

29th International Conference on Efficiency, Cost, Optimization, Simulation and Environmental Impact of Energy Systems (ECOS 2016)

Portoroz, Slovenia
19 - 23 June 2016

Volume 1 of 5

Editors:

**Andrej Kitanovski
Alojz Poredos**

ISBN: 978-1-7138-0808-4

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2016) by University of Ljubljana
All rights reserved.

Printed with permission by Curran Associates, Inc. (2020)

For permission requests, please contact University of Ljubljana
at the address below.

University of Ljubljana,
Faculty of Mechanical Engineering
Aškerčeva 6, SI-1000 Ljubljana,
Slovenia

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

VOLUME 1

ADVANCED FOSSIL ENERGY: CLEAN COAL, OIL, NATURAL GAS, CARBON DIOXIDE CAPTURE, UTILIZATION & STORAGE

LIQUEFACTION OF NATURAL GAS INTEGRATED INTO AN AIR SEPARATION PLANT: EVALUATION OF A NOVEL CONCEPT	1
<i>S. Tesch, K. Sabandi, T. Morosuk, G. Tsatsaronis</i>	
OPTIMIZATION AND COMPARISON OF CAL CO₂ CAPTURE SYSTEMS WITH RECARBONATION PROCESS INTEGRATED IN COAL-FIRED POWER PLANT	20
<i>L. Duan, T. Feng, X. Yu, J. Ma</i>	

BASIC & APPLIED THERMODYNAMICS

ECOS 2016: OPTIMIZATION OF AN IRREVERSIBLE CARNOT ENGINE WITH A CHANGING PHASE WORKING FLUID	35
<i>M. Blaise, M. Feidt, D. Maillet</i>	
NEW RESULTS CONCERNING OPTIMIZATION OF CARNOT ENGINE	47
<i>M. Feidt, M. Blaise</i>	
10 YEARS WITH THE PPR78 MODEL: CAPABILITIES AND LIMITATIONS OF PREDICTIVE CUBIC EQUATIONS OF STATE INVOLVING CLASSICAL MIXING RULES	58
<i>R. Privat, J.N. Jaubert</i>	
MATHEMATICAL CONSTRAINTS FOR AN OPTIMAL DESIGN OF TEMPERATURE-DEPENDENT ATTRACTIVE PARAMETER EXPRESSIONS IN CUBIC EQUATIONS OF STATE	76
<i>J.N. Jaubert, R. Privat, S. Lasala, Y. Le Guennec</i>	
EXERGY RECOVERY DURING LNG GASIFICATION USING AMBIENT AIR AS HEAT SOURCE	82
<i>Z. Hadid, A. Zoughaib</i>	
LOCAL STABILITY OF A CURZON AND AHLBORN ENGINE BY USING SIMPLIFIED EXPRESSIONS OF EFFICIENCY	94
<i>D. Ladino-Luna, P. Portillo-Diaz, R.T. Paez-Hernandez</i>	
CORRECT USE OF THERMODYNAMICS	104
<i>O. Armas</i>	

BIOMASS/BIOFUELS, BIOREFINERY CONCEPTS, WASTE-TO-ENERGY

MINERAL PHASE TRANSFORMATION OF BIOMASS ASHES – THERMAL ANALYSIS AND FACTSAGE CALCULATIONS	107
<i>A. Magdziarz, D. Nowak-Wozny, M. Gajek, M. Wilk</i>	
REMOTE, SMALL-SCALE, ‘GREENER’ ROUTES OF AMMONIA PRODUCTION	119
<i>I. Sharma, P. Arora, A. Hoadley, S. Mahajani, A. Ganesh</i>	
EARLY-STAGE DECISION MAKING APPROACH FOR THE SELECTION OF OPTIMALLY INTEGRATED BIOREFINERY PROCESSES	131
<i>A.D. Celebi, A.V. Ensinas, S. Sharma, F. Marechal</i>	
GASIFICATION AND COMBUSTION REACTOR GEOMETRY DESIGN OF A FAST INTERNAL CIRCULATING FLUIDIZED BED GASIFIER	142
<i>J. Mele, A. Senegacnik</i>	
TECHNO-ECONOMIC ASSESSMENT FOR HYDROTHERMAL LIQUEFACTION OF LIGNOCELLULOSIC BIOMASS, A FINNISH CASE STUDY	151
<i>M. Magdeldin, T. Kohl, C. DeBlasio, L. Saeed, M. Jarvinen</i>	
DESIGN OF AN INTEGRATED WASTE WOOD TO HEAT AND HYDROGEN CONVERSION SYSTEM: A PARAMETRIC STUDY	164
<i>C.A. Chahla, A. Zoughaib, C.T. Tran, R. Farel</i>	

ADVANCES ON EXERGY TARGETING OF A BIOFUEL PLANT	176
<i>D. Marmolejo-Correa, M. Hernandez-Hoyos, C. Molina, A. Sanchez, C.C. Guerra</i>	
FINITE RATE REACTION MECHANISM ADAPTED FOR MODELING AND SIMULATION OF PSEUDO-EQUILIBRIUM CELLULOSE PYROLYSIS	191
<i>T.M. Chandia, J.I. Yanagihara, R.B. Astete</i>	
FEASIBILITY ANALYSIS OF 100% TIRE PYROLYSIS OIL IN A COMMON RAIL DIESEL ENGINE	215
<i>U.Z. Baskovic, R. Vihar, T. Seljak, T. Katransik</i>	
THERMOCHEMICAL RECYCLING OF PLASTICS FOR PRODUCTION OF CHEMICAL INTERMEDIATES AT A SWEDISH CHEMICAL COMPLEX SITE	234
<i>M. Morandin, S. Heyne, H. Jilvero, M. Gyllenhammar, L. Petterson, S. Harvey</i>	
SETUP OF AN EXPERIMENTAL SYSTEM TO STUDY THE GAS PHASE KINETICS IN PYROLYSIS PROCESSING	252
<i>F. Desogus, R. Carta</i>	

CHEMICAL REACTIONS & REACTION ENGINEERING

EXERGY MODELING AND OPTIMIZATION OF AN AMMONIA PRODUCTION PLANT	264
<i>D. Florez-Orrego, S.D.O. Junior</i>	
COMPARISON OF DIFFERENT AMMONIA SYNTHESIS LOOP CONFIGURATIONS WITH THE AID OF ADVANCED EXERGY ANALYSIS	285
<i>M. Penkuhn, G. Tsatsaronis</i>	
EXERGY-BASED ESTIMATION AND COMPARISON OF UREA AND AMMONIUM NITRATE PRODUCTION EFFICIENCY AND ENVIRONMENTAL IMPACT	300
<i>Z. Kirova-Yardanova</i>	
DESIGN OF A CHEMICAL REACTOR UNDER MICROWAVE IRRADIATION IN RESONANCE CONDITIONS	316
<i>F. Desogus, S. Casu, G. Muntoni</i>	
THERMOECONOMIC OPTIMIZATION OF AN ENDOREVERSIBLE CHEMICAL ENGINE MODEL	330
<i>M.A. Barranco-Jimenez, A. Ocampo-Garcia, F. Angulo-Brown</i>	

DISTRICT ENERGY SYSTEMS & SMART CITIES

EXERGOCHEMICAL OPTIMIZATION OF A DISTRICT COOLING NETWORK	339
<i>T.D. Coz, A. Kitanovski, A. Poredos</i>	
OPTIMAL OPERATION OF HEAT SUPPLY SYSTEMS WITH PIPING NETWORK	354
<i>R. Yokoyama, H. Kitano, T. Wakui</i>	
TOWARDS ENERGY--AUTONOMOUS CITIES USING CO₂ NETWORKS AND POWER TO GAS STORAGE	369
<i>R. Suciu, P. Stadler, A. Ashouri, F. Marechal</i>	
ENERGY AND ECONOMIC ASSESSMENT OF A POLYGENERATION DISTRICT HEATING AND COOLING SYSTEM BASED ON GASIFICATION OF REFUSE DERIVED FUELS	383
<i>N. Kabalina, M. Costa, W. Yang, A. Martin</i>	
THE ROLE OF HEAT STORAGES IN FACILITATING THE ADAPTATION OF DH SYSTEMS TO LARGE AMOUNT OF VARIABLE RES ELECTRICITY	395
<i>A. Hast, S. Rinne, S. Syri, J. Kivluoma</i>	
OPTIMIZATION OF MULTI-SOURCE COMPLEX DISTRICT HEATING NETWORK, A CASE STUDY	409
<i>M. Vesterlund, A. Toffolo, J. Dahl</i>	
SENSITIVITY ANALYSIS OF DISTRICT HEATING SYSTEM MODEL FOR TRANSITION FROM FOSSIL FUEL TO RENEWABLE ENERGY SOURCES	420
<i>J. Ziemele, A. Gravelins, A. Blumberga, D. Blumberga</i>	
EXPERIMENTAL VALIDATION OF HEAT TRANSPORT MODELLING IN DISTRICT HEATING NETWORKS	430
<i>K. Sartor, P. Dewallef</i>	
OPTIMAL OPERATIONAL MANAGEMENT OF RESIDENTIAL ENERGY SUPPLY NETWORKS WITH POWER AND HEAT INTERCHANGES	442
<i>T. Wakui, H. Kawayoshi, R. Yokoyama, H. Iitaka, H. Aki</i>	

THERMAL LOAD PEAK SHAVING IN DISTRICT HEATING SYSTEMS THROUGH OPTIMIZATION OF USERS REQUEST	462
<i>E. Guelpa, G. Barbero, A. Sciacovelli, V. Verda</i>	
INDUSTRIAL WASTE HEAT INTEGRATION FOR PROVIDING ENERGY SERVICE TO DISTRICT HEATING NETWORKS	474
<i>S. Coss, E. Guelpa, C. Rebillard, V. Verda, O. Le-Corre</i>	
DISTRICT HEATING-DRIVEN MEMBRANE DISTILLATION IN INDUSTRIAL-SCALE BIOETHANOL PRODUCTION: TECHNO ECONOMIC STUDY	487
<i>D. Woldemariam, A. Kullab, E.U. Khan, A. Martin</i>	
ROBUST DESIGN OF LARGE DISTRICT HEATING NETWORKS THROUGH TOPOLOGY OPTIMIZATION	502
<i>A. Pizzolato, A. Sciacovelli, V. Verda</i>	
TOOL FOR DIMENSIONING OF ENERGY EFFICIENT DISTRICT HEATING IN AREAS WITH LOW-ENERGY BUILDINGS	517
<i>P. Abrahamsson, H. Hillamo, H. Saxen</i>	
SMART METERING EFFECT ON ENERGY EFFICIENCY	530
<i>A. Dandens, U. Bariss, R. Soloha, I. Karklina, J. Ziemele, D. Blumberga</i>	

ENERGY & WATER INTERACTIONS, USE OF WATER RESOURCES

A CRITICAL REVIEW OF DEFINITIONS FOR EXERGETIC EFFICIENCY IN REVERSE OSMOSIS DESALINATION PLANTS	537
<i>A.M. Blanco-Marigorta, J.D.M. del Cano</i>	

ENERGY & BUILDINGS

CLUSTERING ALGORITHMS FOR THE SELECTION OF TYPICAL DEMAND DAYS FOR THE OPTIMAL DESIGN OF BUILDING ENERGY SYSTEMS	550
<i>T. Schutz, M.H. Schraven, H. Harb, M. Fuchs, D. Muller</i>	
ECONOMIC ASSESSMENT OF ENERGY STORAGE FOR LOAD SHIFTING IN POSITIVE ENERGY BUILDING	562
<i>O. Dumont, C. Carmo, E. Georges, S. Balderrama, S. Quoilin, V. Lemort</i>	
CLUSTERING OF BUILDINGS WITHIN CITY DISTRICTS TO REDUCE RUNTIME FOR ENERGY SYSTEM PLACEMENT OPTIMIZATION	574
<i>J. Schiefelbein, S. Klask, T. Beckholter, M. Fuchs, D. Muller</i>	
COST OPTIMAL DIMENSIONING OF ENERGY SYSTEM COMPONENTS FOR SMART BUILDINGS CONSIDERING CHANGING END-CONSUMER ENERGY MARKET MODELS	584
<i>H. Wolisz, T. Blanke, M. Hagenkamp, M. Kohn, T. Schutz, M. Wesseling, D. Muller</i>	
AN ALGORITHM FOR STEPWISE EXERGY-BASED MODEL PREDICTIVE CONTROL OF BUILDING HVAC SUPPLY CHAINS	603
<i>M. Baranski, R. Sangi, J. Futterer, D. Muller</i>	
ADAPTIVE REUSE OF CHIMNEY FLUES IN HISTORIC BUILDINGS IN AUSTRALIA	617
<i>R. Greenan</i>	
COST-OPTIMAL BUILDING THERMAL DESIGN IN PRESENCE OF MULTI-OBJECTIVE MODEL PREDICTIVE CONTROL FOR ENERGY SYSTEMS	630
<i>F. Ascione, N. Bianco, C. De Stasio, G.M. Mauro, G.P. Vanoli</i>	
FROM A HOSPITAL REFERENCE BUILDING TO ALL REPRESENTED HEALTHCARE FACILITIES: A NEW APPROACH TO ASSESS ENERGY PERFORMANCE AND RETROFIT POTENTIALS	649
<i>F. Ascione, N. Bianco, F. De Rossi, C. De Stasio, G.M. Mauro, G.P. Vanoli</i>	
OPTIMAL SCHEDULING FOR RESIDENTIAL PEM FUEL CELL COGENERATION SYSTEM UNDER UNCERTAINTY OF PV OUTPUT AND ENERGY DEMAND USING MISOCP APPROACH	670
<i>A. Yoshida, J. Yoshikawa, Y. Fujimoto, S. Wakao, Y. Amano</i>	
SIMULATION-BASED ASSESSMENT OF AN EASY-TO-APPLY, AUTOMATED CONTROL TUNING METHOD FOR TYPICAL PID CONTROL LOOPS IN BUILDING ENERGY SYSTEMS	681
<i>J. Futterer, F. Stinner, D. Muller</i>	
EXERGY ANALYSIS APPLIED TO PERFORMANCE OF BUILDINGS IN EUROPE	696
<i>K. Sartor, P. Dewallef</i>	

VOLUME 2

TOWARDS ENERGY EFFICIENT OFFICE BUILDINGS IN DENMARK: THE MAERSK BUILDING CASE STUDY	708
<i>M. Jradi, C. Veje, B.N. Jorgensen</i>	
MODELLING AND RESIDENTIAL ENERGY PERFORMANCE ANALYSIS - TOWARD NET ZERO ENERGY HOUSE	721
<i>H. Ribeiro, H. Dao, C. Silva</i>	
IN-BUILDING WASTE WATER HEAT RECOVERY: AN URBAN SCALE METHOD FOR ENERGY SAVING ASSESSMENTS	729
<i>A. Bertrand, R. Aggoune, F. Marechal</i>	
ANALYSIS OF CLIMATIC CONDITIONS EFFECT ON HEATING AND COOLING LOADS FOR A HOUSEHOLD	747
<i>I. Soriga, C. Stanciu, A. Gheorghian, D. Stanciu, B. Borcila</i>	
SEARCH FOR THE OPTIMAL SHAPE OF FIXED EXTERIOR SHADING IN A COOLING-DOMINATED CLIMATE	759
<i>S. Stevanovic</i>	
EXERGY ANALYSIS OF A NATURALLY VENTILATED BUILDING INTEGRATED PHOTOVOLTAIC (BIPV) SYSTEM	771
<i>R.A. Agathokleous, S.A. Kalogirou, S. Karellas</i>	
THERMAL ANALYSIS OF A BUILDING INTEGRATED PHOTOVOLTAIC (BIPV) SYSTEM	786
<i>R.A. Agathokleous, S.A. Kalogirou</i>	
DESIGN METHODOLOGY OF PASSIVE HOUSES IN DIFFERENT CLIMATIC ZONES IN ITALY	800
<i>E. Aloisi, U. Desideri</i>	
THE EFFICIENCY OF USING ANTIFREEZING AGENTS IN MONOLITHIC CONSTRUCTION	815
<i>V.V. Strokova, L.N. Botsman, Y.N. Ogurtsova, V.V. Nelubova</i>	
 <u>ENERGY IN TRANSPORTATION</u>	
ENVIRONOMIC DESIGN OF HYBRID ELECTRIC VEHICLES	824
<i>Z. Dimitrova, F. Marechal</i>	
THERMODYNAMIC AND ECONOMIC EVALUATION OF HEAT TRANSPORT AND VALORIZATION SYSTEMS	836
<i>R. Poirier, M. Sorin, N. Galanis</i>	
MEASUREMENT AND COMPARISON OF DETERIORATION INDEX OF TWO VEHICLE CATALYTIC CONVERTERS OPERATED WITH ETHANOL-GASOLINE BLENDS E10 AND E20	845
<i>J. Tibaquirá, W. Valencia, S. Ospina, L. Quirama</i>	
THE APPLICATION OF PROCESS INTEGRATION TO THE OPTIMISATION OF CRUISE SHIP ENERGY SYSTEMS: A CASE STUDY	855
<i>F. Baldi, T.V. Nguyen, F. Ahlgren</i>	
THERMODYNAMIC ANALYSIS AND SYSTEM SIMULATION OF AN "OPTIMIZED CASCADE" LNG PROCESS	875
<i>P. Palazzo, M. Piacentini, E. Sciubba</i>	
MIXED INTEGER OPTIMIZATION OF AN LNG SUPPLY CHAIN IN THE BALTIC SEA REGION	888
<i>A. Bittante, R. Jokinen, J. Krooks, F. Pettersson, H. Saxen</i>	
SUSTAINABILITY ASSESSMENT OF ALTERNATIVE FUELS FOR FREIGHT TRANSPORT: METHODOLOGICAL APPROACH AND CASE STUDY FOR LIQUEFIED NATURAL GAS	902
<i>J.L. Osorio-Tejada, E. Llera-Sastresa, S. Scarpellini</i>	
EXERGY-BASED ANALYSIS OF AIRCRAFT ENVIRONMENTAL CONTROL SYSTEMS – INTEGRATION INTO MODEL-BASED DESIGN AND POTENTIAL FOR AIRCRAFT SYSTEM EVALUATION	915
<i>D. Bender</i>	
IMPACT OF TRAFFIC CONGESTIONS ON ENERGY CONSUMPTION AND EMISSIONS	928
<i>B. Luin, S. Petelin</i>	

ENERGY POLICY & PLANNING

HOW TO EXPLORE AND ANALYZE THE DECISION SPACE IN THE SYNTHESIS OF ENERGY SUPPLY SYSTEMS	938
<i>M. Hennen, M. Lampe, P. Voll, A. Bardow</i>	
POWER PLANT FLEXIBILITY AND VALUE OF FLEXIBILITY IN POWER SYSTEMS WITH HIGH SHARES OF VARIABLE RENEWABLES: A SCENARIO OUTLOOK FOR GERMANY 2035	951
<i>J. Kopiske, S. Spieker, G. Tsatsaronis</i>	
BENEFITS OF DSM MEASURES IN THE FUTURE FINNISH ENERGY SYSTEM	964
<i>V. Olkkonen, S. Rinne, S. Syri, A. Hast</i>	
ENERGY EVALUATION OF REGIONS AND SUB-REGIONS: APPLICATION TO PORTUGAL	978
<i>C. Oliveira, P. Pinheiro, A. Silva, A.C. Ferreira, C. Martins</i>	
THE INFORMATION PLATFORM ENERGYScope.CH ON THE ENERGY TRANSITION SCENARIOS	990
<i>D. Favarat, V. Codina, F. Vuille, F. Marechal</i>	
ELECTRICITY PLANNING IN ALGERIA	999
<i>B. Haddad, A. Liazid, P. Ferreira</i>	
ENERGY STRATEGY PROGRAMS IN CANTON OF VAUD OF SWITZERLAND: SPECIFIC ACTIONS	1014
<i>N. Pouransari, S. Dubois, C. Pahud, M. Meghari</i>	
ENERGY EFFICIENCY IMPROVEMENT POTENTIALS OF PULP AND PAPER SECTOR THROUGH ENERGY BENCHMARKING AND COGENERATION	1028
<i>I. Shabbir, M. Mirzaeian, J. Mooney, F. Anvari</i>	
TECHNO-ECONOMIC EVALUATION OF SELF-CONSUMPTION WITH PV/BATTERY SYSTEMS UNDER DIFFERENT REGULATION SCHEMES	1042
<i>S. Quoilin, A. Zucker</i>	
OPTIMAL USE OF BIOMASS IN LARGE-SCALE ENERGY SYSTEMS: INSIGHTS FOR ENERGY POLICY	1054
<i>V.C. Girones, S. Moret, E. Peduzzi, M. Nasato, F. Marechal</i>	
ENERGY USE AND CO₂ EMISSIONS OF THE MEXICAN WHITE MAIZE AGROINDUSTRY	1066
<i>S. Juarez-Hernandez, C.S. Pardo</i>	
LOCAL COMMUNITY AS THE PILLAR OF DEVELOPING A SUSTAINABLE ENERGY STRATEGY	1082
<i>A. Karabegovic</i>	
INTEGRATION OF RENEWABLE ENERGY SOURCES AND FORECAST OF DEVELOPMENT OF ELECTRICITY CONSUMPTION IN THE SLOVENIAN TRANSMISSION NETWORK TILL 2050	1093
<i>U. Stritih, V. Butala, A. Senegacnik, M. Sekavcnik, S.R. Opresnik, S. Ivanjko</i>	
WAKING THE SLEEPING GIANT – DERIVING A STRATEGY FOR DYNAMIC RENEWABLE HEAT MARKETS IN GERMANY	1108
<i>G. Wagener-Lohse, G. Harrer-Puchner, U. Sieberg</i>	

ENERGY STORAGE (THERMAL, ELECTRIC, HYDROGEN, ALTERNATIVES)

COMPARATIVE ENERGY AND EXERGY ANALYSIS OF COMPRESSED AIR AND LIQUID AIR ENERGY STORAGE SYSTEMS	1123
<i>P. Krawczyk, L. Szablowski, S. Karellas, E. Kakaras, K. Badyda</i>	
SMALL-SCALE PUMPED HEAT ELECTRICITY STORAGE FOR DECENTRALISED COMBINED HEAT AND POWER GENERATION: COST OPTIMAL DESIGN AND OPERATION	1134
<i>A. Vandersickel, A. Aboueldahab, H. Spliethoff</i>	
SIMULATION OF A HEAT TANK WITH PHASE CHANGE MATERIALS (PCM)	1147
<i>C. Tzivanidis, Z. Sagia, J. Alexopoulos</i>	
ECOS 2016: THERMODYNAMIC ANALYSIS OF A THERMOCHEMICAL STORAGE PROCESS USING A MULTISALT OPEN FIXED BED REACTOR	1156
<i>B. Michel, L. Farcot, N. Le Pierres</i>	
TIME-DEPENDENT PERFORMANCE OF AN INTEGRATED SOLAR-DRIVEN HYDROGEN GENERATION DEVICE	1168
<i>L. Wang, D. Gregory, R.A. Suci, F. Marechal</i>	

SIMULATION OF COGENERATION COMBINED CYCLE PLANT FLEXIBILIZATION BY THERMOCHEMICAL ENERGY STORAGE	1183
<i>M. Angerer, M. Djukow, K. Riedl, S. Gleis, H. Spliethoff</i>	
EXERGOECONOMIC ANALYSIS AND OPTIMIZATION OF A NOVEL ISOBARIC ADIABATIC COMPRESSED AIR ENERGY STORAGE SYSTEM	1199
<i>Y. Mazloum, H. Sayah, M. Nemer</i>	
ECONOMIC AND ENERGY ANALYSIS OF A THERMAL ENERGY STORAGE POWER SYSTEM	1211
<i>A. Benato, A. Pezzuolo, A. Stoppato, A. Mirandola</i>	
A MODELLING AND SIMULATION APPROACH FOR THERMAL ENERGY STORAGE DEVICES	1228
<i>E. Terzibachian, B. Tremieac, C. Marvillet, P. Esparcieux</i>	
NUMERICAL INVESTIGATIONS OF A CONTINUOUS THERMOCHEMICAL HEAT STORAGE REACTOR	1240
<i>L. Farcot, B. Michel, N. Le Pierres, P. Papillon</i>	
AN OPTIMIZATION ALGORITHM FOR LOAD-SHIFTING OF LARGE SETS OF ELECTRIC HOT WATER TANKS	1254
<i>N. Beeker, P. Malisani, N. Petit</i>	
EVALUATION OF CRYOGENICS-BASED ENERGY STORAGE CONCEPTS	1265
<i>S. Hamdy, T. Morosuk, G. Tsatsaronis</i>	
ADIABATIC COMPRESSED AIR ENERGY STORAGE – A STUDY ON DYNAMIC PERFORMANCE WITH THERMAL ENERGY STORAGE	1279
<i>A. Sciacovelli, Y. Li, Y. Ding</i>	
LIQUID AIR ENERGY STORAGE – OPERATION AND PERFORMANCE OF THE FIRST PILOT PLANT IN THE WORLD	1291
<i>A. Sciacovelli, D. Smith, H. Navarro, Y. Li, Y. Ding</i>	
TECHNO-ECONOMIC OPTIMIZATION OF ISOLATE MICRO-GRIDS INCLUDING PV AND LI-ION BATTERIES IN THE BOLIVIAN CONTEXT	1302
<i>S. Balderrama, W. Canedo, M. Fernandez, V. Lemort, S. Quoilin</i>	
SYSTEMATIC THERMAL ENERGY STORAGE INTEGRATION IN INDUSTRY USING PINCH ANALYSIS	1314
<i>D. Olsen, Y. Abdelouadoud, B. Wellig, P. Krummenacher</i>	
PERFORMANCE ANALYSIS OF ADIABATIC COMPRESSED AIR HEAT STORAGE AND SOLAR HYBRID SYSTEM	1328
<i>W. Liu, X. Man, A. Xie, C. Niu, G. Xu, Q. Li</i>	
ACTIVE PCM COLD STORAGE IN OFF-GRID TELECOMMUNICATION BASE STATIONS: POTENTIAL ASSESSMENT OF PRIMARY ENERGY SAVINGS	1336
<i>A. Studniorz, D. Wolf, A. Christidis, G. Tsatsaronis</i>	

ENGINES, FURNACES & BOILERS, COMBUSTION/GASIFICATION

THE IMPACT OF AIR QUALITY AND SITE SELECTION ON GAS TURBINE ENGINE PERFORMANCE	1350
<i>D. MacPhee, A. Beyene</i>	
SET-UP OF A ROBUST NARX MODEL SIMULATOR OF GAS TURBINE START-UP	1365
<i>H. Bahlawan, M. Morini, M. Pinelli, P.R. Spina, M. Venturini</i>	
A LUMPED THERMODYNAMIC MODEL OF GAS TURBINE BLADE COOLING: PREDICTION OF FIRST-STAGE BLADES TEMPERATURE AND COOLING FLOW RATES	1378
<i>R. Masci, E. Sciubba</i>	
TECHNO-ECONOMIC OPTIMISATION OF THREE GAS LIQUEFACTION PROCESSES FOR SMALL-SCALE APPLICATIONS	1391
<i>T.V. Nguyen, E.D. Rothuizen, B. Elmegaard, A.H. Bruun</i>	
DYNAMICS OF WET FLUE GAS DESULPHURIZATION IN SPRAY ABSORBER	1405
<i>M.M. Petrovic, V.D. Stevanovic, S. Jankovic, S. Milivojevic</i>	
QUASI-DIMENSIONAL MODEL OF AN OPTICALLY ACCESSIBLE SPARK IGNITION ENGINE	1416
<i>P. Gobbato, N. Saccon, A. Irimescu</i>	

VOLUME 3

OPTIMIZATION OF A SYNGAS PURIFICATION LINE AND CO₂ CAPTURE SYSTEMS INTEGRATED WITH A SMALL-SCALE UP-DRAFT GASIFIER	1429
<i>G. Cau, V. Tola, E. Maggio</i>	
THERMODYNAMIC APPROACH TO ASSESS PREMIXED SPHERICAL FLAME PROPAGATION: CALCULATION OF LAMINAR FLAME SPEED, RADIUS PROFILE AND EXERGY DESTRUCTION USING EXPERIMENTAL PRESSURE TRACES AS INPUT	1443
<i>R.M. Hartmann, E.J. de Oliveira, M.I. Rocha, A.A.M. Oliveira Jr.</i>	
DESIGN AND CFD ANALYSIS OF A CURTIS TURBINE STAGE	1456
<i>M. Achille, S. Cardarelli, F. Pantano, M. Zito</i>	
PROCESS SIMULATION OF AN AIR COOLED GAS TURBINE BLADE	1471
<i>A. Biondi, F. Palomba, B. Ricci</i>	
DESIGN AND CFD ANALYSIS OF AN ODONTOIATRIC TURBINE	1482
<i>G. Califano, A. Notari, S. Scorza, M. Tommasi</i>	
NUMERICAL MODEL OF AN EXTERNALLY FIRED GAS TURBINE, INCLUDING AN ARBITRARY NUMBER OF STAGES IN EXPANSION AND COMPRESSION PROCESSES	1497
<i>A. Durante, G. Pena-Vergara, P. Curto-Risso, A. Medina, A.C. Hernandez</i>	
OPTIMIZING THE EFFICIENCY OF AN EXTERNALLY FIRED GAS TURBINE	1509
<i>A. Durante, G. Pena-Vergara, P. Curto-Risso, M. Pedemonte, P. Ezzatti</i>	
THERMODYNAMIC ASSESSMENT OF AN INTEGRATED MILD OXYFUEL COMBUSTION POWER PLANT – PRELIMINARY STUDY	1520
<i>P. Gladysz, W. Stanek, L. Czarnowska</i>	
WALL TEMPERATURE AND SYSTEM MASS EFFECTS IN A RECIPROCATING GAS SPRING	1538
<i>A.I. Taleb, P. Sapin, C. Barfuss, A.J. White, D. Fabris, C.N. Markides</i>	

ENVIRONMENTAL, SOCIAL AND SUSTAINABILITY ISSUES ASSOCIATED WITH ENERGY SYSTEMS, INDUSTRIAL PRODUCTION, AND TRANSPORTATION

ASSESSING DIRECT AND EMBODIED ENERGY TRADES AMONG NATIONAL ECONOMIES THROUGH INPUT-OUTPUT ANALYSIS	1550
<i>M.V. Rocco, C. Pavarini, E. Colombo</i>	
COST ALLOCATION STRATEGY FOR OFF GRID SYSTEM IN RURAL AREA: A CASE STUDY ON IRRIGATION FOR RURAL AGRICULTURAL LANDS IN INDIA	1562
<i>G. Bonamini, F. Riva, E. Colombo</i>	
BENEFITS OF INTEGRATING GEOGRAPHICALLY DISTRIBUTED DISTRICT HEATING SYSTEMS	1573
<i>D.F. Dominkovic, I. Bacekovic, D. Sveinbjornsson, A.S. Pedersen, G. Krajacic</i>	
ENVIRONMENTAL AND EXERGETIC SUSTAINABILITY ASSESSMENT OF POWER GENERATION FROM BIOMASS	1593
<i>L. Stougie, G.A. Tsolidis, H. van der Kooi, G. Korevaar</i>	
ESTABLISHING THE LOCAL EMISSION STANDARD LEVEL: THE CASE OF ASSALUYEH	1603
<i>H. Khajehpour, Y. Saboohi, G. Tsatsaronis</i>	
COMPARING LEAN-GREEN MODELS FOR ECO-EFFICIENT PRODUCTION	1621
<i>M.F. Abreu, A.C. Alves, F. Moreira</i>	
POTENTIAL ENVIRONMENTAL IMPACTS OF HYDRAULIC AND CHEMICAL STIMULATIONS IN DEEP GEOTHERMAL WELLS – A GERMAN PERSPECTIVE	1632
<i>A. Bertram, C. Bonnemann, L. Ceranna, N. Gestermann, G. Houben, T. Plenefisch, T. Tischner, U. Wegler</i>	
ENVIRONMENTAL, ECONOMIC AND TECHNICAL ASSESSMENT OF RUBBER BLENDS WITH MULTI-CRITERIA ANALYSIS	1648
<i>P.S. Dekic, G. Radenkovic, B. Milutinovic, G. Stefanovic</i>	
LIFE CYCLE ASSESSMENT OF WASTE MANAGEMENT SCENARIOS WITH ENERGY RECOVERY USING MULTI-CRITERIA ANALYSIS	1659
<i>B. Milutinovic, G. Stefanovic, P.S. Dekic, I. Mijailovic</i>	
A CROSS-COUNTRY ASSESSMENT OF ENERGY- RELATED CO₂ EMISSIONS: A COMBINED DECOMPOSITION AND DECOUPLING APPROACH	1673
<i>F. Lima, M.L. Nunes, J. Cunha</i>	
ENVIRONMENTAL IMPACTS OF ELECTRICITY PRODUCTION OF MICRO WIND TURBINES WITH VERTICAL AXIS	1688
<i>L. Lombardi, E. Carnevale, B. Mendecka, G. Santoni, W. Stanek</i>	

ENVIRONMENTAL IMPACT BY HYDROGEO THERMAL ENERGY GENERATION IN LOW-ENTHALPY REGIONS	1705
<i>C. Lohse</i>	

EXERGY BASED METHODS AND THERMO-ECONOMIC ANALYSIS & OPTIMIZATION

EXERGO ECONOMIC ANALYSIS-BASED CRITERIA FOR COMPETITIVENESS OF HYBRID POWER CYCLES USING MULTIPLE HEAT SOURCES OF DIFFERENT TEMPERATURES	1720
<i>T. Yue, N. Lior</i>	
ENERGY, EXERGY AND ADVANCED EXERGY ANALYSIS OF A MILK PROCESSING FACTORY	1751
<i>F. Buhler, T.V. Nguyen, J.K. Jensen, B. Elmegaard</i>	
EXERGOECONOMIC ANALYSIS APPLIED TO THE PROCESS OF REGASIFICATION OF LNG INTEGRATED INTO AN AIR SEPARATION PROCESS	1764
<i>S. Tesch, T. Morosuk, G. Tsatsaronis</i>	
ALLOCATION OF WASTE AND RESOURCES IN MULTIPRODUCT PLANTS: THERMOECONOMICS AND LCA	1782
<i>J.A.M. da Silva, J.J.C.S. Santos, M. Carvalho, S.D. Oliveira Jr.</i>	
EXERGY DESTROYED IN THE ARTERIES DUE TO STENOSIS	1800
<i>I.B. Henriques, C.E.K. Mady, J.M. Marin, L.M. Serra, S.D.O. Junior</i>	
APPLICATION OF THE MIXED INTEGER LINEARIZED EXERGOECONOMIC (MILE) METHOD WITH EVOLUTIONARY OPTIMIZATION TO A COGENERATION COGENERATION	1812
<i>M. Reini, P. Pinamonti, S. Costanzo, M. Caisi</i>	
EXERGY ANALYSIS WITH VARIABLE AMBIENT CONDITIONS	1830
<i>M. Reini, M. Caisi</i>	
BIO-PRODUCTS: A NEW WAY TO CALCULATE FOSSIL FUELS IN THE GRAVE TO CRADLE EXERGY ASSESSMENT	1838
<i>K. Whiting, L.G. Carmona, T. Sousa</i>	
EXERGY ANALYSIS APPLIED TO THE HEATING PROCESS OF AVIARIES FOR BROILER PRODUCTION IN BRAZIL	1861
<i>A. Migliavacca, S.D. Oliveira Jr., J.I. Yanagihara</i>	
THERMOECONOMIC ANALYSIS OF A CEMENT PRODUCTION PLANT	1874
<i>A. Valero, A. Abadias</i>	
APPLICATION OF EXERGOECONOMIC, EXERGOENVIRONMENTAL AND ADVANCED EXERGY ANALYSES ON CARBON BLACK PRODUCTION	1892
<i>P. Mergenthaler, A.P. Schinkel, G. Tsatsaronis</i>	
EXTENDED EXERGOENVIRONMENTAL METHOD AS A TOOL FOR ENVIRONMENTAL RESPONSIBILITY - ACCOUNTING IN COMPLEX ENERGY SYSTEMS	1907
<i>H. Khajehpour, Y. Saboohi, G. Tsatsaronis</i>	
EXERGO-ECONOMIC EVALUATION OF A CSP PLANT IN COMBINATION WITH A DESALINATION UNIT	1927
<i>B. Meyer-Kahlen, J. Wellmann, T. Morosuk</i>	
A NEW APPROACH FOR APPLYING DYNAMIC EXERGY ANALYSIS AND EXERGOECONOMICS TO A BUILDING ENVELOPE	1948
<i>S. Sayadi, G. Tsatsaronis, T. Morosuk</i>	
EXERGETIC ANALYSIS OF STILLAGE CONCENTRATION	1965
<i>N.A. Fukushima, R. Palacios-Bereche, S.A. Nebra</i>	
IMPROVING THE ACCURACY OF THE RESULTS OF EXERGY ANALYSIS AND EXERGOECONOMICS EVALUATION FOR THE COMPLEX ENERGY SYSTEM USING THE CFD TECHNIQUE	1977
<i>G. Vuckovic, M. Stojiljkovic, M. Vukic, P. Trubaev, M. Ignijatovic</i>	
FINITE-TIME THERMOECONOMIC OPTIMIZATION OF A NON-ENDOREVERSIBLE NOVIKOV POWER PLANT MODEL UNDER DIFFERENT REGIMES OF PERFORMANCE WITH DULONG-PETIT'S HEAT TRANSFER LAW	1991
<i>J.C. Pacheco-Paez, M.A. Barranco-Jimenez, F. Angulo-Brown</i>	
A CRITICAL REASSESSMENT OF THE HESS-MURRAY LAW	2001
<i>E. Sciubba</i>	
EXERGY DYNAMICS OF A SPHERE UNDERGOING A NON-EQUILIBRIUM CONCENTRATION TRANSIENT	2015
<i>E. Sciubba, F. Zullo</i>	

COMPARATIVE EXERGOECONOMIC EVALUATION OF TWO MODERN COMBINED-CYCLE POWER PLANTS	2029
<i>M. Assar, T. Blumberg, T. Morosuk, G. Tsatsaronis</i>	
EXERGETIC AND EXERGOECONOMIC EVALUATION OF A SOFC/ENGINE HYBRID POWER GENERATION SYSTEM	2044
<i>Y.D. Lee, K.Y. Ahn, T. Morosuk, G. Tsatsaronis</i>	
EXERGY ANALYSIS OF THE COMPRESSION SYSTEMS AND ITS PRIME MOVERS FOR A FPSO UNIT	2060
<i>W.L.R. Gallo, A.G. Gallego, V.L. Acevedo, R. Dias, H.Y. Ortiz, B.A. Valente</i>	

FUEL CELLS

INFLUENCE OF TALC DUST IMPURITIES IN THE MCFC CATHODE INLET GAS MIXTURE	2080
<i>J. Milewski, R. Bernat</i>	
LCA STUDY OF THE FUEL CELL BASED UPS IN MANUFACTURING AND OPERATIONAL PHASE	2096
<i>M. Mori, G. Stern</i>	
CONCEPTUAL DESIGN OF A SMALL PORTABLE HEAT INTEGRATED METHANOL STEAM REFORMER – HIGH TEMPERATURE PEM FUEL CELL SYSTEM	2112
<i>A. Lotric, M. Sekavcnik, A. Pohar, B. Likozar, S. Hocevar</i>	
MULTI-OBJECTIVE OPTIMIZATION OF SOLID OXIDE FUEL CELL–GAS TURBINE HYBRID CYCLE AND UNCERTAINTY ANALYSIS	2126
<i>S. Sharma, C.A. Dilan, E. Peduzzi, F. Marechal, A.V. Ensinas</i>	

HEAT & MASS TRANSFER, FLUID DYNAMICS

FLUID DYNAMICS ASSESSMENT OF THE TESLA TURBINE ROTOR	2135
<i>G. Manfrida, L. Talluri</i>	

VOLUME 4

NEW APPROACH FOR TRANSIENT SIMULATION OF CLOSED BATCH EVAPORATION IN A PLATE HEAT EXCHANGER	2150
<i>M. Gleinser, C. Wieland, H. Spliethoff</i>	
CFD MODELLING TO AID THE DESIGN OF STEEL SHEET MULTISTAGE PUMPS	2165
<i>F. Fontana, M. Masi</i>	
SIMULATION OF A HEAT EXCHANGER	2178
<i>C. Tzivanidis, Z. Sagia, J. Alexopoulos</i>	
MICROFLUIDIC IN-CHIP TEMPERATURE CONTROL VIA HEAT OF MIXING RELEASE	2189
<i>G. Bonciolini, A.J. de Mello, E. Sciubba, D. Vigolo</i>	
THERMAL ANALYSIS OF AN ENTIRE FLAT PLATE COLLECTOR WITH A SERPENTINE FLOW SYSTEM AND DETERMINATION OF THE WATER AND AIR FLOW AND CONVECTION REGIME	2203
<i>D. Korres, C. Tzivanidis</i>	
A SIMPLER FINITE ELEMENT METHOD FOR THE FLUX DENSITY DISTRIBUTION OF A PARABOLIC TROUGH CONCENTRATOR	2216
<i>J. Song, K. Tong, Z. Zhou</i>	
PERFORMANCE STUDY OF A FIN AND TUBE HEAT EXCHANGER WITH DIFFERENT FIN GEOMETRY	2227
<i>S. Singh, K. Sorensen, T.J. Condra</i>	
EXPERIMENTAL AND NUMERICAL INVESTIGATION OF THERMAL AND FLUID FLOW PROCESSES IN A MATRIX HEAT EXCHANGER	2244
<i>M. Tomic, P. Zivkovic, B. Milutinovic, M. Vukic, A. Borcic</i>	
THERMODYNAMIC PERFORMANCES ON TYPICAL DAYS OF A STEAM GENERATION SYSTEM WITH A SOLAR ASSISTED ABSORPTION HEAT TRANSFORMER	2254
<i>F. Liu, J. Sui, H. Jin</i>	

NONBIOMASS RENEWABLE THERMAL SYSTEMS

OPTICAL AND THERMAL ANALYSIS OF A NEW U-TYPE EVACUATED TUBE COLLECTOR WITH A MINI-COMPOUND PARABOLIC CONCENTRATOR AND A CYLINDRICAL ABSORBER	2270
<i>D. Korres, C. Tzivanidis</i>	
NANOFLUIDS APPLICATION IN DIRECT ABSORPTION SOLAR COLLECTORS: REVIEW AND NUMERICAL MODEL	2282
<i>S. Dugaria, M. Bortolato, D. Del Col</i>	
A ONE YEAR PERFORMANCE COMPARISON OF TRANSPARENT AND UNGLAZED TRANSPIRED COLLECTORS	2299
<i>L. Guillon, S. Halle, D.R. Rousse</i>	
TOWARDS OPTIMAL DESIGN OF SOLAR ASSISTED INDUSTRIAL PROCESSES: CASE STUDY OF A DAIRY	2312
<i>A.S. Wallerand, R. Voillat, F. Marechal</i>	
EXPERIMENTAL EVALUATION OF A 3-D DYNAMIC SOLAR-THERMAL COLLECTOR MODEL UNDER TIME-VARYING ENVIRONMENTAL CONDITIONS	2341
<i>I. Guarracino, J. Freeman, C.N. Markides</i>	
DESIGN CHALLENGES OF LOW GRADE HEAT RECOVERY ORCS FOR LOW POWER OUTPUT: EXPERIENCES FROM A PROTOTYPE DESIGN	2356
<i>A. Elgin, A. Beyene</i>	

ORC

ORCMKIT: AN OPEN-SOURCE LIBRARY FOR ORGANIC RANKINE CYCLE MODELLING AND ANALYSIS	2369
<i>R. Dickes, D. Ziviani, M. de Paepe, M. van den Broek, S. Quoilin, V. Lemort</i>	
TECHNICAL AND ECONOMIC OPTIMIZATION OF AN ORGANIC RANKINE CYCLE DEDICATED TO THE PRODUCTION OF ELECTRICITY FROM A GEOTHERMAL SOURCE USING A GENETIC ALGORITHM	2381
<i>S. Schuller, C. Josset, B. Auvity, J. Bellettre</i>	
FLEXIBLE TWO-STAGE TURBINE BLEEDING ORGANIC RANKINE CYCLES (ORCS) FOR COMBINED HEAT AND POWER APPLICATIONS	2395
<i>D. Meinel, K. Braimakis, C. Wieland, S. Karellas, H. Spliethoff</i>	
THERMODYNAMIC AND TECHNICAL CRITERIA FOR THE OPTIMAL SELECTION OF THE WORKING FLUID IN A MINI-ORC	2407
<i>B. Franchetti, A. Pesiridis, I. Pasmazoglou, E. Sciubba, L. Tocci</i>	
DEEP WATER COOLED ORC FOR FLOATING OIL PLATFORM APPLICATIONS	2421
<i>C.G.F. do Val, J.A.M. da Silva, S.D.O. Junior</i>	
ENERGY PERFORMANCE AND ECONOMIC EVALUATION OF HEAT PUMP/ORGANIC RANKINE CYCLE SYSTEM WITH SENSIBLE THERMAL STORAGE	2437
<i>C. Carmo, O. Dumont, M.P. Nielsen, B. Elmegaard</i>	
OPTIMAL PART-LOAD OPERATION OF AN 11 KWE ORGANIC RANKINE CYCLE FOR WASTE HEAT RECOVERY	2448
<i>S. Lecompte, M. van den Broek, M. De Paepe</i>	
THERMAL DECLINE MITIGATION IN A GEOTHERMAL PLANT BY HYBRIDIZATION WITH A CONCENTRATING SOLAR POWER SYSTEM	2460
<i>M.C. Bassetti, F. Bizzarri, D. Consoli, O. Tari, G. Manete, A. Lazzaretto</i>	
MULTIPLE EXPANSION ORC FOR SMALL SCALE – LOW TEMPERATURE HEAT RECOVERY	2477
<i>D. Micheli, M. Reini, R. Taccani</i>	
A THERMODYNAMIC FEASIBILITY STUDY OF AN ORGANIC RANKINE CYCLE (ORC) FOR HEAVY DUTY DIESEL ENGINE (HDDE) WASTE HEAT RECOVERY IN OFF-HIGHWAY APPLICATIONS	2489
<i>S. Lion, C.N. Michos, I. Vlaskos, R. Taccani</i>	
STEADY STATE AND DYNAMIC MODELLING OF A 1 MW_{EL} COMMERCIAL WASTE HEAT RECOVERY ORC POWER PLANT	2506
<i>G. Andritsos, A. Desideri, C. Gantiez, V. Lemort, S. Quoilin</i>	
RECOVERING GAS TURBINE HIGH-TEMPERATURE EXHAUST HEAT USING ORGANIC RANKINE CYCLE WITH MIXTURE AS WORKING FLUID	2518
<i>A. Pezzuolo, A. Benato, A. Stoppato, A. Mirandola</i>	

ORGANIC RANKINE CYCLE MODELLING AND THE ORCMKIT LIBRARY: ANALYSIS OF R1234ZE(Z) AS DROP-IN REPLACEMENT OF R245FA FOR LOW-GRADE WASTE HEAT RECOVERY	2532
<i>D. Ziviani, R. Dickes, S. Quoilin, V. Lemort, M. De Paepe, M. van den Broek</i>	
DEVELOPMENT OF A SEMI-ANALYTICAL MODEL OF VOLUMETRIC EXPANDER FOR SYSTEM-LEVEL SIMULATION	2545
<i>J.F. Oudkerk, R. Dickes, V. Lemort</i>	
PERFORMANCE COMPARISON BETWEEN SINGLE AND DUAL PRESSURE ORGANIC RANKINE CYCLE SYSTEMS	2553
<i>E. Bonamico, G. Manente, A. Lazzaretto</i>	
A NOVEL SCROLL EXPANDER FOR FLANK LEAKAGE INVESTIGATION: PRELIMINARY TESTS	2573
<i>G.R. Fanti, G.H.B. Donato, P.E.B. de Mello</i>	
PERFORMANCE EVALUATION OF AN ORGANIC RANKINE CYCLE (ORC) CONNECTED TO TWO-PHASE CLOSED THERMOSYPHONS	2582
<i>V.L. Le, S. Declaye, X. Dumas, L. Ferrand, V. Lemort</i>	
DESIGN AND CFD ANALYSIS OF A LJUNGSTRÖM TURBINE FOR AN ORC CYCLE IN A WASTE HEAT RECOVERY APPLICATION	2596
<i>C.F. Palumbo, V.F. Barnabei, E. Preziuso, U. Coronetta</i>	
ADVANCED EXERGOECONOMIC ANALYSIS OF ORGANIC RANKINE CYCLE WASTE HEAT RECOVERY SYSTEM OF A MARINE POWER PLANT	2610
<i>T. Koroglu, O.S. Sogut</i>	
PERFORMANCE OF WORKING-FLUID MIXTURES IN AN ORC-CHP SYSTEM FOR WASTE-HEAT RECOVERY	2628
<i>O.A. Oyewunmi, C.J.W. Kirmse, C.N. Markides</i>	
THERMODYNAMIC ANALYSIS OF POWER GENERATION CYCLES WITH HIGH TEMPERATURE GAS COOLED NUCLEAR REACTOR HTGR AND ADDITIONAL COOLANT HEATING UP TO 1600°C	2641
<i>M. Dudek, Z. Kolenda, M. Jaszczur, W. Stanek</i>	

POWER GENERATION AND CHP WITH FOSSIL FUELS AND NUCLEAR

MULTI-OBJECTIVE SUPERSTRUCTURE-FREE SYNTHESIS AND OPTIMIZATION OF THERMAL PLANTS	2649
<i>L. Wang, M. Lampe, P. Voll, Y. Yang, A. Bardow</i>	
A PRACTICAL APPROACH TO OPTIMIZING THE OPERATION OF THREE UNITS AT POWER PLANT LJUBLJANA	2663
<i>I. Kustrin, I. Bole, A. Senegacnik</i>	
NOX REDUCTION AND EFFICIENCY IMPROVEMENT OF A 210 MW_T COAL-FIRED BOILER CO-FIRING BIOMASS	2670
<i>J. Smrekar, P. Gostinčar, A. Sarjas, M. Hocevar</i>	
MODERN DESIGN CONCEPTS FOR THERMAL POWER GENERATION TOWARDS HIGHEST EFFICIENCY, INCREASED UTILIZATION AND REDUCED CARBON FOOTPRINT	2684
<i>C. Bergins, M. Agraniotis, M.S. Brzozowska, T. Buddenberg, E. Kakaras</i>	
INCREASING THE FLEXIBILITY OF COMBINED HEAT AND POWER PLANTS WITH HEAT PUMPS AND THERMAL ENERGY STORAGE	2705
<i>E. Mollenhauer, A. Christidis, G. Tsatsaronis</i>	
SIMULATION ON THE FLUE GAS PRE-DRIED LIGNITE-FIRED POWER PLANTS FIRING HIGH MOISTURE LIGNITE	2718
<i>X. Han, S. Karellas, Q. Mu, M. Liu, J. Liu, J. Yan, D. Rakopoulos, E. Kakaras</i>	
INVESTIGATION OF AN AMMONIA-WATER COMBINED POWER AND COOLING SYSTEM DRIVEN BY JACKET WATER AND EXHAUST GAS HEAT OF INTERNAL COMBUSTION ENGINE	2730
<i>Y. Chen, W. Han, H. Jin</i>	
DYNAMIC SIMULATION OF A 550 MW_{EL} COAL FIRED POWER PLANT FOR EXTENDED SECONDARY CONTROL POWER OUTPUT	2742
<i>J. Hentschel, H. Zindler, H. Spliethoff</i>	
SCHEDULING OPTIMIZATION OF COMBINED HEAT AND POWER UNITS WITH MULTIPLE DEGREES OF FREEDOM BASED ON THE SUPERPOSITION PRINCIPLE	2760
<i>A. Bischì, S. Lico, T. Cortigiani, G. Manzolini, P. Silva, E. Martelli</i>	

PERFORMANCE ANALYSIS OF A STEAM POWER PLANT WITH DISTRICT HEATING	2776
<i>T. Koroglu, A.S. Karakurt, U. Gunes</i>	
PERFORMANCE STUDY OF A 1000MW COAL-FIRED POWER PLANT INTEGRATED WITH THE TOWER SOLAR ENERGY COLLECTOR SYSTEM.....	2788
<i>L. Duan, S. Jia, X. Yun, K. Xie</i>	
THERMODYNAMIC MODEL OF A HYBRID BRAYTON THERMOSOLAR PLANT	2801
<i>R.P. Merchan, M.J. Santos, A. Medina, A.C. Hernandez</i>	

POWER GENERATION AND CHP WITH RENEWABLES AND WASTE

EXPERIMENTAL ANALYSIS OF A FLEXIBLE BLADED HORIZONTAL AXIS WIND TURBINE	2817
<i>D. MacPhee, A. Beyene</i>	
THERMAL-ECONOMIC DESIGN OF A SOLAR DISH STIRLING COGENERATION SYSTEM USING A MULTI-OBJECTIVE APPROACH	2828
<i>A.C. Ferreira, M.L. Nunes, L.A.S.B. Martins, S.F.C.F. Teixeira, J.C.F. Teixeira, S.A. Nebra</i>	
ENERGY OPPORTUNITIES IN A TYRE PLANT	2841
<i>D. Tavares, C. Pinho</i>	
OPTIMAL ENERGY SUPPLY SYSTEM AND HOURLY OPERATION PLAN FOR THE TUM CAMPUS GARCHING USING LINEAR PROGRAMMING MODEL URBS.....	2852
<i>B. Hetterich, J. Dorfner, A. Vandersickel, H. Spliethoff</i>	

VOLUME 5

THERMOECONOMIC ANALYSIS OF A SUGARCANE COGENERATION CYCLE BY SUBCYCLE DECOMPOSITION	2867
<i>J.C. Lopez, M.A. Lozano, L.M. Serra, E.A. Pina, A. Restrepo</i>	
THEORETICAL AND EXPERIMENTAL INVESTIGATIONS ON THE INSTANTANEOUS HEAT TRANSFER IN THE CYLINDER OF AN ERICSSON ENGINE	2881
<i>O.B. Sassi, A. Fula, F. Sierra, P. Stouffs</i>	
METHODOLOGY TO EVALUATE THE VIABILITY OF WINDFARM – CASE STUDY	2893
<i>T.C. Freitas, D.C.R. Volpato</i>	
CAPABILITY OF A SMALL SIZE CSP PLANT TO PROVIDE DISPATCH POWER.....	2906
<i>L. Migliari, D. Cocco, M. Petrollese, G. Cau</i>	
TECHNO-ECONOMIC ANALYSIS OF A HYBRID CSP-CPV POWER PLANT.....	2918
<i>M. Petrollese, D. Cocco, L. Migliari, G. Cau</i>	
STEADY-STATE AND TRANSIENT MODELS OF A COOLING SYSTEM FOR IMPROVING THE PERFORMANCES OF A PV FIELD.....	2930
<i>F. Schiro, A. Stoppato, A. Benato, N. Destro</i>	
CONNECTING INDIVIDUAL RESIDENTIAL HYDROGEN CHP ENERGY SYSTEMS WITH RENEWABLES INTO DIFFERENT SIZED GRIDS	2950
<i>R. Lacko, R. Stropnik, M. Mori, B. Drobnic</i>	
PARAMETRIC ANALYSIS OF A SOLAR THERMAL POWER PLANT WITH AN ORGANIC RANKINE CYCLE (ORC) GENERATOR.....	2961
<i>J.B. Obi, R. Taccani, D. Micheli, M. Reini</i>	
SIMULATION AND COMPARATIVE THERMOECONOMIC ANALYSIS OF CENTRAL RECEIVER CONCENTRATED SOLAR PLANTS USING AIR AS HEAT TRANSFER FLUID	2975
<i>A. Catalano, M. Rocco, C. Toro, E. Colombo, E. Sciubba</i>	
ANALYSIS OF ENVIRONMENTAL IMPACT OF WIND TURBINES AT INCREASING SIZE	2990
<i>L. Lombardi, E. Carnevale, B. Mendecka, G. Santom</i>	
FEASIBILITY ANALYSIS OF AN ELECTRICITY, COOLING AND HEATING MICROGRID DEVELOPED FOR A UNIVERSITY CAMPUS IN LISBON, PORTUGAL USING COMBINED HEAT, COOLING AND POWER TEMPLATE FOR MANUSCRIPTS	3018
<i>M. Sandoval-Reyes, M.M. Eskander, J.M. Pires, B. Lacarriere, C.A. Silva</i>	
LIMITATIONS OF THERMAL POWER PLANTS TO SOLAR AND WIND DEVELOPMENT IN BRAZIL.....	3031
<i>R.F.C. Miranda, P. Ferreira, R. Schaeffer, A. Szklo</i>	
NUMERICAL ANALYSIS OF A COMPRESSION IGNITION ENGINE FOR CHP APPLICATIONS POWERED IN THE DUAL-FUEL MODE WITH SYNGAS AND BIODIESEL	3054
<i>M. Costa, M. La Villetta, N. Massarotti, D. Piazzullo, V. Rocco</i>	

NEW METHODOLOGY FOR COMPUTING PERFORMANCE OF SOLAR STIRLING ENGINES WITH COGENERATION USING FRESNEL MIRRORS, DEVELOPED IN THE FRAMEWORK OF THERMODYNAMICS WITH FINITE SPEED AND THE DIRECT METHOD	3066
<i>P. Stoian, C. Monica, P.S. Adrian, B. Bogdan, S. Camelia, P. Gheorghe, B. Nicolae, B. Eugen</i>	
AUTOMATED DISPATCH CONTROL SYSTEM OF THERMAL SOLAR POWER PLANT	3083
<i>A. Belousov, Y. Koshlich, A. Grebenik</i>	
RESEARCH OF LIGHTNING PROTECTION FEATURES FOR A WIND MILL BY THE METHOD OF TRACING THE LINES OF STREAM FUNCTION	3094
<i>A.N. Potapenko, A.I. Shifanov, T.A. Potapenko</i>	
MODELING AND PARAMETRIC ANALYSIS OF A WASTE – TO-ENERGY FACILITIES PERFORMANCE FOR ELECTRICAL ENERGY PRODUCTION	3101
<i>E. Badine, C. Maatouk</i>	
DEMAND RESPONSE POTENTIAL IN THE CHEMICAL INDUSTRY: A REVIEW	3110
<i>F. Klaucke, T. Morosuk, F. Holtrup, G. Tsatsaronis</i>	

PROCESS INTEGRATION, SIMULATION & OPTIMIZATION OF ENERGY SYSTEMS

PERFORMANCE COMPARISON OF ENERGY SUPPLY SYSTEMS UNDER UNCERTAIN ENERGY DEMANDS BASED ON A MIXED-INTEGER LINEAR MODEL	3121
<i>R. Yokoyama, R. Nakamura, T. Wakui</i>	
IDENTIFICATION OF DATA-DRIVEN GREY-BOX MODELS FOR ENERGY MANAGEMENT APPLICATIONS	3134
<i>H. Harb, N. Boyanov, T. Schutz, H. Wolisz, K. Huchtemann, D. Muller</i>	
DEVELOPMENT OF A SIMPLIFIED PROCESS INTEGRATION METHODOLOGY FOR RETROFIT IN MEDIUM-SIZE INDUSTRIES	3143
<i>R. Bergamini, T.V. Nguyen, F. Buhler, B. Elmegaard</i>	
A PRELIMINARY ANALYSIS OF FLOATING PRODUCTION STORAGE AND OFFLOADING FACILITIES WITH GAS LIQUEFACTION PROCESSES	3158
<i>T.V. Nguyen, Y.A. Carranza-Sanchez, S.D.O. Junior</i>	
"COMPOSED THERMODYNAMIC RARITY" OF THE MATERIALS IN ELECTRIC AND ELECTRONIC EQUIPMENT	3173
<i>A. Valero, A. Valero, N. von Gries</i>	
HEAT INTEGRATION OF A VINASSE CONCENTRATION SYSTEM AND JUICE EVAPORATION SYSTEM WITHIN A CONVENTIONAL SUGARCANE BASED ETHANOL PRODUCTION PROCESS	3184
<i>E.F. Cortes-Rodriguez, N.A. Fukushima, R. Palacios-Bereche, A.V. Ensinas, S.A. Nebra</i>	

REFRIGERATION & AIR CONDITIONING, HEAT PUMPS

TRANSIENT REFRIGERATION CYCLES - SIMULATION RESULTS	3201
<i>M. Loffler, A. Magdanz</i>	
EXPERIMENTAL STUDY OF A NOVEL EJECTOR-ABSORPTION REFRIGERATION CYCLE DRIVEN BY MULTI-HEAT SOURCES	3216
<i>Y. Shi, G. Chen, D. Hong, Q. Wang</i>	
INFLUENCES ON THE SEASONAL PERFORMANCE OF HEAT PUMP SYSTEMS INVESTIGATED VIA DYNAMIC SIMULATIONS	3224
<i>P. Mehrfeld, M. Nurenbeg, K. Huchtemann, D. Muller</i>	
MODE AND STORAGE LOAD BASED CONTROL OF A COMPLEX BUILDING SYSTEM WITH A GEOTHERMAL FIELD	3239
<i>J. Futterer, G. Bode, D. Muller</i>	
PERFORMANCE ANALYSIS OF MAGNETOCALORIC HEAT PUMP WITH MANGANESE-BASED COMPOUNDS AS A MAGNETIC REFRIGERANT	3251
<i>G. Sota, T. Kawanami, K. Yamashita, T. Onishi, K. Soejima, H. Wada, S. Hirano, T. Okamura, S. Bae, N. Hirano, K. Shirai, S. Hirasawa</i>	
ENHANCED THERMAL RESPONSE TEST USING FIBER OPTICS FOR A DOUBLE U-PIPE BOREHOLE HEAT EXCHANGER ANALYSED BY NUMERICAL MODELING	3261
<i>N. Aranzabal, G. Radioti, J. Martos, J. Soret, F. Nguyen, R. Charlier</i>	
COMPARING SEASONAL PERFORMANCE FACTOR OF DIFFERENT HEAT PUMP SYSTEMS FOR RESIDENTIAL HVAC IN THE DFB CLIMATE AREA OF CROATIA	3275
<i>T. Kurevija, J. Kapuralic, M. Macenic</i>	

OPTIMAL OPERATION OF VAPOR-COMPRESSION CYCLES IN OFF-DESIGN CONDITIONS	3286
<i>A. Reyes-Lua, S. Skogestad</i>	
THERMODYNAMIC PERFORMANCE EVALUATION OF R744 SUPERMARKET REFRIGERATION SYSTEMS BY EMPLOYING ADVANCED EXERGY ANALYSIS	3298
<i>P. Gullo, G. Cortella</i>	
ACCURACY IMPROVEMENT OF PERFORMANCE EVALUATION FOR VARIABLE REFRIGERANT FLOW SYSTEMS	3309
<i>E. Matsui, S. Kametani, T. Nobe</i>	
EASY ADVANCED CONTROL FOR ENERGY EFFICIENCY APPLIED TO REFRIGERATION	3318
<i>B. Ballot-Miguet, J. Blancarte, G. Duhot</i>	
OPTIMIZATION OF MULTI-LAYER ACTIVE MAGNETIC REGENERATOR TOWARDS COMPACT AND EFFICIENT REFRIGERATION	3330
<i>T. Lei, K. Engelbrecht, K.K. Nielsen, H.N. Bez, C.T. Veje, C.R.H. Bahl</i>	
IMPACT OF BOREHOLE CEMENT-BENTONITE GROUT THERMAL CONDUCTIVITIES ON A LONG-TERM GROUND-SOURCE HEAT PUMP EFFICIENCY	3342
<i>T. Kurevija, M. Macenic, S. Borovic</i>	
THREE DIMENSIONAL MOLDING OF MANGANESE RELATED MAGNETO CALORIC MATERIAL BY USE OF SELECTIVE LASER SINTERING MACHINE	3356
<i>S. Hirano, A. Toba, H. Suzuki, T. Kawanami, T. Oonishi</i>	
STUDY ON PERFORMANCES OF A NOVEL RESIDENTIAL AIR SOURCE HEAT PUMP SYSTEM FOR HEATING	3366
<i>W.L. Luo, J. Bonechi, D. Liu, R.Z. Wang</i>	
PROPENE/ISOBUTANE MIXTURES IN HEAT PUMPS: AN EXPERIMENTAL INVESTIGATION	3375
<i>V. Venzik, D. Roskosch, B. Atakan</i>	
SHORT-TIME MODELLING OF GEOTHERMAL SYSTEMS	3390
<i>L. Lamarche</i>	
MODELING OF FROST GROWTH AND EVAPORATION OF REFRIGERATION MIXTURES IN A FIN-AND-TUBE HEAT EXCHANGER	3399
<i>E. Keryakos, J. Toubassy, A. Danlos, D. Clodic, G. Descombes</i>	
INVESTIGATION ON ANNUAL ENERGY PERFORMANCE OF A VWV AIR-SOURCE HEAT PUMP SYSTEM	3410
<i>R. Wang, Z. Jin, X. Zhai, C. Jin, W. Luo, T.M. Eikevik</i>	
COMPARATIVE EXERGOCHEMICAL ANALYSIS OF VARIOUS TRANSCRITICAL R744 COMMERCIAL REFRIGERATION SYSTEMS	3421
<i>P. Gullo, G. Cortella</i>	
THERMODYNAMIC MODELLING AND EXERGIC ANALYSIS OF AMMONIA-WATER REFRIGERATION SYSTEM	3433
<i>A.G. Gallego, G. Martins</i>	
DESIGN OF SERIALY CONNECTED AMMONIA-WATER HYBRID ABSORPTION-COMPRESSION HEAT PUMPS FOR DISTRICT HEATING WITH THE UTILISATION OF A GEOTHERMAL HEAT SOURCE	3445
<i>J.K. Jensen, T. Ommen, W.B. Markussen, B. Elmegaard</i>	
ECOS 2016: OPERATION STRATEGY FOR HEAT RECOVERY OF TRANSCRITICAL CO₂ REFRIGERATION SYSTEMS WITH HEAT STORAGES	3464
<i>M. Noding, N. Fidorra, M. Graber, J. Kohler</i>	
PROPOSAL AND ASSESSMENT OF A TWO-STAGE LIQUID DESICCANT DEHUMIDIFICATION SYSTEM DRIVEN BY LOW-TEMPERATURE HEAT AND POWER	3480
<i>W. Han, B. Su</i>	
EFFICIENT WASTE HEAT RECOVERY IN A CRYOGENIC DISTILLATION AIR SEPARATION PLANT USING HEAT PUMPS	3494
<i>N. Demesa, J.C. Bruno, A. Coronas, A. Huicochea</i>	
THERMO-ECONOMIC ASSESSMENT BASED ON FIELD TEST RESULTS FOR THE AIR-TO-WATER HEAT PUMP	3503
<i>P. Poredos, T. Duh, A. Kitanovski, A. Poredos</i>	
 <u>SYSTEM OPERATION, CONTROL, DIAGNOSTICS & PROGNOSIS</u>	
ANALYSIS OF DIFFERENT FOULING PREDICTIVE MODELS IN A HEAT EXCHANGER FROM EXPERIMENTAL DATA	3518
<i>C. Weber, B. Tremeac, C. Marvillet, C. Castelain</i>	

METHODOLOGY FOR STREAMS DEFINITION AND GRAPHICAL REPRESENTATION IN TOTAL SITE ANALYSIS	3531
<i>E. Mechaussie, S. Bungener, F. Marechal, G. Van Eetvelde</i>	
THE EFFECT OF AIR DIRECT INJECTION ON GASOLINE COMBUSTION IN A SMALL DISPLACEMENT PORT FUEL INJECTION ENGINE	3546
<i>F. Catapano, S. Di Iorio, P. Sementa, B.M. Vaglieco</i>	
NUMERICAL AND EXPERIMENTAL INVESTIGATION OF SIMULTANEOUS HEAT AND MASS TRANSFER WITHIN BIO-BASED MATERIAL	3558
<i>M. Asli, F. Brachelet, R. Derbal, A. Chauchois, E. Antezak, D. Defer</i>	
Author Index	