
<i>Corneliu Bob, Tamas Dencsak, Liana Bob</i>	
<a href="#"><u>Thermoeconomical Study of a Prime Mover Stirling Engine in a Micro CCHP Biomass System for Domestic Residence</u></a>	75
<i>Krisztina Uzuneanu, Dan Scarpete, Nicolae Badea</i>	
<a href="#"><u>Thermoeconomical Performance Criteria in Using Biofuels for Internal Combustion Engines</u></a>	81
<i>Krisztina Uzuneanu, Dan Scarpete, Tanase Panait, Marcel Dragan</i>	

<b><u>Reducing Greenhouse Gases Emissions by using Biomass in Co-Generation Energetic Plants</u></b>	87
<i>Tanase Panait, Krisztina Uzuneanu, Marcel Dragan</i>	
<b><u>Trigenerative Plant with Low Caloric Potential of Geothermal Sources</u></b>	91
<i>Marcel Dragan, Tanase Panait, Krisztina Uzuneanu</i>	
<b><u>Optimal Architectures of Domestic mCCHP Systems based on Renewable Sources</u></b>	95
<i>N. Badea, N. Cazacu, I. Voncila, K. Uzuneanu</i>	
<b><u>Estimating Global Solar Radiation on Horizontal from Sunshine Hours in Abu Dhabi – UAE</u></b>	101
<i>Ali Assi, Mohammed Jama</i>	
<b><u>Prediction of Monthly Average Daily Global Solar Radiation in Al Ain City – UAE Using Artificial Neural Networks</u></b>	109
<i>Ali Assi, Maitha Al Shamisi, Mohammed Jama</i>	
<b><u>Experimental Study on Combustion of Biomass in a Boiler with Gasification</u></b>	114
<i>Tanase Panait, Gheorghe Ciocea, Ion Ion</i>	
<b><u>Photovoltaic Integration in Buildings A Case Study in Portugal</u></b>	119
<i>Anabela Duarte, Dulce Coelho, Nuno Tomas</i>	
<b><u>Stirling Engine in Residential Systems Based on Renewable Energy</u></b>	124
<i>Dan Scarpete, Krisztina Uzuneanu, Nicolae Badea</i>	
<b><u>Integrated Portable Biogas Systems for Managing Organic Waste</u></b>	130
<i>Christopher I. Taylor, Mohamed G. Hassan, Sherif F. Ali</i>	
<b><u>Numerical Study of Thermal Field of Pantograph Contact Strip-Contact Line Wire Assembly</u></b>	139
<i>Constantin-Florin Ocoleanu, Gheorghe Manolea, Grigore Cividjian, Cornelia A Bulucea</i>	
<b><u>Energy Saving with Rehabilitation Solutions for Existing Structures</u></b>	144
<i>Sorin Dan</i>	
<b><u>Experimental Study Concerning Waste Agricultural Biomass Degradation During Anaerobic Fermentation</u></b>	150
<i>Ioana Ionel, Adrian Eugen Cioabla, Dorel Cicirone Badescu</i>	
<b><u>Experimental Results Concerning Biogas Production through Anaerobic Fermentation, based on Different Waste Biomass</u></b>	154
<i>Adrian Eugen Cioabla, Ioana Ionel, Carmencita Constantin</i>	
<b><u>A Power Line Communication Control Scheme for Electrical Energy Management</u></b>	160
<i>Mohamed Zoubir Saidi, Hamid Bentarzi, Larbi Refoufi</i>	
<b><u>Analyses of Solar Energy Power Generation Depending on Meteorological Conditions for Istanbul</u></b>	166
<i>Safak Saglam</i>	
<b><u>Transmission and Distribution Losses of Turkey's Power System</u></b>	170
<i>Nevzat Onat</i>	
<b><u>Energy Efficient Lighting Controls and a Sample Application</u></b>	176
<i>Safak Saglam, Bulent Oral</i>	

<b><u>Systemic Approach of Hazardous and Non-Hazardous Waste Management</u></b>	181
<i>Carmen Aurora Bulucea, Nikos E. Mastorakis, Cornelia Aida Bulucea, Niculae Boteanu, Aurel Stinga</i>	
<b><u>Turkey's Energy Policy and Investment Plans</u></b>	190
<i>Nevzat Onat, Haydar Bayar</i>	
<b><u>Rewarding and Recognition Schemes for Energy Conserving Driving, Vehicle Procurement and Maintenance. RECODRIVE</u></b>	196
<i>Aurel Stinga, Gheorghe Manolea, Liviu Dinca</i>	
<b><u>Waste Biomass &amp; Coal Co-Combustion in Stationary Fluidized Bed as Promising RES based Technology</u></b>	202
<i>Gavrila Trif-Tordai, Ioana Ionel, Francisc Popescu, Luisa Izabel Dungan, Lucia Varga</i>	
<b><u>Evaluation of Polycyclic Aromatic Hydrocarbons Content of Soil in Areas Heavily Industrialised</u></b>	210
<i>Iuliana Manea, Buruleanu Lavinia, Stefania Iordache, Laur Manea</i>	
<b><u>Authors Index</u></b>	215

# Plenary Lecture 1

## Sustainability of Buildings



### Professor Corneliu Bob

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**Abstract:** The lecture deals with some aspects on sustainability of the new buildings and of strengthened structures. Buildings and infrastructure generate one third of the total CO<sub>2</sub> emissions. In this respect, the construction industry can make a significant contribution by going consuming planning methods. The first part of the presentation is devoted to the correlation: CO<sub>2</sub> emission – energy saving – environment preservation. The second part is dealing with the energy incorporated in main building materials and with the importance of thermal insulation, air tightness and thermal mass of the building envelope. For the strengthened structures, the calculated components of sustainability like total cost of rehabilitated solution, energy used with raw materials and consolidation time are presented in the third part of the present lecture.

#### Brief Biography of the Speaker:

Prof. Corneliu BOB, graduated at the University "Politehnica" of Timisoara – Romania in 1961 and Ph.D. Civil Engineering in 1971 at the same University. In 1990 he became professor of R.C. Structures and Ph.D. – Scientific Coordinator at the Civil Engineering Faculty in Timisoara. From 1996 till 2004 he was the Head of the National Building Research Institute – Timisoara Branch. Professor Bob has also been very active in the Romanian Associations for Civil Engineering: National Association Engineering for Structural Analysis, Bucharest, Romanian Concrete Commission, Romanian Academy – Material Science. Member of IABSE since 1992, Prof. Bob became the member in Permanent Committee, Working Commission WC-8 and Structural Engineering Document Editorial Board. In the last two years he has been involved, with good results, in the WSEAS activities.

Prof. Bob has had many and major contributions in the field of Structural Engineering:

(i). He participated as designer at more than 70 structures projects. In the last 15 years his attentions was paid to the design of the RC prefabricated structures: 25 structures have been projected and built up with more than 100000 m<sup>2</sup> built surface. An important contribution of Prof. Bob in this field was in a patent concerning the "RC prefabricated structures with rigid nodes".

(ii). A very important field of work was paid to evaluation and rehabilitation of existing buildings. He participated at 75 projects of maintenance and rehabilitation of some important structures affected by seismic actions, gas explosions as well as time environmental factors. A very notable contribution is the "Model of reinforcement corrosion in RC Structures".

(iii). Prof. Bob C. has published 21 books and 250 papers in Journals and Proceedings of National and International Meetings. The field of interest of works is: rehabilitation of structures, analysis and design of structures, durability of buildings, new special concrete types.

Prof. Corneliu BOB played an important role in development of assessing of existing structures and in design of new buildings and he has devoted great energy in promoting the role of students and young engineers as designers and researchers.

## Plenary Lecture 2

### Energy Transformations and Flows Related to Exergy Conversion and Losses in Electric Train Braking



#### Associate Professor Cornelia Aida Bulucea

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**Abstract:** A sustainable industrial metabolism, integrating technical and ecological aspects should be one of the greatest challenges of humanity within the present industrial world. Starting from the observation that Nature built ordered structures and human beings are only one component in the complex web of the ecological interactions, we just happen to be a part of the huge evolution process of Nature, the focus of this presentation is to enhance the way of thinking that human activities cannot be separated from the functioning of the entire system. Learning from the Nature means to accept that the technical systems processes involving energy conversion and matter transformation need to be linked to environment engineering. In this context, the presentation is an overview of environmental problems associated to electric train braking processes. The merit of an electric transportation system is based not only on technical performance, safety, energy efficiency, economics and societal acceptance, but also on environmental impact and exergy efficiency. From the viewpoint of exergy and environment, the braking regime, particularly electric braking, is a special aspect of railway vehicles using electric traction. Since electric drive systems are used with static converters and traction induction motors, these machines with appropriate control can realize both traction and electric braking regimes for electric traction vehicles. Concerns regarding mechanical braking are associated with unrecovered energy and material utilization. Also, for underground electric trains during mechanical braking, the abnormal but frequent situation involving the unequal charge of the traction induction motors is a concern. These aspects of the electric railway vehicles, particularly the underground electric trains are analyzed so as to assist in improving environmental performance.

#### Brief Biography of the Speaker:

Cornelia Aida Bulucea is currently an Associate Professor in Electrotechnics, Electrical Machines and Environment Electrical Equipments in the Faculty of Electromechanical and Environmental Engineering, University of Craiova, Romania. She is graduate from the Faculty of Electrical Engineering Craiova and she received the Ph.D degree from Bucharest Polytechnic Institute. In Publishing House she is author of four books in electrical engineering area. Research work is focused on improved solutions for electrical networks on basis of new electric equipments and environmental impact of energy and electric transportation systems. She has extensive experience in both experimental and theoretical research work, certified by over 50 journal and conference research papers and 13 research projects from industry. She has held in the Association for Environment Protection OLTENIA and she is a regular invited keynote lecture for environmental engineering symposia organized by Chamber of Commerce and Industry OLTENIA. Due to WSEAS recognition as huge scientific Forum she participated in five WSEAS International Conferences, presenting papers and chairing sessions. She was Plenary Lecturer in the WSEAS International Conference on POWER SYSTEMS, held by the University of Cantabria, Santander, Spain, September 23-25, 2008. She is very proud of her 10 papers published in the WSEAS Conferences Books and 3 papers published in WSEAS TRANSACTIONS ON ENVIRONMENT AND DEVELOPMENT, and in WSEAS TRANSACTIONS ON ADVANCES IN ENGINEERING EDUCATION.

## Plenary Lecture 3

### Thermoeconomical Performance Criteria in Using Biofuels for Internal Combustion Engines



#### Associate Professor Krisztina Uzuneanu

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**Abstract:** The alternative fuels used to fuel internal combustion engines are supposed to keep the same output and efficiency as if the engine is supplied with classical fuel. Substituting the fossil fuels by unconventional ones is essential to make oil savings and reduce gas emissions at the same time. This, however, should not affect the engine performance: output, power, chemical and noise emissions, operation costs, easy cold start, safety operation. Biofuels of different type and properties are currently tested on real test bench engines with regard to their effect on power output, fuel efficiency and exhaust emissions. This action helps identifying the best fuel characteristics as well as the limits in biofuel concentration for which the current engines can operate without problems. Through the measurements, the impact of biofuel type and concentration on emissions and vehicle operation is quantified for various conditions and representative emissions factors are being developed for future application and policy assessment.

The major research is still on the second generation of biofuels (biofuels produced from agricultural residue and waste materials - biomass), because the problems raised are not completely solved. Only the utilization of biomass allows for the conception of carbon-negative energy; all other renewables (wind, solar) are all carbon-neutral at best, carbon-positive in practice.

A case study referring to mixtures ethanol – gasoline to fuel an internal combustion engine is presented as an application of using biofuels in transports. By replacing a fraction from the fossil fuel with an unconventional fuel, the engine thermoeconomic parameters should be reevaluated.

#### **Brief Biography of the Speaker:**

Dr. Krisztina Uzuneanu graduated Faculty of Mechanical Engineering of University Dunarea de Jos of Galati in 1984 and she obtained the title of Doctor Engineer in 1998.

Since 1987 she followed the academic carrier at Dunarea de Jos University of Galati as assistant, lecturer and associate professor. Dr. Uzuneanu is a visiting professor at different universities: Universidade do Minho, Portugal, Universita degli Studi di Genova, Italy, Universita degli Studi di Salerno, Italy, Pannon University Veszprem, Hungary, Erciyes University Kayseri, Turkey and visitor scientist of of Universidade do Minho Guimaraes, Portugal where she was awarded with a post-doc NATO grant in 2002 - 2003.

Research fields are connected with applied thermodynamics, alternative fuels for internal combustion engines, modeling the thermal stresses of different parts of internal combustion engines and monitoring the emissions. Dr. Uzuneanu published 95 articles in national and international conferences proceedings and she is author of 3 books. The research was done as member of 20 research contracts financed by European Commission and Romanian Ministry of Education and Research and director of 5 research contracts financed by industry.

Dr K. Uzuneanu is member of Romanian Society of Thermodynamics since 1990.