



August 30 – September 3  
Foz do Iguaçu, Paraná, Brazil

**PROGRAM AND BOOK OF ABSTRACTS OF THE 22ND INTERNATIONAL CONFERENCE ON  
EFFICIENCY, COST, OPTIMIZATION, SIMULATION, AND  
ENVIRONMENTAL IMPACT OF ENERGY SYSTEMS**

edited by:  
Sílvia Azucena Nebra  
Sílvio de Oliveira Júnior  
Edson Bazzo

Support of  
**ABCM - The Brazilian Society of Mechanical Sciences and Engineering**



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**USP** - University of São Paulo  
**UFSC** - Federal University of Santa Catarina  
**ASME** – American Society of Mechanical Engineers  
**ICAT** – International Centre for Applied Thermodynamics

To this book of abstracts a CD Proceedings is enclosed containing all the papers mentioned in full.

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Congress Secretariat



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## *The series of the Ecos Conferences*

**1987, May 25-29**, Rome, Italy: 4th International Symposium on 2nd Law Analysis of Thermal Systems:

Organizing Committee: R. Melli, E. Sciubba

Executive Committee: R.A. Gaggioli, M.J. Moran, E. Sciubba

**1989, June 5-8**, Beijing, China: Thermodynamic Analysis and Improvement of Energy Systems (TAIES '89), International Symposium.

Organizing Committee: C.H. Wu, R.A. Gaggioli

Executive Committee: Ruixian Cai, M.J. Moran

**1990, May 28 – June 1**, Florence, Italy: Florence World Energy Research Symposium (FLOWERS '90). S.S. Stecco, M.J. Moran.

**1991, June 3-6**, Athens, Greece: Analysis of Thermal and Energy Systems (ATHENS '91), International Conference.

Executive Committee: D.A. Kouremenos, R.A. Gaggioli, M.J. Moran

Organizing Committee: G. Tsatsaronis, C.D. Rakopoulos

**1992, June 15-18**, Zaragoza, Spain: International Symposium on Efficiency, Costs, Optimization and Simulation of Energy Systems (ECOS '92)

A. Valero, G. Tsatsaronis.

**1993, July 5-9**, Cracow, Poland: Energy Systems and Ecology (ENSEC '93), International Conference.

J. Szargut, G. Tsatsaronis, Z. Kolenda, A. Ziebig.

**1994, July 6-8** Florence, Italy: Florence World Energy Research Symposium (FLOWERS '94)

E. Carnevale, G. Manfrida, F. Martelli.

**1995, July 11-14**, Istanbul, Turkey: International Conference on Efficiency, Costs, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS '95)

Y.A. Gögüş, A. Öztürk, G. Tsatsaronis

**1996, June 25-27**, Stockholm, Sweden: International Symposium on Efficiency, Costs, Optimization, Simulation and Environmental Aspects of Energy Systems (ECOS '96)

G. Svedberg, G. Manfrida, M.J. Moran, G. Tsatsaronis

**1997, June 10-13**, Beijing, China: Thermodynamic Analysis and Improvement of Energy Systems (TAIES '97), International Conference.

Scientific Committee: Ruixian Cai, M.J. Moran, G. Tsatsaronis

Organizing Committee: Jingyi Chen, E. Sciubba

**\*1997, July 30-August 1**, Florence, Italy: Florence World Energy Research Symposium (FLOWERS '97)\*

\*Chairman: Giampaolo Manfrida

Co-Chairmen: Özer A Arnas, Jean Pierre Cerdan, Gunnar Svedberg\*

**1998, July 8-10**, Nancy, France: Efficiency, Costs, Optimization, Simulation and Environmental Aspects of Energy Systems and Processes (ECOS '98)

Honorary Chairmen: E.P. Gyftopoulos, P. Le Goff

M. Feidt, A. Bejan, M.J. Moran, G. Tsatsaronis

**1999, June 8-10**, Tokyo, Japan: Efficiency, Costs, Optimization, Simulation and Environmental Aspects of Energy Systems (ECOS '99)

M. Ishida, G. Tsatsaronis, M.J. Moran, H. Kataoka

**2000, July 5-7**, Enschede, The Netherlands: International Conference on Efficiency, Costs, Optimization, Simulation and Environmental Aspects of Energy and Process Systems (ECOS 2000)

Honorary Chairman: J. Szargut

G.G. Hirs, G. Tsatsaronis, M.J. Moran

**2001, July 4-6**, Istanbul, Turkey: Efficiency, Costs, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS '01)

Honorary Chairman: E.P. Gyftopoulos

A. Öztürk, A. Bejan, M. Feidt, Y.A. Gögüş

**2002, July 3-5**, Berlin, Germany: 15th International Conference on Efficiency, Costs, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS 2002)

Honorary Chairman: K.F. Knoche

G. Tsatsaronis, M.J. Moran

*The series of the Ecos Conferences*

**2003, June 30 – July 2**, Copenhagen, Denmark: The 16th International Conference on Efficiency, Costs, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS 2003)

Organizing Committee: B. Qvale (Chairman)

Scientific Committee: N. Houbak, M.J. Moran

**2004, July 7-9**, Guanajuato, Mexico: 17th International Conference on Efficiency, Costs, Optimization, Simulation and Environmental Impact of Energy and Process Systems (ECOS 2004)

Organizing Committee: R. Rivero (Chairman)

G. Tsatsaronis, M.J. Moran

**2005, June 20-22**, Trondheim, Norway: The 18th International Conference on Efficiency, Costs, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS 2005)

Organizing Committee: S. Kjelstrup (Chairman)

Scientific Council: J.E. Hustad (Chairman)

**2006, July 12-14**, Aghia Pelagia, Crete, Greece: The 19th International Conference on Efficiency, Costs, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS 2006)

Honorary Chairmen: E.P. Gyftopoulos, G. Hatsopoulos

C.A. Frangopoulos, C. Rakopoulos, G. Tsatsaronis

**2007, June 25-28**, Padova, Italy: The 20th International Conference on Efficiency, Costs, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS 2007)

A. Mirandola, Ö. Arnas

**2008 June 24 – 27**, Kraków, POLAND, The 21st International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS 2008)

Zygmunt Kolenda; Andrzej Ziębik

**2009 August 31-September 3**, Foz do Iguaçu, Brazil, The 22nd International Conference on Efficiency, Cost, Optimization, Simulation, and Environmental Impact of Energy Systems (ECOS 2009)

S. A. Nebra, S. Oliveira Jr, E. Bazzo, A. S. Walter

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The Organizing Committee of the 22<sup>nd</sup> ECOS - International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems would like to thank the authors of the two hundred and thirty papers that constitute these Proceedings. Without their contribution our work would not be possible. We are also grateful to all people who contributed in many ways, participating in the Conference, reviewing papers, working in the organization, sponsoring, organizing panels and preparing lectures. Special thanks to the invited lecturers and panelists. The Brazilian Research Foundations: CNPq, CAPES and States Foundations that have also contributed to get this achievement.

Compared to its long tradition, some differential aspects characterize this ECOS2009:

- for the first time ECOS is held in South America in a city located at a three countries border (Argentina, Brazil and Paraguay), Foz do Iguaçu;
- Foz do Iguaçu was also selected for being aside of one of the UNESCO World Natural Heritage Sites, the Iguaçu Falls;
- it is also the first time that the conference is organized by three very young Universities (if we compare them with European universities): University of Campinas, University of São Paulo and Federal University of Santa Catarina.

Regarding the central subject of ECOS2009, 'Energy and its efficient and sustainable utilization', Brazil is also a particular country, with a total energy offer constituted by 45.3 % of renewable sources, being 13.6 from hydraulic energy, 16.4% from sugar cane, 11.6 % from other biomass, and 3.5 % from other sources. Moreover, 86.7 % of its electric energy is generated from renewable sources. Some of the conference lectures and panels were organized to show and discuss these peculiar aspects of the Brazilian Energetic Matrix. The proceedings of the conference consist of five volumes, and have the contribution of people from 25 different countries.

We wish to all participants of ECOS2009 a very fruitful conference and a pleasant, sunny and happy stay in Brazil!

ECOS2009 Organizing Committee

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August 31

8:30 – 10:20

**Pacifico Room**

*Opening Conference*

ENERGY EFFICIENCY IN PETROBRAS

Luis Tadeu Furlan - Petrobras

10:20 – 10:40

*Coffee Break*

10:40-12:40

**Pacifico Room**

*Basic and Applied Thermodynamics*

Chairs: M. R. von Spakovsky and Ö. Arnas

**01.01**

QUANTUM THERMODYNAMICS: NON-EQUILIBRIUM 3D DESCRIPTION OF AN UNBOUNDED SYSTEM AT AN ATOMISTIC LEVEL  
Smith CE, Sciacovelli A, Verda V, von Spakovsky MR

**01.02**

NON-EQUILIBRIUM THERMODYNAMICS, THE SECOND LAW AND MATERIALS SCIENCE - KEYS TO ENERGY FROM SPACE  
Arnas O

**01.03**

ENTROPY PRODUCTION MINIMIZATION IN 2-D BOUNDARY VALUE PROBLEMS  
Latkowski J, Kolenda ZS, Bocardo JE

**01.04**

TWO PERFORMANCE INDICATORS FOR CHARACTERIZATION OF THE ENTROPY PRODUCTION IN A PROCESS UNIT  
van der Ham LV, Gross J, Kjelstrup S

**01.05**

ON THE CONSISTENCY OF THE THERMOECONOMIC APPROACHES REGARDING A REVERSIBLE STEAM POWER CYCLE  
Santos JJCS, Nascimento MAR, Lora EES, Silva JAM, Escobar PJC

**03.13**

THERMOECONOMIC DIAGNOSIS THEORY BASED ON THERMOCHARACTERIZATION  
A. Zaleta-Aguilar, R. Domínguez-Vega, A. Olivares-Arriaga, V. Rangel-Hernández, J. J. Pacheco-Ibarra, A. Gallegos-Muñoz and J. Belman-Flores

10:40-12:40

**Iguaçu Room**

*Heat Transfer*

Chairs: A. Hernández-Guerrero and V. Verda

**02.01**

FLOW STRUCTURE WHEN INSTABILITIES ARE PRESENT IN A TREE-DIMENSIONAL SINUSOIDAL PLATE  
Grimaldi AF, PhD, Méndez RR, Rubio-Arana C

**02.02**

GEOMETRIC ANALYSIS FOR HEAT TRANSFER ENHANCEMENT IN A CHANNEL GROOVED WITH DEFLECTORS  
Leon-Conejo JC, PhD, Ortiz JL, Rubio-Arana C

**02.03**

FROM NATURE TO HEAT FLUX DISSIPATION  
Rubio-Jimenez CA, PhD, Rubio-Arana C, Vital-Flores F

**02.04**

INFLUENCE OF DESIGN PARAMETERS ON TWO-PHASE PRESSURE DROP AND ENTROPY GENERATION DURING EVAPORATION OF REFRIGERANTS  
Eskin N, Deniz E

**02.05**

EXERGY ANALYSIS DUE TO FLUID FLOW ON THE EFFICIENCY OF THE SOLAR AIR COLLECTORS WITH DIFFERENT SURFACE ABSORBERS  
MBoghrati, S. E. Shakib, J. A. Esfahani

**02.06**

APPLICATION OF BEJAN'S CONSTRUCTAL THEORY TO A SOLAR COLLECTOR: THE FUNDAMENTALS TO DEFINE THE FIRST CONSTRUCTION AND OPTIMIZATION  
Ojeda J, Mendez F

10:40-12:40

**Brasilia Room**

*Combustion and Gasification*

Chairs: K. J. Ptasiński and D. Tondeur

**11.01**

EXERGY ANALYSIS OF BIOMASS-TO-SYNTHETIC NATURAL GAS (SNG) PROCESS VIA INDIRECT GASIFICATION  
Vitasari CR, Jurascik M, Ptasiński KJ

**11.02**

ASSESSMENT OF THE RICE HUSK COMBUSTION IN A BUBBLING AND ATMOSPHERIC FLUIDIZED BED APPLYING RESPONSE SURFACE METHODOLOGY  
Martínez, J. D., Juan Daniel Martínez, López, J. P., Betacur, M.

**11.03**

THEORETICAL AND EXPERIMENTAL INVESTIGATION OF BIOMASS GASIFICATION PROCESS IN A FIXED BED GASIFIER

Plis P, Wiik RK

**11.04**

POTENTIAL OF THE SYNGAS OBTAINED FROM AIR BIOMASS GASIFICATION – COOPERATION OF A GASIFIER WITH A WATER BOILER FIRED WITH COAL

Plis P, Wiik RK

**11.05**

FEASIBILITY FOR UTILIZATION OF AN ORGANIC SOLID WASTE ORIGINATED FROM THE MEAT PROCESSING INDUSTRY AS AN ALTERNATIVE ENERGY SOURCE IN COMBUSTION PROCESS

Virmond E, Schacker RL, Albrecht W, Althoff CA, Souza M, Moreira RFPM, José HJ

10:40-12:40

**Assunção Room**

*Combined Cooling, Heating and Power*

Chairs: L. M. Serra and A. V. Ensinas

**04.07**

THERMO-ECONOMIC-ENVIRONMENTAL ANALYSIS AND OPTIMIZATION APPLIED TO THE COMBINED PRODUCTION OF SUGAR, ETHANOL AND ELECTRICITY

Pellegrini LF, Oliveira S

**04.08**

COMPARATIVE EXERGOCHEMICAL STUDY OF TRIGENERATION SYSTEMS FOR A DAIRY INDUSTRY

Burbano JC, Pellegrini LF, Oliveira, S.

**04.09**

ENERGY COST ANALYSIS OF SIMPLE TRIGENERATION SYSTEMS UNDER VARIABLE OPERATION CONDITIONS

Serra LM, Carvalho M

**04.10**

EXPLORING THE USE OF EXERGY AND EXTERNALITY PARAMETERS TO EXAMINE A COGENERATION POWER PLANT

Domigan W, Bailey M

**04.11**

TECHNICAL AND ECONOMIC ASSESSMENT OF SMALL SCALE BIOMASS CHP PLANT IN AN EXISTING BRAZILIAN'S INDUSTRY

Rodrigues MLM, Arrieta FRP

**04.12**

INTEGRATION OF A HEMICELLULOSE EXTRACTION PROCESS INTO A BIOMASS BASED HEAT AND POWER PLANT

Lundgren J, Helmerius J

10:40-12:40

**Santiago Room**

*Process Design, Analysis and Integration of Thermal and Chemical Systems*

Chairs: N. Lior and S. Colle

**09.01**

AN ENERGY AND EXERGY ANALYSIS OF FLY ASH USE IN CEMENT AND CONCRETE PRODUCTION

Stefanovic G, Lior N

**09.02**

MODELING, SIMULATION AND ANALYSIS OF ETHANOL FERMENTATION PROCESS WITH CONTROL STRUCTURE IN INDUSTRIAL SCALE

Americano da Costa M, Monteiro JB, Magazoni FC, Colle S

**09.03**

EXERGOCHEMICAL ANALYSIS OF THE ENERGETIC PROCESSES IN TOBACCO INDUSTRY

Vuckovic G, Ilić G, Rašković P, Stojiljković M

**09.04**

INTEGRATION OF BIOMASS GASIFICATION SYSTEMS IN A SUGARETHANOL FACTORY: STUDY OF CASES

Passolongo R, Ramos RAV, Woiski ER, Maia CRM

**09.05**

PROCESS INTEGRATION AND OPPORTUNITY FOR HEAT PUMPS IN INDUSTRIAL PROCESSES

Becker H, Marechal F, Vuillermoz A.

**09.06**

ENERGY AND EXERGY ANALYSIS OF UNREFINED SUGAR PRODUCTION IN COLOMBIA

Velasquez. A, H.I, Agudelo SAF, FChejne, Oliveira S

12:40-1400

*Lunch*

14:00-16:00

**Pacífico Room**

*Basic and Applied Thermodynamics*

Chairs: L. A. Arias-Hernandez and L. F. Pellegrini

**01.06**

EXERGY ANALYSIS OF THE HUMAN RESPIRATION UNDER PHYSICAL ACTIVITY

Albuquerque-Neto C, Pellegrini LF, Ferreira MS, Yanagihara JI, Oliveira S

**01.07**

LOCAL STABILITY OF AN IRREVERSIBLE ENERGY CONVERTER WORKING IN THE MAXIMACOPANDECOLOGICAL REGIMES  
 LA Arias-Hernandez, RTPaez-Hernandez, OHilario-Ortiz

**01.08**

ON THE TREATMENT OF DISSIPATIVE COMPONENTS AND RESIDUES IN THERMOECONOMIC MODELING  
 Santos JJCS, Nascimento MAR, Lora EES, Escobar PJC, Silva JAM

**01.09**

THERMODYNAMIC PROPERTIES OF BIOFUELS: HEAT CAPACITIES OF BINARY MIXTURES CONTAINING ETHANOL AND HYDROCARBONS UP TO 20 MPA USING A NEW FLOW CALORIMETER  
 David Vega-Maza, José J Segovia, MCarmen Martín, Rosa MVillamañán, César RChamorro, Miguel AVillamañán

14:00-16:00

**Iguaçu Room**

*Heat Transfer*

Chairs: A. Hernández-Guerrero and R. Zevenhoven

**02.07**

SOLIDIFICATION AROUND A HORIZONTAL LONG TUBE WITH AND WITHOUT TURBULENCE PROMOTER  
 Paixão LC, Ismail KAR

**02.08**

DESCRIPTION OF THE FLOW BEHAVIOR BETWEEN CROSSCORRUGATED PLATES WITH CONVERGENT AND DIVERGENT SEPARATION  
 Luna JM, RRomero-Mendez, PhD, Ortiz JL, Ortiz JL

**02.09**

EXPERIMENTAL AND NUMERICAL INVESTIGATION OF THE PARAMETRIC GEOMETRY INFLUENCE ON THE THERMAL AND HYDRAULIC BEHAVIOR OF PIN-FINS HEAT SINKS  
 Zuniga-Cerroblanco JL, PhD, Rubio-Arana C, RRomero-Mendez

**02.10**

EXPERIMENTAL AND NUMERICAL ANALYSES OF A NON-UNIFORM AGENTS FLOW IMPACT ON A FINNED CROSS-FLOW HEAT EXCHANGER EFFECTIVENESS  
 Bury T.; Składzień, J.; Hanuszkiewicz-Drapała, M.

**02.11**

RECOVERY OF HEAT FROM THERMAL INFRARED RADIATION: THE ROLE OF HEAT CONDUCTION AND CONVECTION, WINDOW MATERIAL AND SYSTEM LAYOUT  
 Zevenhoven R, Sakey M

**02.12**

CONSTRUCTION MATERIALS IN CIVIL ENGINEERING: STUDY OF EMISSIVITY USING THERMOGRAPHY  
 Desideri U, Sorbi N, Leonardi D, Arcioni L, ABBATI V

14:00-16:00

**Santiago Room**

*Process Design, Analysis and Integration of Thermal and Chemical Systems*

Chairs: G. Stefanovic and M. Sorin

**09.08**

INTEGRATED OPTIMIZATION OF WATER AND ENERGY CONSUMPTION. PART I: STUDIES AND CONSIDERATIONS ON SIMULTANEOUS ENERGY AND WATER MINIMIZATION  
 Martínez-Patiño J, Picón-Núñez M, Serra LM, Verda V

**09.09**

INTEGRATED OPTIMIZATION OF WATER AND ENERGY CONSUMPTION. PART II: SYSTEMATIC APPROACH FOR THE SYNTHESIS OF INTEGRATED WATER AND ENERGY NETWORKS  
 Martínez-Patiño J, Picón-Núñez M, Serra LM, Verda V

**09.10**

ENERGY SAVING IN MULTICOMPONENT DISTILLATION BY DIVIDED WALL  
 Errico M, Mascia M, Mulas M, Tola G

**09.11**

MASS AND ENERGY INTEGRATION IN THE SUGAR AND ALCOHOL PRODUCTION PROCESSES  
 Cortes MG, Suárez EG, Salgado YC, Carvajal YA, Morales VG, Corsano G

**09.12**

THERMODYNAMIC EQUIPARTITION AND ENERGY EFFICIENT MEMBRANE NETWORKS  
 Mikhail S, Etienne AS, Forouzan S, Fernand R

14:00-16:00

**Brasilia Room**

*Combustion and Gasification*

Chairs: K. J. Ptasinski and S. Harvey

**11.08**

DESIGN OF A COMBUSTION CHAMBER TO BURN LEATHER RESIDUALS GASIFICATION GAS

da Silva Cristiano V, Beskow Arthur B, Indrusiak MLS, Godinho, M., Marcilio, N. R.

**11.09**

A SIMPLIFIED MEAN VALUE MODEL OF THE COMBUSTION PROCESS FOR THE SIMULATION OF ENERGY SYSTEMS

Gambarotta A, Taburri M, Vaja I, Lucchetti G

**11.10**

PRODUCTION OF SYNTHETIC NATURAL GAS FROM BIOMASS – PROCESS INTEGRATED DRYING

Heyne S, Harvey S

**11.06**

HYDROGEN SYNTHESIS IN A RECIPROCAL FLOW POROUS REACTOR WITH ENERGY EXTRACTION

Barcellos WM, Aguiar IBC, Lawrence, A. K., Souza LCEO, Saveliev, A. V.

**11.07**

COMBUSTION WAVE PROPAGATION IN FLAME-TROWER IGNITION SYSTEM APPLIED TO POROUS BURNER SUPERADIABATIC BOILER

Barcellos WM, Rocha PAC, Aguiar IBC, Saveliev, A. V.

14:00-16:00

**Assunção Room**

*Combined Cooling, Heating and Power*

Chairs: G. Tsatsaronis and J.A. Matelli

**04.13**

A CASE-BASED REASONING PROTOTYPE FOR COGENERATION PLANT DESIGN

Matelli JA, Bazzo E, Silva JC, Binelli GJ

**04.14**

COMPARATIVE EVALUATION OF LNG – BASED COGENERATION SYSTEMS

Morosuk T, Tsatsaronis G

**04.15**

SELECTION AND SIZING PROCEDURE OF POLYGENERATION PLANTS USING MATHEMATICAL PROGRAMMING

Rubio C, Uche J, Martínez-Gracia A

**04.16**

MATHEMATICAL METHOD FOR SIMULTANEITY ASSESSMENT OF TIME DEPENDENT ENERGY DEMAND FUNCTIONS FOR COMPLEX TRIGENERATION (CCHP) SYSTEMS

Roque PR, Betancourt, Grau RA, Benito YR, J A R Parise

**04.17**

SMALL SCALE DECENTRALIZED POLYGENERATION SYSTEMS

Sasso M, Possidente R, Roselli C, Sibilio S

**04.18**

STRUCTURAL AND PARAMETRIC OPTIMIZATION OF COGENERATION POWER PLANTS USING GENETICALGORITHM

Araujo LR, Donatelli JLM, Silva EAC

16:00 – 16:20

*Coffee Break*

16:20 – 18:20

**Pacifico Room**

*World Energy Panel*

Noam Lior (US), Claudia C. Sheinbaum (Mexico), Antonio Valero (Spain), Na Zhang (China), Kirit S. Parikh (India), Toshihiko Fujita (Japan) and Mauricio Tolmasquim (Brazil)

September, 1st

8:20 – 10:20

**Pacífico Room**

*Basic and Applied Thermodynamics*

Chairs: R. Rivero and G. Stefanovic

**01.10**

STUDY ON THE INTERMITTENCE OF CERTAIN ENERGY SOURCES BASED ON A NONENDOREVERSIBLE POWER PLANT MODEL  
MABarranco-Jiménez, LA Arias-Hernandez, FAngulo-Brown

**01.11**

FINITE-TIME THERMOECONOMIC OPTIMIZATION OF A NONENDOREVERSIBLE HEAT ENGINE  
MABarranco-Jiménez, LA Arias-Hernandez, FAngulo-Brown

**01.12**

INTERNALLY IRREVERSIBLE CURZON AND AHLBORN CYCLE WITH LINEAR AND NON-LINEAR HEAT TRANSFER  
Ladino-Luna D

**01.13**

ON THE DYNAMIC ROBUSTNESS OF A NON-ENDOREVERSIBLE CURZON-AHLBORN ENGINE WORKING IN AN ECOLOGICAL REGIME  
Chimal-Eguia JC, N. Sánchez-Salas

**01.14**

PROPOSAL OF ECOLOGIC TAXES BASED ON THERMO-ECONOMIC PERFORMANCE OF A NON ENDOREVERSIBLE HEAT ENGINE MODEL  
MABarranco-Jiménez, NSanchez-Salas, FAngulo-Brown

08:20-10:20

**Iguaçu Room**

*Heat Transfer*

Chairs: R. Zevenhoven and A. Hernández-Guerrero

**02.13**

DEVELOPMENT OF A DETAILED THERMAL MODEL FOR DESIGNING HEAT PIPE HEAT EXCHANGERS  
Isoppo DFI, Borges TPF, Mantelli MBH

**02.14**

DESIGN PARAMETERS FOR REGENERATIVE HEAT EXCHANGERS  
Nobrega CEL, Brum NCL

**02.15**

FOULING MITIGATION THROUGH OPTIMIZATION OF HEAT EXCHANGER CLEANING SCHEDULES  
Tavares VBG, Costa ALH, Borges JL, Queiroz EM, Pessoa FLP, Liporace FS, Oliveira SG

**02.16**

ENERGY CONVERSION IN AN ELECTRICAL CONDUCTOR: THE INFLUENCE OF THE SKIN EFFECT ON THE HEAT TRANSFER PROCESS  
Chávez O, Mendez F

**02.17**

ECO-FRIENDLY THERMAL INSULATION MATERIAL MADE WITH CELLULOSIC FIBER AND RIGID POLYURETHANE CASTOR OIL FOAM  
Neira DSM, Marinho GS, Ramos RRF

08:20-10:20

**Brasilia Room**

*Combustion and Gasification*

Chairs: G. Martins and J. H. Sosa-Arnao

**11.11**

A CONSTANT-VOLUME BOMB AND CO-FLOW REACTOR INVESTIGATION OF IGNITION PHENOMENON OF HYDROCARBON FUELS IN HIGH TEMPERATURE OXIDIZER  
Werle S, Wilk RK

**11.12**

EXPERIMENTAL INVESTIGATION OF O<sub>2</sub> ENRICHED CONFINED FLAMES  
Santos AAB, Torres Ednildo A, Pereira PAP

**11.13**

THERMAL PERFORMANCE AND SPECIFIC CO EMISSION EVALUATION OF A SMALL SCALE DOWNDRAFT WOOD BURNER FOR DOMESTIC COOKSTOVES  
Martins G, Gallego AG

**11.14**

EVALUATION OF SMALL-SCALE SOLID WASTE INCINERATOR: CASE STUDY  
Oliveira JCD, Costa AMS, Júnior CB, Higa M

**11.15**

ANALYSIS OF HYBRID CONFIGURATION OF COAL BASED METHANOL-POWER POLYGENERATION SYSTEM  
Zhang GQ, Gao L, Jin HG

**11.16**

FIRST AND SECOND LAW TO ANALYZE THE PERFORMANCE OF BAGASSE BOILER  
Sosa-Arnao JH, Nebra AS

08:20-10:20

**Assunção Room**

*Combined Cooling, Heating and Power*

Chairs: A. Lazzaretto and A. V. Ensinas

**04.01**

ENERGY EFFICIENCY IN ANHYDROUS BIOETHANOL PRODUCTION FROM SUGARCANE PART 1: PROCESS SIMULATION AND THERMAL INTEGRATION

Dias MOS, Ensinas AV, Modesto M, Nebra SA, Maciel Filho R, Rossel CEV

**04.02**

ENERGY EFFICIENCY IN ANHYDROUS BIOETHANOL PRODUCTION FROM SUGARCANE PART 2: COGENERATION SYSTEMS TECHNOLOGY

Modesto M, Ensinas AV, Dias MOS, Nebra SA, Maciel Filho R, Rossel CEV

**04.03**

ENERGETIC EVALUATION OF COGENERATION SYSTEMS IN SUGAR CANE PLANTS IN BRAZIL – CASE STUDIES

Palacios-Bereche R, Pereira P, Nebra SA, Oliveira C E L, Rabi JA

**04.06**

TECHNICAL AND ECONOMICAL ANALYSIS OF BIOMASS INTEGRATED GASIFIER COMBINED HEAT AND POWER

Boloy RAM, Silveira JL, Antunes JS

**04.05**

SYNTHESIS AND PARAMETER OPTIMIZATION OF A COMBINED SUGAR AND ETHANOL PRODUCTION PROCESS INTEGRATED WITH A CHP SYSTEM

Morandin M, Toffolo A, Lazzaretto A, François Marechal, Ensinas AV, Nebra SA

**04.04**

THERMODYNAMIC AND THERMOECONOMICS EVALUATION OF DIFFERENT TECHNOLOGIES AND STEAM PARAMETERS FOR PLANT MODERNIZATION ALTERNATIVES IN AN AUTONOMOUS DISTILLERY

Escobar PJC, Lora EES, Venturini OJ, Santos JJCS, Moura AG

08:20-10:20

**Santiago Room**

*Process Design, Analysis and Integration of Thermal and Chemical Systems*

Chairs: N. Lior and M. Sorin

**09.13**

ECONOMIC EVALUATION OF REFRIGERATION ALTERNATIVES FOR ALCOHOLIC FERMENTATION

Cardemil J, Colle S, Monteiro JB, Magazoni FC

**09.14**

COOLING OF ETHANOL FERMENTATION PROCESS USING ABSORPTION CHILLERS

Magazoni FC, Monteiro JB, Deucher R, Americano da Costa M, Cardemil J, Colle S

**09.15**

INTEGRATION OF SECOND-GENERATION TECHNOLOGIES (CELLULOSE PROCESSING) WITH EXISTING SUGAR CANE PROCESSING UNITS (ETHANOL AND ELECTRIC ENERGY)

Neto OB, Garcia C, Leal MRLV

**09.16**

TECHNICAL AND ECONOMIC EVALUATION OF AN ANHYDROUS ETHANOL DISTILLERY IN PERU

Chavez-Rodriguez MF, Palacios-Bereche R, Walter ACS, Nebra SA

**09.17**

USE OF HYDRODYNAMIC CAVITATION AS AN ALTERNATIVE FOR BIODIESEL PRODUCTION

Santos SL, Ferreira MS, Marin MPA, Novazzi LF

**09.18**

THE EFFECT OF INCREASED HEAT INTEGRATION ON THE COST FOR PRODUCING DME VIA BLACK LIQUOR GASIFICATION

Pettersson K, Harvey S

10:20-10:40

*Coffee Break*

10:40-12:40

**Assunção Room**

*Combined Cooling, Heating and Power*

Chairs: Z. Guzovic and J. A. Matelli

**04.19**

EXPERIMENTAL RESULTS AND EXERGOECONOMIC ANALYSIS OF A NATURAL GAS SMALL SCALE COGENERATION PLANT

Carvalho AN, Bazzo E, Pierobom M C, Restrepo AH

**04.20**

EXPERIMENTAL ANALYSIS OF SMALL SCALE POLYGENERATION SYSTEM BASED ON A NATURAL GAS-FIRED MICRO-CHP AND A HYBRID HVAC SYSTEM EQUIPPED WITH A DESICCANT WHEEL

Sasso M, Roselli C, Vanoli GP, Angrisani G, Minichiello F

**04.21**

PERFORMANCE ANALYSIS OF A GAS FIRED MICROTURBINE BASED COGENERATION SYSTEM

Orlando AF, Ramos EE, Bellido MMH

**04.22**

OPTIMAL SIZING OF RESIDENTIAL GAS ENGINE COGENERATION SYSTEMS FOR POWER INTERCHANGE OPERATION FROM ENERGY-SAVING VIEWPOINT

Wakui T, Yokoyama R

**4.23**

COMPARATIVE ANALYSIS OF COMBINED COOLING, HEATING AND POWER SYSTEMS (CCHP) COVERING DATA CENTERS ENERGY NEEDS

Manno M, Guizzi GL, Zaccagnini A

**4.024**

COMPARING OPERATIONAL STRATEGIES OF AN INTERNAL COMBUSTION ENGINE COGENERATION SYSTEM THROUGH A COMPUTATIONAL SIMULATION PROCEDURE

Johnathan A. F. Arteaga and Denilson B. Espirito Santo

10:40-12:40

**Santiago Room**

*Process Design, Analysis and Integration of Thermal and Chemical Systems*

Chairs: F. Marechal and L. M. Serra

**09.19**

A COMBINED APPROACH TO ENERGY EFFICIENCY MONITORING IN THE PULP AND PAPER INDUSTRY

Sivill L, Manninen J, Ahtila P

**09.20**

ANALYSIS OF A THERMO MECHANICAL PULP AND PAPER MILL USING ADVANCED COMPOSITE CURVES

Ruohonen P, Ahtila P

**09.21**

HEAT INTEGRATION ANALYSIS OF THERMAL SEPARATION UNITS IN A PULP MILL CONVERTED TO AN ETHANOL PRODUCTION PLANT

Fornell R, Berntsson T

**09.22**

ANALYSIS OF KRAFT PULP MILL BY PROCESS SIMULATION

Labidi J

**09.23**

INTEGRATING BIOMASS GASIFICATION WITH PULP AND PAPER PRODUCTION – SYSTEMS ANALYSIS OF ECONOMIC PERFORMANCE AND CO<sub>2</sub> EMISSIONS

Wetterlund E, Pettersson K, Harvey S

**09.24**

A SYSTEMATIC APPROACH FOR ASSESSING STEAM BALANCES FOR KRAFT PULP MILLS – MODEL DEVELOPMENT AND CASE STUDY

Jönsson J, Algehed J

10:40-12:40

**Pacifico Room**

*Scientific Committee Meeting*

10:40-12:40

**Iguaçu Room**

*Simulation, Improvement and Optimization of Energy Conversion Systems*

Chairs: G. Tsatsaronis and H. Rusinowski

**03.01**

COMBINED OPTIMIZATION OF THE OPERATION OF EXISTING POWER PLANTS WITH THE DESIGN AND OPERATION OF HEAT STORAGE SYSTEMS FOR A LARGE DISTRICT HEATING NETWORK

Jüdes M, Christidis A, Koch C, Pottel L, Tsatsaronis G

**03.02**

A GENERAL APPROACH FOR EXERGONOMIC IMPROVEMENT OF THERMAL SYSTEMS: APPLICATION TO COMPLEX COGENERATION PLANTS

Vieira LS, Cruz ME

**03.03**

INTERNALIZATION OF CO<sub>2</sub> EMISSION COST IN COGENERATION SYSTEMS

Alcântara R, Balestieri JAP

**03.04**

A REVIEW OF METHODS TO OPTIMIZE FOR ENERGY EFFICIENCY

Moorhouse D, Camberos JA

**03.10**

MORE ELECTRIC ENGINE MODELING AND  
ANALYSIS USING EXERGY AS A DESIGN  
COMPARISON TOOL

Gandolfi R, Pellegrini LF, Salvador P, Silvio de  
Oliveira Jr

**03.06**

ON THE STOCHASTIC ANALYSIS OF A  
COMBINED CYCLE

Santos RR, Barbosa A

12:40 – 14:00

*Lunch - Free Afternoon*

September, 2

8:20 – 10:20

**Pacífico Room**

*Brazilian Biofuels Production*

L. A. Horta Nogueira and Isaias C. Macedo

10:20 – 10:40

*Coffee Break*

10:40-12:40

**Pacífico Room**

*Renewable Energy*

Chairs: A. Walter and S. Harvey

**07.08**

THE POTENTIAL CONTRIBUTION OF THERMO POWER PLANTS IN THE BRAZILIAN ELECTRIC SECTOR

Pinto CP, Walter ACS

**07.09**

ANALYSIS OF THE PRODUCTIVE CHAIN OF ORBIGNYA SP. AND ACROCOMIA ACULEATA FOR ELECTRICITY GENERATION AND SUSTAINABLE DEVELOPMENT OF ISOLATED COMMUNITIES

Gurgel Veras CA

**07.10**

TEGBIOS: A PROTOTYPE OF THERMOELECTRIC POWER GENERATOR FOR BIOMASS STOVES

Champier D, Rivaletto M, Strub F

**07.11**

COMPARATIVE ANALYSIS OF BRAZILIAN RESIDUAL BIOMASS FOR PELLET PRODUCTION

Missagia B, Krautz HJ

**07.12**

A COMBINED SOLAR-BIOMASS RANKINE CYCLE CONCEPT FOR SMALL-SIZE COGENERATION

Borello D, Corsini A, Rispoli F, Tortora E

**07.13**

APPLICATION OF SOLAR ENERGY AND BOILER WASTE HEAT IN POWER PLANTS

Ziraksaz MH

10:40-12:40

**Iguaçu Room**

*Simulation, Improvement and Optimization of Energy Conversion Systems*

Chairs: E. E. S. Lora and M. Modesto

**03.07**

SIMULATION WITH TRNSYS® 16 OF A MICRO-HYDRO PLANT FOR RURAL AREAS

Esposito S, Kawa Radha

**03.11**

THERMOECONOMIC DIAGNOSIS SYSTEM USING NEGETROPY AS AN EXERGY COMPONENT FLOW

Silva JAM, Venturini OJ, Lora EES, Nascimento MAR, Santos JJCS

**03.09**

ENERGY AND EXERGY EVALUATION OF A BOILER'S OPERATION WITH THE APPLICATION OF A HYBRID MODEL

Stanek W, Rusinowski H, Budnik M

**03.05**

MATHEMATICAL MODEL OF THE STEAM-WATER CYCLE OF THE POWER UNIT

Szapajko G, Rusinowski H

**03.08**

IMPROVED EXERGOCHEMICAL APPROACH TO ANALYZE AND OPTIMIZE ENERGY SYSTEMS

Valdés CF, FChejne, CLondoño

**03.12**

PROCEDURE FOR THE OPTIMIZATION OF THE CONCEPTUAL DESIGN OF CENTRALIZED AIR CONDITIONING CHILLER WATER SYSTEMS

Armas JC, YValdivia

10:40-12:40

**Brasilia Room**

*Conventional and Advanced Power Plants*

Chairs: L. A. Horta Nogueira and G. Manfrida

**13.01**

THERMAL DIAGNOSTICS OF OPERATING THE POWER UNIT

Rusinowski H, Szapajko G, Stanek W

**13.02**

THERMODYNAMIC ANALYSIS OF COMBINED POWER CYCLES USING BLACK LIQUOR GASIFICATION

Gallego AG, Llagostera J

**13.03**

AVAILABILITY ANALYSIS OF HEAT RECOVERY STEAM GENERATORS USED IN THERMAL POWER PLANTS

Souza GFM, Carazas FJG, Salazar CH

**13.04**

THERMODYNAMIC, ECONOMIC AND ENVIRONMENTAL ANALYSES OF RANKINE CYCLE POWER PLANTS REPOWERING TO COMBINED CYCLE USING GAS TURBINES

Bohorquez WOI

**13.05**

THERMODYNAMIC DIAGNOSIS AND PROGNOSIS SYSTEM OF A GAS TURBINE COMBINED CYCLE

Silva JAM, Venturini OJ, Lora EES, Nascimento MAR, Santos JJCS, Pinho, A. F.

10:40-12:40

**Assunção Room**

*Combined Cooling, Heating and Power*

Chairs: Z. Guzovic and T. Fujita

**04.25**

ENERGY-ECONOMIC ANALYSIS OF CHP TURBINE WITH THREE-STAGE HEATING OF DISTRICT HEATING SYSTEM WATER

Guzovic Z, Jukic P, Loncar D

**04.26**

STUDY ON AREA-WIDE ENERGY UTILIZATION BY USE OF DECENTRALIZED ENERGY SYSTEM: SIMULATION ANALYSIS FOR COMBINATION OF NEIGHBORING COMMERCIAL AND RESIDENTIAL BUILDINGS

Fujita T

**04.27**

INFLUENCE OF DISTRICT HEATING TEMPERATURE LEVEL ON A CHP STATION

Johansson P-O, Jonshagen KG, Genrup M

**04.28**

ENERGY SAVINGS USING TRIGENERATION ON BUSINESS AND HOTEL COMPLEX "AIRPORT CITY BELGRADE"

Ivan Glisic, Vucko

**04.29**

ENERGY AND EXERGY EFFICIENCIES OF A REAL CHP INTEGRATED CERAMIC FACTORY

Yilmaz Yoru, THikmet Karakoc, Arif Hepbasli

10:40-12:40

**Santiago Room**

*Process Design, Analysis and Integration of Thermal and Chemical Systems*

Chairs: Na Zhang and N. Lior

**09.26**

THERMODYNAMIC ANALYSIS OF A LOW-TEMPERATURE MULTIEFFECT EVAPORATION SEAWATER DESALINATION SYSTEM COUPLED WITH AN ABSORPTION HEAT PUMP

Wang Y, Lior N

**09.27**

PROPOSAL AND ANALYSIS OF A COGENERATION SYSTEM WITH INTEGRATION OF CHEMICALLY RECUPERATED GAS TURBINE CYCLE AND THERMAL SEAWATER DESALINATION

Luo CD, Zhang N, Lin H, Cai R

**09.28**

A THERMOECONOMIC ANALYSIS OF A NUCLEAR DESALINATION PLANT

Ansari K, Sayyaadi H, Amidpour M

**09.29**

EXERGY COST ASSESMENT FOR WATER-RELATED TECHNOLOGIES

Martínez-Gracia A, Uche J, Rubio C, Carrasquer B, AlValero

**09.30**

A TURBINE-DRIVEN CIRCULATION PUMP IN A DISTRICT HEATING SUBSTATION

Lauenburg P

12:40 – 14:00

*Lunch*

14:00 – 16:00

**Pacífico Room**

*Renewable Energy*

Chairs: Isaías C. Macedo and A. Walter

**07.02**

COST-EFFECTIVENESS AND COMPARISON BETWEEN GRID EXTENSION, DIESEL ENGINES AND SOLAR PHOTOVOLTAIC FOR PUMPING SYSTEMS IN NORTHERN CHILE

Chueco-Fernández FJ, Bayod-Rújula AA

**07.03**

ELECTRICAL AND THERMAL PERFORMANCE OF PV/T HYBRID PANELS

Bayod-Rújula AA, Diaz-Garaio S, Amo A

**07.05**

HEAT PRODUCTION BY STATIONARY PARABOLIC, CYLINDRICAL SOLAR CONCENTRATOR

Bojic M, Marjanovic N, Miletic I

**07.07**

PROPOSED REPOWERING OF A COAL-FIRED POWER PLANT BY USING LOW-GRADE SOLAR THERMAL ENERGY

Hong H, Zhao YW, Jin HG

**07.04**

PERFORMANCE OF A SOLAR THERMAL DESALINATION SYSTEM WITH SPECIAL FLOW CHANNELS

Rodrigues FP, Silva MEV, Schwarzer K, Filho FELU, Praciano PEBS

**07.06**

NEW MECHANISM FOR A PARABOLIC SOLAR TRACKING SYSTEM

Barbosa ES, Schwarzer K, Silva MEV, Bezerra CAD, Almeida DO

14:00-16:00

**Brasilia Room**

*Conventional and Advanced Power Plants*

Chairs: A. Mirandola and H. Rusinowski

**13.06**

IMPROVED LOAD CONTROL STRATEGY FOR LARGE SIZED COMBINED CYCLES

Jonshagen KG, Genrup M, Eriksson P

**13.07**

BIOMASS RETROFITTING A NATURAL GAS-FIRED PLANT TO A HYBRID COMBINED CYCLE (HCC)

Pihl E, Johnsson F, Thunman H

**13.08**

A GAS TURBINE SUBMARINE ISOBARIC CAES PEAK LOAD POWER PLANT WITH HEAT RECOVERY AND STORAGE

Manfrida G, Ignesti, M.

**13.09**

A PROCEDURE FOR THE EVALUATION OF RESIDUAL LIFE OF STEAM POWER PLANT DEVICES

Lo Casto E, Mirandola A, Stoppato A

**13.10**

THERMAL LOADS TO THE EUROPEAN PRESSURIZED WATER REACTOR CONTAINMENT CAUSED BY LOSS-OF-COOLANT ACCIDENTS

Bury T

**13.11**

PRELIMINARY CORE DESIGNS OF TWO FLUID MOLTEN SALT REACTORS

Shimazu Y, Y. Kamiyama, T. Narabayashi, M. Tsuji

14:00-16:00

**Assunção Room**

*Environmental Impact and Sustainability of Energy Systems*

Chairs: R. Zevenhoven and A. Valero

**06.01**

APPLYING THERMOECONOMICS TO THE ANALYSIS OF THE NORTH AMERICAN FOOD CHAIN

Torres C, Valero A

**06.02**

THE CREPUSCULAR PLANET PART I: A MODEL FOR THE EXHAUSTED ATMOSPHERE

Valero A, Agudelo A, AlValero

**06.03**

THE CREPUSCULAR PLANET. PART II A MODEL FOR THE EXHAUSTED CONTINENTAL CRUST

AlValero, Valero A

**06.04**

BIOFUELS PRODUCTION: EXERGO-ENVIRONMENTAL EVALUATION

Velásquez HI, Pellegrini LF, Oliveira S

**06.05**

EXERGOECONOMIC AND EXERGOENVIRONMENTAL ANALYSIS OF DIFFERENT OPTIMISATION OPTIONS FOR ELECTRICITY PRODUCTION USING SOFC WITH INTEGRATED ALLOTHERMAL BIOMASS GASIFICATION

Buchgeister J, Meyer L, Castillo R, Tsatsaronis G

**06.06**

EXERGOENVIRONMENTAL EVALUATION OF WASTEWATER TREATMENT PROCESSES

Mora-Bejarano CH, Oliveira S

14:00-16:00

**Santiago Room**

*Hydrogen and Fuel Cells*

Chairs: A. Hernandez-Guerrero and J. A. Matelli

**10.01**

ITAIPU HYDROELECTRIC POWER PLANT AND ITS EXPERIMENTAL HYDROGEN PRODUCTION UNITY

Pinto CS

**10.02**

CO<sub>2</sub>-FREE PRODUCTION OF HYDROGEN USING CATALYTIC THERMAL DECOMPOSITION

Godínez OEB, Mendez F, Godínez EGB, Treviño C

**10.03**

DEVELOPMENT OF A PHYSICAL – CHEMICAL MODEL FOR A PEM FUEL CELL

García-Acevedo LE, Figueroa PRF, Oliveira AAM

**10.04**

ANALYSIS OF FLOW DISTRIBUTION IN A SYMMETRIC BIPOLAR PLATE FOR PEMFC

Ramos-Alvarado B, Hernandez A, Juárez-Robles D, Rubio-Arana C

**10.05**

EXPERIMENTAL STUDY FOR PEMFCs WITH CONVENTIONAL AND INNOVATIVE CHANNEL CONFIGURATIONS

Cano-Andrade S, Hernandez A, Juárez-Robles D, Rubio-Arana C

16:00 – 16:20

*Coffee Break*

16:20 – 18:20

**Pacífico Room**

*Renewable Energy*

Chairs: G. Manfrida and S. Harvey

**07.14**

PART-LOAD PERFORMANCE OF TWIST-COUPLED FLEXIBLE TURBINE BLADE AT LOW REYNOLDS NUMBER

Beyene A

**07.15**

OCEAN WAVE ENERGY EXTRACTION FROM AN AIR-COMPRESSION CHAMBER

Godínez EGB, Mendez F, Godínez OEB

**07.16**

INTEGRATION OF GEOTHERMAL ENERGY IN STEAM POWER PLANTS. A CASE STUDY WITH EXERGY ANALYSIS

Manfrida G, Fiaschi D.

**07.17**

100-PERCENT RENEWABLE ENERGY SUPPLY FOR PORTUGAL

Krajacic G, Duic N, Carvalho MGS

16:20-18:20

**Iguaçu Room**

*Heat Pumps, Refrigeration and Air Conditioning*

Chairs: E. E. S. Lora and W. Gazda

**05.10**

EXPERIMENTAL TIME-TEMPERATURE CHARACTERISTICS OF AIR BLAST CRYOGENIC FREEZING SYSTEMS

Gazda W

**05.01**

THEORETICAL ANALYSIS OF A TWO-STAGE EJECTOR-VAPOUR COMPRESSION REFRIGERATION CYCLE

Yari M

**05.02**

THERMOECONOMIC COMPARISON OF DISTRICT AND LOCAL COOLING WITH ABSORPTION CHILLERS

Ziher D, Poredos A

**05.03**

EXPERIMENTAL ANALYSIS OF THE EFFECT OF HUMIDITY ON THE PERFORMANCE OF A HEAT PUMP WATER HEATING SYSTEM

Ozturk MM, Erbay LB

**05.04**

EXERGETIC ANALYSIS OF THE TRANSCRITICAL CYCLE OF AN BOTTLE COOLER OPERATING WITH CO<sub>2</sub>

Almeida IMG, Barbosa CRF, Fontes FAO

**16:20-18:20**

**Brasilia Room**

*Gas Turbines and Internal Combustion Engines*

Chairs: A. Mirandola and H. Rusinowski

**12.13**

GAS TURBINE SENSOR VALIDATION THROUGH CLASSIFICATION WITH ARTIFICIAL NEURAL NETWORKS

Fast M, Palmé T, Karlsson A

**12.14**

THE ULTRA-MICRO GAS TURBINE GENERATOR PROJECT AT UDR1: EXPERIMENTAL ASSESSMENT OF THE COMPRESSOR MAP AND OF THE PRESSURE LOSSES AT THE REGENERATIVE COMBUSTION CHAMBER

Capata R

**12.15**

THE IMPACT OF USING SYNGAS AS FUEL IN DESIGN OF THE RECUPERATOR OF A REGENERATIVE GAS TURBINE ENGINE

Oliveira LM, Nascimento MAR, Menon GJ

**12.16**

PRELIMINARY MODELLING RESULTS FOR AN OTTO CYCLE / STIRLING CYCLE HYBRID-ENGINE-BASED POWER GENERATION SYSTEM

Cullen BP, McGovern J, Feidt M, Petrescu S

16:20-18:20

**Assunção Room**

*Environmental Impact and Sustainability of Energy Systems*

Chairs: R. Zevenhoven and E. Sciubba

**06.13**

REFINERY FLARE STACK ANALYSIS USING EXTENDED EXERGY

Diaz-Mendez SE, Hernandez A, JMRodríguez-Lelis, Sciubba E

**06.14**

EXERGY DESTRUCTION INSIDE AN ECOSYSTEM USED FOR THE ENVIRONMENTAL IMPACT ASSESSMENT: CASE OF A REFINERY FLARE STACK SURROUNDINGS

Diaz-Mendez SE, Hernandez A, Rodriguez-Lelis JM, Rubio-Arana C

**06.15**

APPLICATION OF THE EXERGY METHOD TO THE ENVIRONMENTAL IMPACT ESTIMATION: THE NITRIC ACID PRODUCTION AS A CASE STUDY

Kirova-Yordanova Z

**06.16**

THE DERIVATIVE “DRIFT” IN COMPLEX SYSTEMS DYNAMICS THE CASE OF CLIMATE CHANGE AND GLOBAL WARMING

Giannantoni C, Zoli M

**06.17**

LIFE CYCLE ASSESSMENT OF THE METHANOL PRODUCTION FROM SUGARCANE BAGASSE

M. L. G. Renó, E. E. S. Lora and J. C. Escobar Palacio

**06.18**

ANALYSIS OF DIFFERENT METHODOLOGIES FOR ENERGY AND ENVIRONMENTAL CERTIFICATION APPLIED TO A RESIDENTIAL BUILDING IN CENTRAL ITALY

U. Desideri, D. Leonardi, L. Arcioni, L. Pierassa and V. P. Piccioni

16:20-18:20

**Santiago Room**

*Hydrogen and Fuel Cells*

Chairs: J. A. Matelli and V. Verda

**10.06**

FUEL CELL - BASED CHP IN LARGE-SCALE PUBLIC CONSUMERS IN GREECE

Kakaras E, Karellas S, Doukelis A, Zovas P

**10.07**

EXERGOCHEMICAL ANALYSIS IN HYDROGEN PRODUCTION BY AUTOTHERMAL REFORMING OF NATURAL GAS WITH COGENERATION

Alves LG, Nebra SA

September, 3

8:20 – 10:20

**Pacifico Room**

*CCS - Carbon Capture and Storage*

Chairs: G. Manfrida and G. Tsatsaronis

**08.01**

PROCESS SIMULATION OF UTILIZATION OF CO<sub>2</sub> AND STEELMAKING SLAGS TO FORM PRECIPITATED CALCIUM CARBONATE (PCC)

Said A

**08.02**

ANALYSIS OF THE TECHNOLOGIES FOR CAPTURE AND SEPARATION OF CO<sub>2</sub>

Napoleão D, Balestieri JAP

**08.03**

COMPARISON OF AN IGCC WITH PRE-COMBUSTION CARBON CAPTURE AND AN IGCC DESIGN WITH CHEMICAL-LOOPING COMBUSTION

Erlach B, Erlach B, Tsatsaronis G

**08.04**

EXERGOCHEMICAL ANALYSIS OF A POWER PLANT WITH CHEMICAL LOOPING COMBUSTION

Petrakopoulou F, Tsatsaronis G, Morosuk T

**08.05**

THE ENVIRONMENTAL IMPACT OF POST COMBUSTION CO<sub>2</sub> CAPTURE WITH MEA AND WITH AMMONIA FOR A COAL-FIRED POWER PLANT

Strube R, Pellegrini Susini GA

**08.07**

ENVIRONMENTAL AND ECONOMIC OPTIMIZATION BY CARBON CAPTURE PROCESS APPLIED TO MEA CHEMISORPTION SYSTEM

Ferrufino GLAA, Luna CMR, Ballestieri JAP, Carvalho JA

08:20-10:20

**Iguaçu Room**

*Heat Pumps, Refrigeration and Air Conditioning*

Chairs: Z. Kirova-Yordanova and R. L. Cornelissen

**05.06**

ANALYSIS AND OPTIMIZATION OF A THERMOELECTRIC COOLING AIR SYSTEM

Santos LP, Silva RE, Silva JM, Camargo JR

**05.07**

AIR COOLING BY A SOLAR ABSORPTION SYSTEM: 2008 SUMMER EXPERIMENTAL RESULTS

Mizquierdo

**05.08**

PERFORMANCE EVALUATION METHODS OF A SPLIT AIR CONDITIONING SYSTEM

Y.Kato, Kametani S

**05.09**

RUNNING PERFORMANCE OF SPLIT-TYPE AIR CONDITIONING SYSTEMS INSTALLED IN A UNIVERSITY CAMPUS AND AN OFFICE BUILDING IN JAPAN

Ichikawa T, Yoshida S, Nobe T, Kametani S

**05.05**

LIQUIFIED NATURAL GAS ENERGY RECOVERY IN REFRIGERATION CYCLES

Santos ED, Acunha Júnior IC, Schneider, OS

08:20-10:20

**Brasilia Room**

*Gas Turbines and Internal Combustion Engines*

Chairs: E. Sciubba and D. Favrat

**12.01**

EXTENDED EXERGY ANALYSIS OF THE RESPONSE OF A GAS TURBINE PROCESS TO VARIATIONS IN THE TURBINE INLET TEMPERATURE

Cennerili, S.; Sciubba, E.; Diaz-Mendez, S. E.; Hernandez-Guerrero, A.; Rodriguez-Lelis, J. M.

**12.02**

NUMERICAL STUDY OF FLUID FLOW IN RIBBED COOLING CHANNELS TO GAS TURBINE

N. Cristobal Uzarraga-Rodriguez, Armando Gallegos-Muñoz, Alejandro Zaleta-Aguilar, J. Arturo Alfaro-Ayala, Alfonso Campos-Amezcuca and Zdzislaw Mazur-Cerwiec

**12.03**

DIFFERENT FUELS ASSESSMENT IN GAS TURBINE COMBUSTION CHAMBER FOR PRE-MIXED AND DIFFUSE FLAME

Rodrigues LO, Nascimento MAR

**12.04**

NUMERICAL SIMULATIONS OF A PRECHAMBER AUTOIGNITION ENGINE OPERATING ON NATURAL GAS

Heyne S, Millot G, Favrat D

**12.05**

THERMODYNAMIC OPTIMIZATION OF A SPARK IGNITION ENGINE

Curto-Risso PL, A Medina, A Calvo-Hernández

**12.06**

INVESTIGATION ON THE CHARGE EXCHANGE WORK DIMINISHING OF INTERNAL COMBUSTION ENGINE IN PART LOAD

Postrzednik S, Zmudka Z

08:20-10:20

**Assunção Room**

*Environmental Impact and Sustainability of Energy Systems*

Chairs: L. M. Serra and R. Zevenhoven

**06.07**

OPTIMAL SYNTHESIS OF TRIGENERATION SYSTEMS SUBJECT TO ENVIRONMENTAL CONSTRAINTS

Carvalho M, Serra LM, Lozano MA

**06.08**

ENERGETIC SAVING IN ITALIAN SECLUSION INSTITUTES: EXPERIMENTATION IN THE TOWN OF PADOVA

Stoppato A, Mariano M, Fornea P, Marani M.

**06.09**

ANALYSIS OF EMISSIONS INTO ATMOSPHERE OF THE COGENERATION AND DISTRICT HEATING PLANT IN NORCIA (ITALY)

Proietti S, Desideri U, Sdringola P, Curbis F

**06.10**

INTEGRATED PLANNING OF A MULTIFUNCTIONAL COMPLEX IN PERUGIA: SUSTAINABLE BUILDING SOLUTIONS AND ENERGY ENVIRONMENT CERTIFICATION

Proietti S, Desideri U, Sdringola P

**06.12**

SOCIO-TECHNICAL ASPECTS OF POTENTIAL FUTURE USE OF EXCESS HEAT FROM KRAFT PULP MILLS

Svensson I-L, Moshfegh B, Ottosson M, Anshelm J, Jönsson J, Berntsson T

**06.11**

GLOBAL WARMING: A RESULT OF GREENHOUSE GAS EMISSIONS OR OF HEAT-UP OF THE SURROUNDINGS BY POWER PLANTS?

Zevenhoven R, Beyene A

08:20-10:20

**Santiago Room**

*Hydrogen and Fuel Cells*

Chairs: V. Verda and M. von Spakovsky

**10.08**

MODELLING AND SIMULATION OF A BIOMASS GASIFICATION-SOLID OXIDE FUEL CELL COMBINED HEAT AND POWER PLANT USING ASPEN PLUS

Doherty W, Reynolds A, Kennedy D

**10.09**

DETAILED MODEL OF MOLTEN CARBONATE FUEL CELL STACKS

Massano C, Sciacovelli A, Verda V

**10.10**

THERMODYNAMIC AND ECONOMIC OPTIMIZATION OF A MOLTEN CARBONATE FUEL CELL POWER SYSTEM COUPLED WITH HYDROGEN PRODUCTION

Verda V, Nicolini F

**10.11**

APPLICATION OF A HYBRID MULTI-LEVEL OPTIMIZATION APPROACH TO THE DYNAMIC SYNTHESIS/DESIGN AND OPERATION / CONTROL UNDER UNCERTAINTY OF A PEMFC SYSTEM

von Spakovsky MR, Kim K, Wang M

**10.12**

THERMODYNAMIC OPTIMIZATION OF A MONOLITHIC-TYPE SOLID OXIDE FUEL CELL

Sciacovelli A, Verda V

**10.13**

SOLID OXIDE FUEL CELL AND GAS TURBINE HYBRID SYSTEMS FOR AIRCRAFT

Santin M, Traverso A

10:20 – 10:40

*Coffee Break*

10:40-12:40

**Pacífico Room**

*CCS - Carbon Capture and Storage*

Chairs: G. Manfrida and A. Perrella Balestieri

**08.08**

THE SEQUESTRATION AND STORAGE MODEL OF ATMOSPHERIC CARBON DIOXIDE

Ferruffino GLAA, Carvalho JA, Nascimento LFC

**08.06**

OPTIMIZATION OF A SETUP OF MEMBRANES IN SERIES FOR GAS SEPARATION USING GENETICALGORITHM

Schmeda López DR, Smith Schneider P, Indrusiak MLS

10:40-12:40

**Iguaçu Room**

*Heat Pumps, Refrigeration and Air Conditioning*

Chairs: R. L. Cornelissen and Z. Kirova-Yordanova

**05.11**

PARAMETRIC STUDY AND SEASONAL SIMULATIONS OF A SOLAR POWERED ADSORPTION COOLING SYSTEM

Taylan O, Baker DK, Kaftanoğlu, B.

**05.12**  
IMPROVED COOLING OF DISTRICT HEATING WATER IN SUBSTATIONS BY USING ALTERNATIVE CONNECTION SCHEMES  
Johansson P-O, M Sc Ph D Student

**05.13**  
DEVELOPMENT OF A NEW ABSORPTION-DEMIXING HEAT TRANSFORMER: WORKING MIXTURE AND CYCLE OPTIMIZATION  
Noubli H, Alonso D, Renaudin V, Cachot T

**05.14**  
THERMAL AND ENERGY OPTIMIZATION OF LARGE AIR CONDITIONING SYSTEMS VIA COMPUTATIONAL FLUID DYNAMICS SIMULATION  
Estrada CJD, Solano JP, Corredor LM, Polo GRA

**05.15**  
THERMODYNAMIC ANALYSIS OF A NEW MODEL: RADIANT FLOOR COOLING WITH FRESH AIR PRECOOLING AND DEHUMIDIFYING  
Guangze H

**05.16**  
EXERGY EFFICIENT THERMAL SYSTEMS FOR BUILDINGS  
R. L. Cornelissen

10:40-12:40

**Brasilia Room**

*Gas Turbines and Internal Combustion Engines*

Chairs: C. A. Gurgel Veras and P. R. Wander

**12.07**  
DURABILITY STUDIES OF MONO-CYLINDER COMPRESSION IGNITION ENGINES OPERATING WITH DIESEL, SOY AND CASTOR OIL METHYLESTERS  
Wander PR, Altafini CR, Colombo AL, Perera SC

**12.08**  
HEAT RELEASE AND ENGINE PERFORMANCE EFFECTS OF SOYBEAN OIL ETHYL ESTER BLENDING INTO DIESEL FUEL  
Bueno AV, Velásquez JA, Milanez LF

**12.09**  
BIODIESEL/MINERAL DIESEL FUEL MIXTURES: SPRAY EVOLUTION AND ENGINE PERFORMANCES AND EMISSIONS CHARACTERIZATION  
Valentino G, Allocca L, Iannuzzi S, Montanaro A

**12.10**  
ENERGY AND ENVIRONMENTAL SIMPLE ANALYSIS OF DIESEL ENGINES FUELED WITH PRODUCER GAS AND BIODIESEL FROM ANIMAL FATS  
Yepes IDR, Corredor LM

**12.11**  
SMALL SCALE ELECTRICITY GENERATION FROM SIMULTANEOUS BURNING OF STRAIGHT VEGETABLE OIL AND SYNGAS IN COMPRESSION IGNITION ENGINE  
Gurgel Veras CA

**12.12**  
ENERGY AND ECOLOGICAL SIGNIFICANCE OF CATALYTIC CONVERTER OPERATION IN INTERNAL COMBUSTION ENGINE  
Zmudka Z, Postrzednik S

10:40-12:40

**Assunção Room**

*Environmental Impact and Sustainability of Energy Systems*

Chairs: L. F. Pellegrini and A. H. Restrepo-Victoria

**06.19**  
COMPARATIVE ANALYSIS OF ENERGY SOURCES: THE SUSTAINABILITY CHALLENGE FOR THE XXI CENTURY  
Avelino AFT, Gordon AM

**06.20**  
CONSEQUENTIAL LIFE CYCLE ASSESSMENT: A TOOL TO EVALUATE GREENHOUSE GAS EMISSIONS FROM SOYBEAN-DERIVED BIODIESEL IN BRAZIL  
Novak LH, Ugaya CML, Mbohwa C

**06.21**  
USE OF WATER IN STEEL MILL INDUSTRY  
Souza AMT, Cunha AMS, França GAC, Andrade RM

**06.22**  
STATISTICAL ANALYSIS OF MODELS OF THE DEMAND FORECAST-CASE STUDY ON SALE CARDBOARD FOR RECYCLING  
Silva NR, Esguícero FJ, Silva ACD, Leão AL, Esperancini MST

**06.23**  
EVALUATION OF THE PRODUCTION COST OF COW LEATHER FERTILIZER PRODUCED FROM SCRAP LEATHER RESIDUES  
Ribeiro EMP, Mello PB, Ribeiro RP

**06.24**  
ESTIMATE OF THE DISCARD OF FERROUS AND NOT FERROUS METALS  
Silva NR, Sartori MMP, Silva ACD, Leão AL, Esperancini MST

10:40 – 12:40

**Santiago Room**

*Scientific Committee Meeting*

12:40

**Pacifico Room**

*Closing Ceremony*