

7TH BIENNIAL INTERNATIONAL WORKSHOP

# ADVANCES IN ENERGY STUDIES 2010



# CAN WE **BREAK** THE ADDICTION TO FOSSIL ENERGY?

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UNIVERSITAT AUTÒNOMA DE BARCELONA (UAB)

19-21 OCTOBER 2010

AND

COSMOCAIXA

22 OCTOBER 2010

**BARCELONA**

## MONDAY, 18 OCTOBER 2010

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18:00–20:00 Registration at the conference location, the *Sala d'Actes* of the Faculty of Business and Economics (*Facultat d'Economia i Empresa*), on the Bellaterra campus of the Universitat Autònoma de Barcelona (UAB)

## TUESDAY, 19 OCTOBER 2010

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08:00 Registration

09:00 Welcome Address and Presentation of the AES2010  
Louis Lemkow, Director of ICTA  
Mario Giampietro, ICTA/UAB, Chair of Local Organizing Committee

09:30 **Plenary Lecture:**  
Adjusting to new energy realities in the second half of the age of oil  
Charlie Hall, State University of New York at Syracuse, USA

10:30–11:30 *Session 1.1*  
*Understanding the situation: Analysis of the metabolic patterns of societies*  
*Chair: Hans Schnitzer*

10:30 Putting metabolic patterns of society within a larger perspective  
Mark Brown, University of Florida, USA

11:00 Analysing metabolic trends of European countries to come to terms with energetic realities  
Alevgul H. Sorman, Universitat Autònoma de Barcelona, Spain

11.30 Coffee Break

12:00–13:30 *Session 1.2: Urban Metabolic Patterns*  
*Chair: Sergio Ulgiati*

12:00 Positioning Rust Belt cities for a sustainable future: Step 1, an evaluation of neighborhood socio-ecological metabolism  
Myrna Hall, State University of New York at Syracuse, USA

12:30 Urban energy metabolism using ecological network analysis: case study of four Chinese cities  
Brian Fath, Towson University, US

13:00 Energy infrastructure for a high humane and low carbon future  
Sudhakara Reddy Basireddy, Indira Gandhi Inst. of Development Research, India

13:30 Lunch Break

14:30–16:30 *Session 1.3: Modelling changes in the metabolism of societies*  
*Chair: Kozo Mayumi*

- 14:30 Modelling a Trophically Balanced Economy  
John R. Schramski, University of Georgia, USA
- 14:50 The meaning of rebound effects in the energy-related practices of households  
Sophie Némov, Université Libre de Bruxelles, Belgium
- 15:10 Romanian metabolism and sustainable policies (MuSIASEM at level n-4)  
Raluca Ioana Iorgulescu, Siena College, USA
- 15:30 Modelling the energy dynamics of human civilizations within the theory of cultural evolutionism  
Georgios Karakatsanis, National Technical University of Athens, Greece
- 15:50 The robustness of the environmental kuznets curve for CO<sub>2</sub>  
Tommaso Luzzati, University of Pisa, Italy
- 16:10 Proposal for analytical simile of intra-European exchange of matter-energy: Manoilescu-Georgescu-Roegen model  
Vasile Dogaru, West University of Timisoara, Romania

16:30 Coffee Break

17:00–18:20 *Session 1.4: Energy metabolism and the environment*  
*Chair: Raluca Iorgulescu*

- 17:00 EROEI and net energy in the exploitation of natural resources. A study based on the Lotka-Volterra Model  
Ugo Bardi, Università di Firenze, Italy
- 17:20 Bioenergy and its actual mitigation of climate change: Does carbon neutral mean climate neutral?  
Francesco Cherubini, Norwegian University of Science and Technology, Norway
- 17:40 Searching meaningful indicators within the water world. How can exergy help?  
Amaya Martínez Gracia, Universidad de Zaragoza, Spain
- 18:00 Environmental impact of using different energy sources for family house heating  
Henryk Manteuffel Szoeg, Warsaw University of Life Sciences, Poland

20:30 Social Dinner at the restaurant El Mirador of the Palau de la Música Catalana

Restaurante El Mirador of the Palau de la Musica Catalana is located in the historic centre of Barcelona, in Carrer de Sant Francesc de Paula, 2 (corner C/ Sant Pere Més Alt). It is on walking distance from the FGC station Pl Catalunya and from the Metro station Urquinaona (line 1 & 4).

**WEDNESDAY, 20 OCTOBER 2010**

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09:00–11:00 *Session 2.1: Evaluating alternatives to fossil energy*  
*Chair: Jesús Ramos-Martín*

- 09:00 **Invited talk:** The second nuclear era: Renaissance or agony?  
Marcel Coderch Collel, Comisión del Mercado de las Telecomunicaciones, Spain
- 09:40 Nuclear energy: Status and future limitations  
Michael Dittmar, ETH Zürich, Switzerland
- 10:00 On the competition between food, feed and fuel  
Sanderine Nonhebel, University of Groningen, the Netherlands
- 10:20 Wind power in China: Dream or reality  
Xin Li, Sustainability Research Institute, UK
- 10:40 Dispelling the misconception of low-EROI photovoltaics: Peak Oil is here, let us not squander what is left  
Marco Raugei, ESCI, Universitat Pompeu Fabra, Spain

11:00 Coffee Break

11:30–13:30 *Session 2.2: Challenges of future electricity supply*  
*Chair: Mario Giampietro*

- 11:30 **Invited Talk:** Ready or not, here comes the smart grid!  
Seth Blumsack, Pennsylvania State University, USA
- 12:10 Breaking the curve? The secret success of the reduction in Norwegian electricity consumption  
Eivind Stø, National Institute for Consumer Research, Norway
- 12:30 Is there a future role for urban electricity cooperatives? The case of Greenpeace energy  
Jakob Mueller, University Witten/Herdecke, Germany
- 12:50 Environmental, economic and financial uncertainties of nuclear electricity  
Patrizia Ghisellini, University of Bologna, Italy
- 13:10 The effects of using different mixes of energy sources in the generation of electricity in Europe  
Xavier Gabarrell Durany, ICTA, Universitat Autònoma de Barcelona, Spain

13:30 Lunch Break

14:30–16:30 *Session 2.3: Integrating energy systems with natural processes.*  
*Chair: Mark T. Brown*

- 14:30 Integrated sustainability and systems assessment applied to small-scale biodiesel in Barbados  
Kyrke Gaudreau, University of Waterloo, CA
- 14:50 Integrated systems of food, energy and environmental services production as an alternative for small rural properties in Brazil  
Feni Agostinho, State University of Campinas, Brazil

- 15:10 The socio-economic and biophysical dimensions of urbanization strategies in China: land use changes, human time and energy intensity  
Giuseppina Siciliano, University IUAV of Venice, Italia
- 15:30 Alternative energy sources: integrating urban wastewater treatment and wood biomass production for bioenergy purpose  
Elvira Buonocore, Parthenope University of Naples, Italy
- 15:50 An analysis of technical alternatives in a waste-water treatment plant by using sludge as energy resource  
Beatriz Carrasquer Álvarez, CIRCE, Spain
- 16:10 Low carbon transition options for Australia  
Barney Foran, Charles Sturt University, Australia

16:30 Coffee Break

17:00–19:00 *Poster Tour and Discussion*

## **THURSDAY, 21 OCTOBER 2010**

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09:00–11:00 *Session 3.1: Scenarios of energy transition away from fossil energy*  
*Chair: Giuseppe Munda*

- 09:00 Natural growth curves for modeling the transition to a post carbon society  
Hans Schnitzer, Graz University of Technology, Austria
- 09:30 Energy transition of a sector in The Netherlands  
Ivo Opstelten, SEV, the Netherlands
- 10:00 Institutions for energy transition at the peak of the oil age  
Igor Matutinović, GfK center for market research, Croatia
- 10:20 Prospective life-cycle uncertainties of emerging energy technologies  
István Krómer, VEIKI Institute for Electric Power Research, Hungary
- 10:40 Optimisation proposal of the RES-E support model in Portugal: comparison of the Portuguese, Spanish and German models  
Cátia Duarte Sousa, Lusófona University, Portugal

11:00 Coffee Break

11:30–13:30 *Session 3.2: Creating better energy statistics for generating more robust energy scenarios*  
*Chair: Roger Strand*

- 11:30 Are energy statistics useful for making energy scenarios?  
Mario Giampietro, ICREA/Universitat Autònoma de Barcelona, Spain
- 11:55 Going beyond energy accounting for sustainability: Energy, fund elements and technology.  
Kozo Mayumi, University of Tokushima, Japan
- 12:10 The maker perspective of energy statistics  
Ann Christin Bøeng, Statistics of Norway

- 12:35 From Balances to Accounts: a meaningful reorganisation of energy data  
Aldo Femia, ISTAT, Italy  
13:00 Discussion with audience

13:30 Lunch Break

15:00–17:00 *Concluding Session: Where do we go from here?*  
*Chairs: Mario Giampietro and Sergio Ulgiati*

- 15:00 **Invited talk:** The Energy–Complexity Spiral  
Joe Tainter, Utah State University, USA  
15:40 **Invited Talk:** Peak Oil and the Continuing Financial Crisis  
Gail Tverberg, Editor of the Oil Drum  
16:10 General discussion  
16:40 Presentation of the follow-up event: Fossil energy dependence and our energy  
future: a public conversation  
Katharine N. Farrell  
16:50 Closure and *arrivederci* at the next BIWAES  
Sergio Ulgiati

17:00 Cocktail sponsored by **Springer**

**FRIDAY, 22 OCTOBER 2010**

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Follow-up Event at the Cosmocaixa Science Centre, Barcelona – Event open to the public

*Fossil Energy Dependence and Our Energy Future: A Public Conversation*

14:30–15:30 General Scientific Discussion of the Website Project and its Contents  
Experts and Participants of the Conference

15:30–16:00 Informal Break (a tour in the science museum . . .)

----- in Catalan and English with simultaneous translation: -----

16:00–16:30 Welcome and Presentation of the Public Conversation  
Katharine N. Farrell / Maria-Carmen Llasat

16:30–17:30 Questions and Responses from the Public at the Event  
Speed Round: 180 Seconds per Speaker

17:30–18:00 Selection of Your Tube Video Comments

18:00–18:30 Coffee Break

18:30–19:30 Additional Inputs from the Website and the General Public  
General Discussion

19:30 End of the Day

<http://www.ourenergyfutures.org/haveyoursay/>

## Poster Presentations

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### *Analysis of Technological Solutions*

Wind Speed Dynamics in Coastal Areas vs. Mountain Ranges – Implications of Diurnal Variability in Urban Wind Power. *Kiti Suomalainen* (Technical University of Lisbon, Portugal), Manuela Juliano, Carlos Silva, Stephen Connors and Paulo Ferrão. (Poster No: 142)

Life Cycle Assessment of Advanced Technologies for Photovoltaic Panels Production. Mirko Bravi, *Maria Laura Parisi* (University of Siena, Italy), Enzo Tiezzi and Riccardo Basosi. (Poster No: 208)

Calculating the Efficiency of Current Hydropower Technology in the Segre-Noguera Pallaresa Basin from the Exergy Approach. *Beatriz Carrasquer* (CIRCE, Universidad de Zaragoza, Spain), Javier Uche and Amaya Martínez. (Poster No: 196)

Zero Emission Water Supply in the CIRCE Building: A Reliable ED+PV System Sizing. *Fernando Círez* (University of Zaragoza, Spain), Angel A. Bayod, Javier Uche and Amaya Martínez. (Poster No: 185)

Simulation and Application of a DC Energy Distribution System for Hybrid Renewable Energy Systems. *Engin Cetin* (Pamukkale University, Turkey), Ahmet Yilanci, Harun Kemal Ozturk, Mahmut Hekim, Ismail Kasikci, Metin Colak and Siddik Icli. (Poster No: 116)

Mathematical Modeling and Simulation of Hybrid Parabolic System in Kızıldere Denizli Turkey. *Gökhan Uçkan* (University of Pamukkale, Turkey), Harun Öztürk, and Sıddık İçli. (Poster No: 205)

Detailed Energy Consumption Assessment of Different Supermarket Refrigeration Configurations in Luxembourg. *Alex Bertrand* (Public Research Center Henri Tudor, Luxembourg) and Daniel Koster. (Poster No: 112)

Special Paint Applications for Energy Saving and CO<sub>2</sub> Emission Reduction in Winter. Mitsuyuki Kawakami and *Kimihiro Yamanaka* (Tokyo Metropolitan University, Japan). (Poster No: 130)

Green Roofs for Urban Areas: Effect of Irrigated-soil Covered Roofs for Cooling. *Kazuhito Ishimatsu* (University of Surrey, UK/ Kyushu Institute of Technology, Japan), Matthew Leach, Keitaro Ito and Yasunori Mitani. (Poster No: 212)

Fossil-Fuel-Free Residential Design. *Robin E. Moore* (University of Georgia, USA), Cason Sisk and John Schramski. (Poster No: 159)

Two-stage Anaerobic Process for Bio-hydrogen and Bio-methane Combined Production from Biodegradable Solid Wastes. *Giorgi Kvesitadze, Tinatin Sadunishvili* (Durmishidze Institute of Biochemistry and Biotechnology, Georgia), Tamara Dudaui, Besarion Metreveli, and Maya Jobava. (Poster No: 203)

Agricultural Residues for Energy Production and Carbon Storage into Soils: A Win-win Option? *Lorenzo Benini* (University of Bologna, Italy), Cristian Torri, Vittoria Bandini, Diego Marazza, Leonardo Marotta and Andrea Contin. (Poster No: 165)

### *Integrated Analysis of Sustainability*

Energy and Environmental Performance of National Agricultural Sectors. Italian and Scottish Case Studies. *Amalia Zucaro* (Parthenope University of Naples, Italy), Kevin Buchan, Salvatore Mellino, Silvio Viglia, and Sergio Ulgiati. (Poster No: 139)

Energy, Environmental and Economic Assessment of Non-Food Use of Brassica Carinata. *Sandra Fahd* (Parthenope University of Naples, Italy), G. Fiorentino, Salvatore Mellino, G. Rótolo, and Sergio Ulgiati. (Poster No: 138)

Viability of Biofuels as Influenced by Agricultural Production System. *Hanne Østergård* (Technical University of Denmark, DK) and Mads Ville Markussen. (Poster No: 153)

Energy and Emergy Evaluations of Agricultural and Farming Production Systems in the Toledo River Basin (Brazil). Otávio Cavalett, *Salvatore D'Angelo* (UNESCO / Parthenope University of Naples, Italy) and Pier Paolo Franzese. (Poster No: 206 )

Revisiting the Role and Contribution of Forest Biofuels in Achieving Climate Policy Objectives of Northern Europe. *Ryan Matthew Bright* (Norwegian University of Science and Technology, Norway), Anders Hammer Strømman, and Glen P. Peters. (Poster No: 191)

Indicators, Emergetic Thresholds and Constraints for Coastal Spatial Planning and Management. *Leonardo Marotta* (Entropia Snc, IT), Lorenzo Benini, Luciano Vogli, Vittoria Bandini, Gianmario Deandrea, and Diego Marazza. (Poster No: 199)

Defossilization: Linking Energy Consumption and Renewable Generation. *Angel A. Bayod-Rijula* (University of Zaragoza, Spain) and Amaya Martínez-Gracia (Poster No: 173)

Hydroelectricity as Alternative is a Real Clean Energy? The Belo Monte Case. *Antônio Libório Philomena* (Instituto Justiça Ambiental, Brazil). (Poster No: 207)

International Comparison of the Exosomatic Energy Metabolic Profile of Developed Economies. *Arturo Andersen Chinbuah* (Universitat Autònoma de Barcelona, Spain). (Poster No: 181)

The Circular Flow of CO<sub>2</sub> Emissions Embodied in International Trade. *Alexandra Marques* (Instituto Superior Técnico, Portugal), João Rodrigues and Tiago Domingos. (Poster No: 195)

Society perception of environmental risks. *Alberto Pasquini* (Deep Blue, Italy) and Alessandra Tedeschi. (Poster No: 188)

### *Discussion of Scenarios*

Reducing the use of fossil fuels: Scenarios for Finland's energy future. *Tiina Häyhä* (University of Jyväskylä, Finland), Pier Paolo Franzese and Sergio Ulgiati. (Poster No: 143)

Measuring and Analyzing the Substitution Effects of Non-Auto Travel and Implications for Fossil Energy Use: Issues, Prescriptions, and Examples. *Kevin J. Krizek* (University of Colorado, USA) and Julian Marshall. (Poster No: 146)

Transition to Sustainable Energy Neutral Districts before 2050: Innovative Concepts and Pilots for the Built Environment. *Bronia Jablonska* (Energy Research Centre of the Netherlands, NL), GerritJan Ruijg, Ivo J. Opstelten, Eric Willems, and Tjerk Epema. (Poster No: 162)

How much are Consumers Willing to Pay for Improved and Greener Electricity Supply? Results from Choice Experiments in Hyderabad, India. *Julian Sagebiel* (Humboldt University Berlin, Germany), Kai Rommel, and Jens Rommel. (Poster No: 163)

Czech publics' Attitude towards Energy Issues and towards the Desertec Project. *Ivan Benes* (CITYPLAN, Czech Republic) and Zuzana Benesova. (Poster No: 169)

Tentative Ideas to Explore the Viability of the Nuclear Option. *François Diaz Maurin* (Unaffiliated, USA). (Poster No: 190)

Can Agriculture Provide us with both Food and Fuel? *Sheshti Johansson* (Uppsala University, Sweden), Karin Liljequist, Lars Ohlander, and Kjell Aleklett. (Poster No: 175)

How and How Much Can Forest Ecosystems Support the Prosperous Way Down? *Silvio Viglia* (Parthenope University of Naples, Italia), Janis Gravitis, Salvatore Mellino, Enrique Ortega, Alexandre Monteiro Souza, and Sergio Ulgiati. (Poster No: 141)

Growth Models: The Role of Energy. *André Cabrera Serrenho* (Technical University of Lisbon, Portugal), Tânia Sousa, and Tiago Domingos. (Poster No: 193)

Mitigation Policies in Non-annex I Countries: Impacts on Competitiveness of Brazilian Energy-intensive Industries. *Régis Rathmann* (UFRJ, Brazil), Alexandre Szklo, and Roberto Schaeffer. (Poster No: 170)

Building up a Prosperous Way Down in Brazil. *Enrique Ortega* (State University of Campinas, Brazil), José Maria Gusman Ferraz, Vito Comar, and E.C. Odum. (Poster No: 201)

#### *Methodologies: Theory and Applications*

Low Energy Anthropocentric Systems Conceptual Mapping. *William Johnson* (University of Georgia, USA) and John Schramski. (Poster No: 152)

On Why Argentina is increasing its Energy Intensity: A Multi-Scale Integrated Analysis of its Energy Metabolism. *Marina Yesica Recalde* and *Jesús Ramos-Martín* (Universitat Autònoma de Barcelona, Spain) (Poster No: 147)

The Rural-urban Energy Metabolism of Catalunya. *Pere Ariza-Montobbio* (Universitat Autònoma de Barcelona, Spain) and Alevgul H. Sorman. (Poster No: 184)

Assessment of Direct, Indirect and Ecological Exergy Consumptions of Drinking Water Production. How does the evaluation perspective affect the environmental assessment? *Costanza Scacchi*, *Ligia Tiruta-Barna*, *Enrico Benetto* (CRP Henri Tudor, Luxembourg), *Philippe Loubet*, *Colin Jury*, and *Isabelle Baudin*. (Poster No: 187)

Multi-objective Optimization for Remote Autonomous Energy Systems. *Rita Paleta* (Instituto Superior Técnico, Portugal). (Poster No: 189)

Critical issues in the spatial organisation in the transition to a sustainable energy system. *Petra Wächter* (Institute of Technology Assessment, Austria), *Michael Ornetzeder*, and *Anna Schreuer*. (Poster No: 192)

On Benefits and Perspectives of Applying Network Theory to Energy Systems. *Franco Ruzzenenti* (University of Siena, Italy), *D. Garlaschelli*, *Riccardo Basosi*. (Poster No: 209)

The Effects of Energy-Saving Technological Change on Energy Consumption: Assessing the Rebound Effect. *Jaume Freire González* (ENT Environment and Management, Spain). (Poster No: 211)

Communicating Emergy Analysis as Footprint and Emergy Profile. *Anna Levin* (Uppsala University, Sweden). (Poster No: 136)

Wealth, Trade and Environment in Brazil and Italy. An emergy-based comparison of carrying capacity, performance and wellbeing. *Lucas Goncalves Pereira* (State University of Campinas, Brazil), *Amalia Zucaro*, *Enrique Ortega*, and *Sergio Ulgiati*. (Poster No: 148)

Sustainability Assessment for Ibiuna County, Sao Paulo, Brazil through Emergy Evaluation. *Elisa Sayoko Nakajima* (State University of Campinas, Brazil) and *Enrique Ortega*. (Poster No: 174)

An Emergy Assessment of Worldwide Biogeochemical Formation of Coal, Oil and Natural Gas. *Mark T. Brown*, *Gaetano Protano* (Parthenope University of Naples, Italy), and *Sergio Ulgiati*. (Poster No: 156)

Emergy Evaluation of Avocado Crop as Raw Material for Biodiesel Production. *Fabio Takahashi* (UNICAMP, Brazil) and *Enrique Ortega*. (Poster No: 150)