

**University of Zagreb
Faculty of Mechanical Engineering and
Naval Architecture (UNIZAG FSB)**

**FSB, NCP meeting
Zagreb, May 14, 2013**

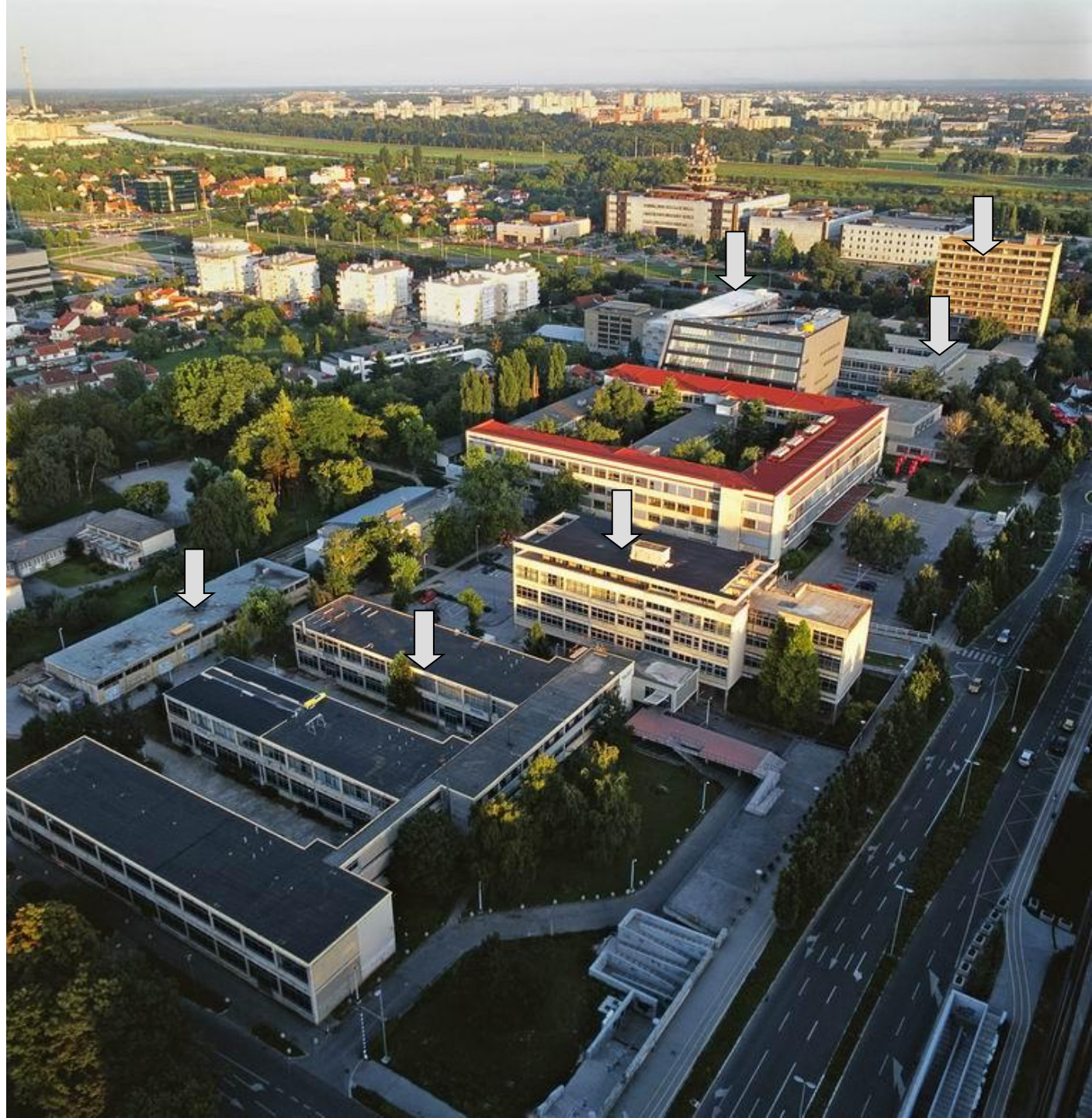
Goran Krajačić, Luka Perković, Hrvoje Mikulčić

FSB

90

Sveučilište u Zagrebu
90 godina Fakulteta strojarstva
i brodogradnje

- 3 Study Programmes
- 13 Departments
- 40 Chairs
- 43 Laboratories
- 74 PhD students
- 234 Researchers
- 2500 Students

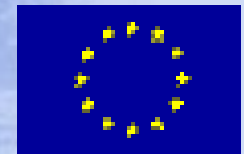


- **University of Zagreb**
 - 60000 students
- **Faculty of Mechanical Engineering and Naval Architecture (FSB-UZ)**
 - 2500 students, 120 lecturers
- **Energy concerned teaching & research (~50 researchers)**
 - Department of Energy, Power Engineering and Environment
 - Power Engineering and Energy Management Chair, Chair of Turbomachinery, Chair of Fluid Mechanics, Chair of Ecology and Water Treatment Technology (+ 3 laboratories)
 - Department of Thermodynamics, Thermal and Process Engineering
 - Chair of Technical Thermodynamics, Chair of Thermal and Process Engineering (+ 2 laboratories)

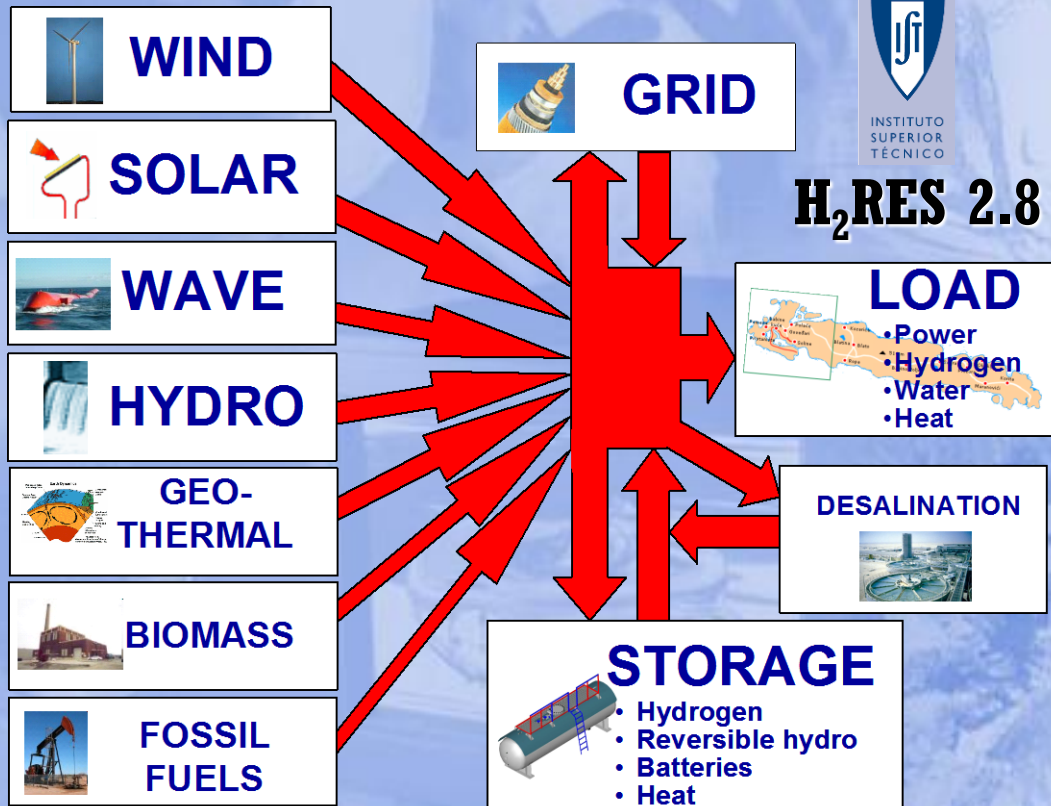


Chair of Power Engineering and Energy Management

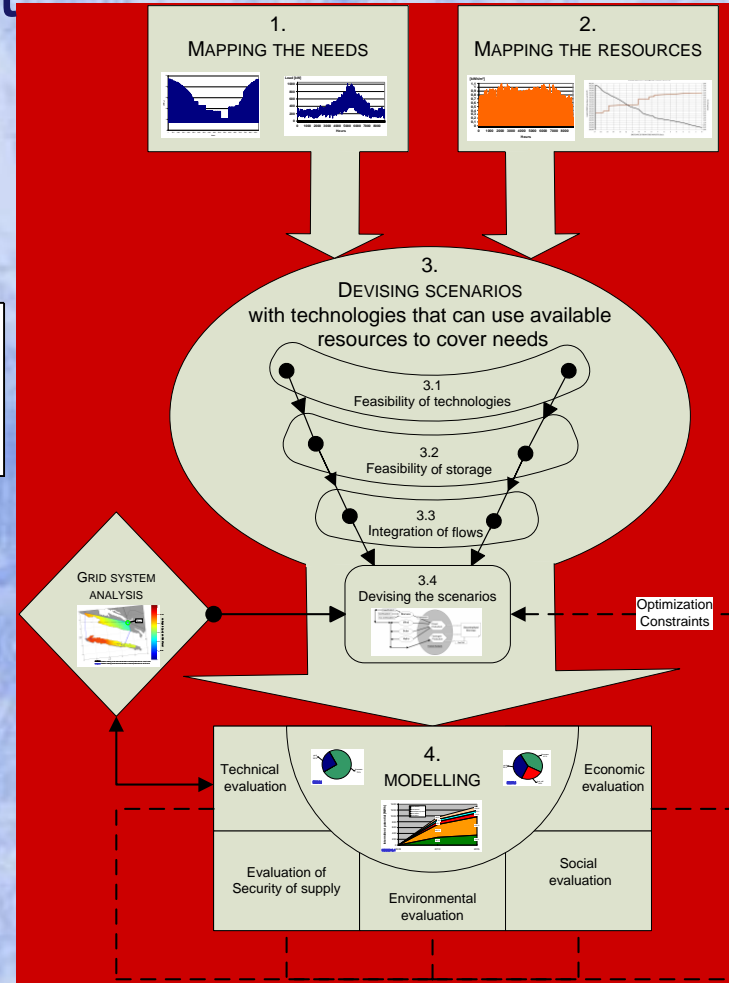
- 5 lecturers + 3 postDoc + 11 PhD students
- Research funding
 - 30% funding from Croatian Ministry of Science, Education and Sport; Ministry of Economy, Labour and Entrepreneurship; Environmental Protection and Energy Efficiency Fund of the Republic of Croatia
 - 30% funding from EC (FP6, FP7, IEE)
 - 40% funding from industrial contracts (HEP, AVL, etc.)



Sustainable Energy Development



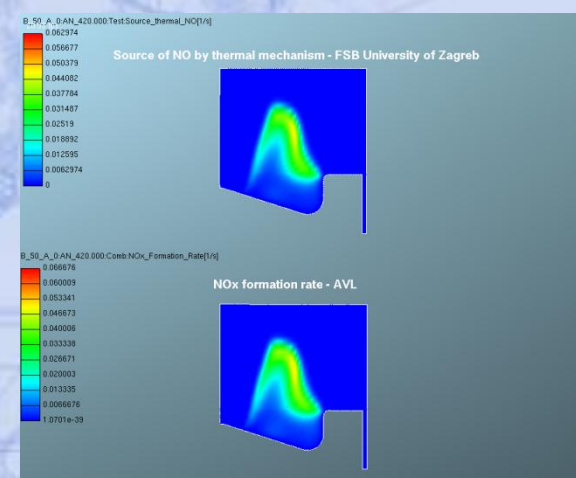
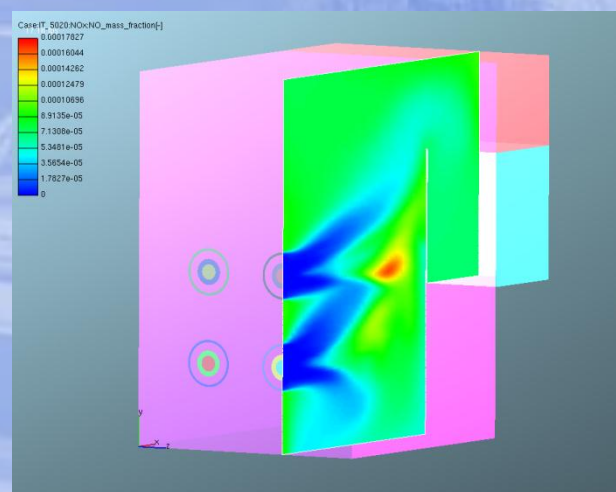
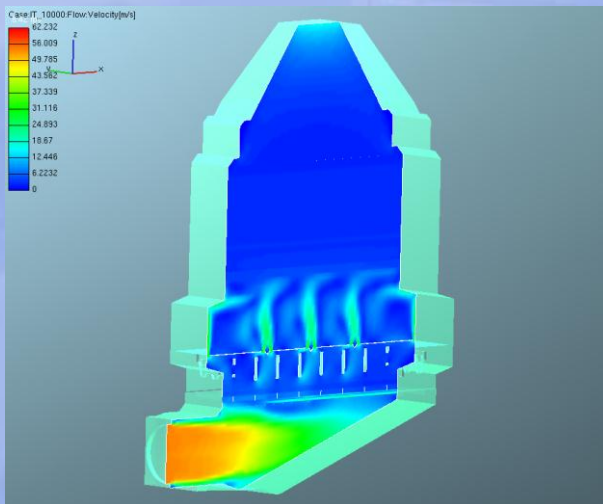
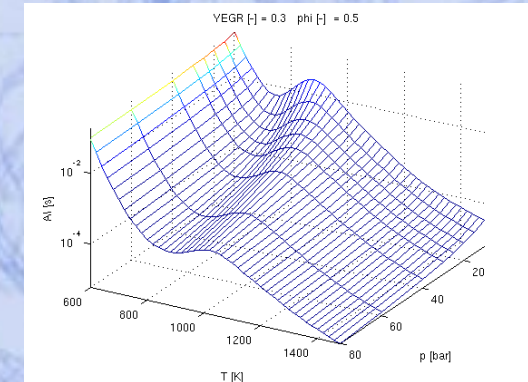
H₂RES – Energy planning tool
<http://powerlab.fsb.hr/H2RES/>



CFD Software development

CFD models – cooperation with AVL company

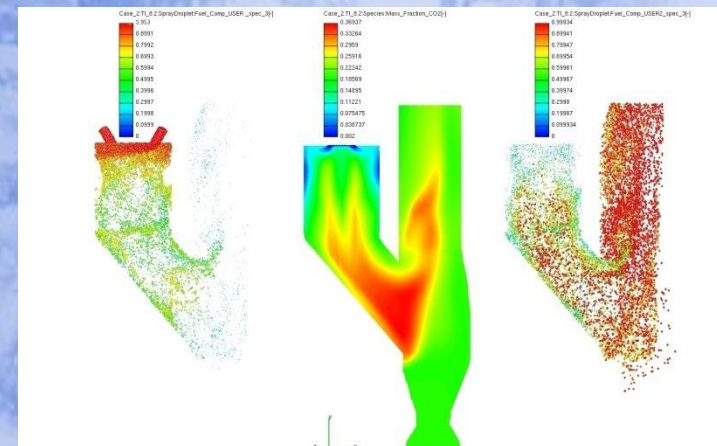
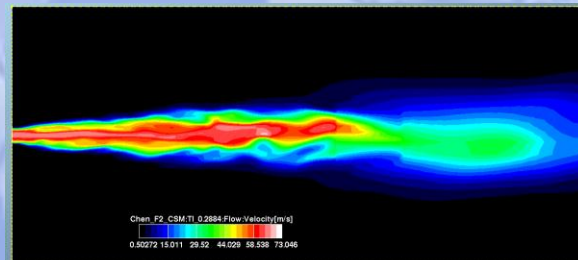
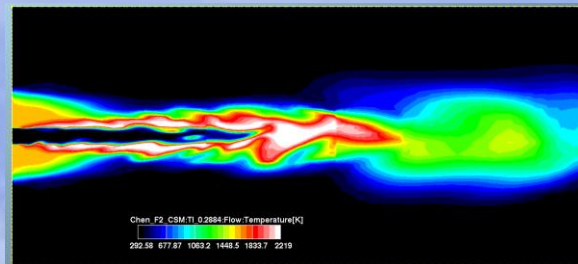
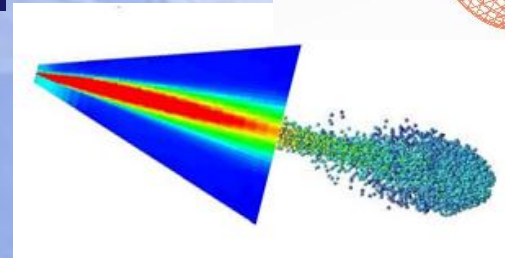
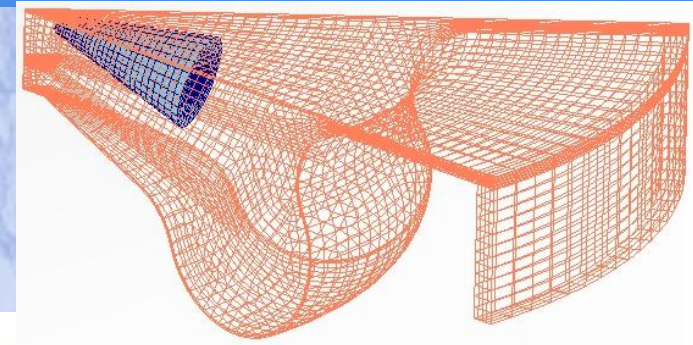
- Combustion model
- Pollutants generation model
- “spray” model
- Radiation model



CFD Software development

CFD models – cooperation with AVL company

- Combustion model
- Pollutants generation model
- “spray” model
- Radiation model





Sustainable Energy Development

Scope and objectives

The Dubrovnik Conference on Sustainable Development of Energy, Water and Environment Systems, to be held in 2011 for its 6th consecutive time, is dedicated to the improvement and dissemination of knowledge on methods, policies and technologies for increasing the sustainability of development by decoupling growth from natural resources and replacing them with knowledge-based economy, taking into account its economic, environmental and social pillars, as well as methods for assessing and measuring sustainability of development, regarding energy, transport, water, environment and food production systems and their many combinations. Sustainability brings also a perfect field for interdisciplinary and multi-cultural evaluation of complex systems, the Dubrovnik Conference has during the first decade of the 21st century become a significant venue for researchers in those areas to meet, and originate, discuss, share, and disseminate new ideas.

The Conference will focus on the following objectives and will be organised in following sessions:

Sustainability comparisons and measurements methodologies; Sustainable development as a driver for innovation and employment; Green New Deal; Decoupling growth from resources; Decarbonization; Energy policy; Transport policy; Water policy and the energy-water interaction; Environmental policy; Agricultural policy; Employment and energy, transport, water and environment systems; Technology transfer and development; Social acceptance; Sustainable resilience of engineering systems; Sustainable tourism; Urbanism; Regional planning and cooperation; Sustainable islands; Research, innovation and development; Education in sustainable development; Cooperation for development; Energy system analysis; Water system analysis; Transport system analysis; Life cycle assessment; Environmental impact assessment; Eco-design and Eco-labelling; Product cycle assessment; Energy planning; Transport management; Renewable energy resources; Primary energy resources; Water resources; Food and agriculture; Renewable electricity generation systems; Thermal power plants; District heating and/or cooling infrastructures in future energy systems; Nano and micro technologies and science for sustainable development of energy, water, and environment systems; Carbon capture and storage/sequestration; Nuclear energy; Advanced sustainable energy conversion systems; Renewable heat systems; Biofuels and bioethanol; Hydrogen production and use technologies; Hybrid and electric vehicles; Other alternative fuels; Water treatment; Water desalination; Wastewater treatment; Waste treatment; Water to energy; Recycling waste; Pollution modelling; Heat and mass transfer modelling; Cogeneration; Hydrogenation; Polygeneration; Storage; Smart energy networks; Energy efficiency in industry and mining; Energy efficiency in agriculture and aquaculture; Energy efficient appliances; Buildings; Energy markets; Emission markets; Political aspects of sustainable development.

Organisers

University of Zagreb, Zagreb, Croatia
Instituto Superior Técnico, Lisbon, Portugal

In cooperation with

University of Dubrovnik, Dubrovnik, Croatia
Aalborg University, Aalborg, Denmark
Institut National Polytechnique de Grenoble, Grenoble, France
University of Rome "La Sapienza", Rome, Italy
Kuwait University, Kuwait
Macedonian Academy of Sciences and Arts, Skopje, Macedonia
Delft University of Technology, Delft, The Netherlands
Institute Voca, Novi Beograd, Belgrade, Serbia
University of Zaragoza, Zaragoza, Spain
University of Pennsylvania, Philadelphia, USA

Sponsors and partners

UNESCO, Paris, France
The Centre for Sustainable Development of Energy, Water and Environment Systems, Zagreb, Croatia
The Club of Rome, European Support Centre, Vienna, Austria
The World Academy of Art and Science

Journals

Applied Energy
Energy - The International Journal
International Journal of Hydrogen Energy
Management of Environmental Quality - An International Journal
Strojanstvo
Thermal Science
Utilities Policy
Water Resources Management

www.dubrovnik2011.sdewes.org

www.dubrovnik2011.sdewes.org



VI DUBROVNIK CONFERENCE ON SUSTAINABLE DEVELOPMENT OF ENERGY, WATER AND ENVIRONMENT SYSTEMS
September 25. - 29, 2011.
Dubrovnik, Croatia

CALL FOR PAPERS

From 25 to 29, 2011
Dubrovnik, Croatia

Abstracts and full papers
Abstracts and full papers should be submitted to the conference website at www.dubrovnik2011.sdewes.org by the deadline of 15th July 2011. The abstracts should be submitted in PDF format and the full papers in PDF and Microsoft Word format. The abstracts should be submitted in English and the full papers in English and Croatian. The abstracts should be submitted in English and the full papers in English and Croatian. The abstracts should be submitted in English and the full papers in English and Croatian.

VI DUBROVNIK CONFERENCE ON SUSTAINABLE DEVELOPMENT OF ENERGY, WATER AND ENVIRONMENT SYSTEMS
June 4-8, 2007
Dubrovnik, Croatia

FIRST ANNOUNCEMENT
An Invitation to Authors, Participants and Sponsors

Organisers:
University of Zagreb, Zagreb, Croatia
Instituto Superior Técnico, Lisbon, Portugal

In cooperation with:
Aalborg University, Aalborg, Denmark
Institut National Polytechnique de Grenoble, Grenoble, France
University of Athens, Athens, Greece
University of Rome "La Sapienza", Rome, Italy
Kuwait University, Kuwait
Delft University of Technology, Delft, The Netherlands
University of Zaragoza, Zaragoza, Spain
University of Pennsylvania, Philadelphia, USA

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Journals:
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Water Resources Management

www.dubrovnik2007.fsb.hr

Conference on Sustainable Development of Energy, Water and Environment Systems

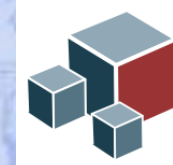
2002 (INCO FP5), 2003, 2005, 2007, 2009, 2011, 2012

<http://www.dubrovnik2013.sdewes.org/>



EU, International/National projects

- HAWE , JoRIEW, DISKNET
- STORIES, GERONIMO, SMART, FLICK THE SWITCH, BIOSIRE, GERONIMO 2, E-SEAP, ERASME (Intelligent Energy Europe)
- Smart energy storage for sustainable energy development, Projects financed by Croatian Science Foundation



- **ADRIACOLD (IPA CBC Adriatic; 30 Months)**

The project aims to promote and spread the use of alternative energy for cooling, on the territories of the Adriatic basin, in order to gain an increasing independence from fossil fuels. the specific objectives can be summarized as follows:

- > analysis and study of the requirements of thermal conditioning (refreshing and cooling) in the region of the programme, and projections to 2020;
- > study and identification of the most effective and appropriate techniques;
- > construction, testing and monitoring of innovative pilot plant performances in 3 of the 5 participating Countries;
- > modeling and feasibility studies that can be used in the territory by the considered users;
- > dissemination of information with the participation of partners representing the different stakeholders: government agencies, equipment manufacturers, tourist operators, agricultural and agro-industrial actors.

GERONIMO 2 (Intelligent Energy Europe)

→ is a 30 month initiative which aims to work closely with dairy and pig farmers from across Europe to unlock the potential that biogas can offer as a cost effective and environmentally friendly means of managing manure.



E-SEAP (Intelligent Energy Europe)

→ Project covers the problem of energy efficiency in prisons by embracing a holistic approach that tackles three elements; prison buildings and management, provision of education and training and dialogue with prison communities.

ERASME – EneRgy Audits in SMEs

- IEE project
- Duration 30 months
 - April 2012 – November 2014
- Main goal
 - Development of methodology for energy audits in SMEs
 - Training of energy auditors
 - Implementation of „walkthrough” and full audits
- 9 partners from 7 countries
- UNIZAG FSB is in charge of the development of the training methodology

i-RESEV

- ICT-aided integration of Electric Vehicles into the Energy Systems with a high share of Renewable Energy Sources
- CSF project
- Duration 36 months
 - 01.01.2012. – 31.12.2014.
- Main goal
 - to provide a basis for full integration of EVs into the RES-based energy systems, through extensive use of ICTs in: (1) modelling, simulation, and optimisation processes; (2) on-line optimal control, estimation, and prediction; (3) strategic planning; and (4) supporting services

MICROGRID

- Optimization of renewable electricity generation systems connected in a micro grid
- CSF project
- Duration 36 months
 - 01.01.2012. – 31.12.2014.
- Main goals to develop:
 - (1) hierarchical optimal control system for dynamic operation of REES micro grid; (2) corresponding communication system; (3) algorithms for planning and optimization of micro grid components; (4) detailed mathematical model for analysis and optimization; (5) modelling and control methods for the energy storage

- 4DH - 4th Generation District Heating Technologies and Systems (financed by Danish Research Council; 6 years project 2012-2017)
 - The Aim is to assist in the development of 4th Generation District Heating Technologies and Systems
 - Objectives:
 - Scientific platform for research activities
 - Societal understanding of the role of District Heating
 - Further additional national and international projects
 - 13 PhD projects
 - The purpose of the collaboration is to establish a research centre for the coherent development of 4th Generation District Heating Technologies and Systems in which synergy is created between the development of grids and components, house installations, district heating production and system integration, as well as planning and implementation tools and methodologies. The overall idea is to further the understanding of the role of district heating in the design of future national energy systems seen in the light of the Danish objective of being fossil fuel-free by 2050 as well as the European 2020 goals. A further perspective of the centre is to facilitate the development of additional national and international research projects as well as demonstration projects . **International partners (Tsinghua University, China; Chalmers, Halmstad and Linnaeus universities, Sweden; University of Zagreb, Croatia; Euro Heat and Power, Bruxelles Belgium)**

Thank you for your attention!

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