

## Content

### VOLUME I

#### Plenary Lecture

- THE ROLE OF PROCESS INTENSIFICATION IN CUTTING GREENHOUSE GAS EMISSIONS** 1  
D. Reay

#### Energy saving technology

- LOW TEMPERATURE SEPARATION SYSTEMS** 13  
R. Smith and S. Farrokhpahan

- THE SEQUENTIAL FRAMEWORK FOR HEAT EXCHANGER NETWORK SYNTHESIS - NETWORK GENERATION AND OPTIMIZATION** 19  
R. Anantharaman and T. Gundersen

- ELUTRIATION OF CARBON BLACK POWDER FROM A POWDER-PARTICLE FLUIDIZED BED FOR THE PROCESS GAS HEAT RECOVERY** 25  
T. Nakazato and K. Hirata

- THREE-DIMENSIONAL FLOW EFFECTS ON CONVECTIVE HEAT TRANSFER FROM A COLD OR A HOT WINDOW COVERED BY A SIMPLE PLANE BLIND TO A ROOM** 31  
P. Oosthuizen

- A STEPWISE FRAMEWORK FOR FLOWSHEET INTEGRATION IN EXTRACTIVE DISTILLATION** 37  
X. Jia, S. Xiang, H. Yu and F. Han

- SECONDARY FLOW EFFECTS IN A TRAPIZOIDAL ISOTHERMAL MINICHANNEL FLOW SYSTEM INVOLVING A SHARP-EDGED 180° BEND** 43  
P. Oosthuizen

- RETROFIT OF GAS SEPARATION PLANT BY PINCH TECHNOLOGY** 49  
D. Napredakul, K. Siemanond, T. Sornchamni and S. Laorrattanasak

- MULTIDIMENSIONAL, NON-ISOTHERMAL, DYNAMIC MODELLING OF PLANAR SOLID OXIDE FUEL CELLS** 55  
K. Tseronis, I. Kookos and C. Theodoropoulos

#### Reactive and hybrid separations

- CFD-BASED MODELLING OF THE RESIDENCE TIME DISTRIBUTION IN STRUCTURED FIXED BEDS** 61  
T. Atmakidis, E. Kenig, A. Viva and E. Brunazzi

- ON ENERGY EFFICIENCY OF HYBRID SEPARATION PROCESSES** 67  
M. Sorin, E. Ayotte-Sauve, Y. Azoumah and F. Rheault

<b>REACTIVE ABSORPTION OF CO<sub>2</sub> INTO AQUEOUS SOLUTIONS OF N,N-DIETHYLETHANOLAMINE</b>	73
P. Vaidya and E. Kenig	
<b>MODELING AND SIMULATION THE PROCESS IN A REACTIVE DIVIDING WALL COLUMN FOR GASOLINE ADDITIVE TAME SYNTHESIS IN THE OIL REFINERY</b>	79
G. Bumbac, V. Plesu, C. Ciornei and A.E. Plesu	
<b>OPTIMAL STRUCTURE OF REACTIVE AND NON-REACTIVE STAGES IN REACTIVE DISTILLATION PROCESSES</b>	85
A.O. Domancich, N.B. Brignole and P.M. Hoch	

#### **Combined heat & power**

<b>CURRENT TRENDS IN EMISSIONS TARGETING AND PLANNING</b>	91
D. Crilly and T. Zhelev	
<b>OPERATION OF UTILITY SYSTEMS: OPTIMISATION-BASED DECISION-MAKING</b>	99
P. Velasco-Garcia, P. Varbanov, H. Arellano-Garcia and G. Wozny	
<b>SIMULATION OF PHASE DISTRIBUTIONS DURING FREEZE-DRYING THROUGH PORE-SCALE NETWORK MODELING</b>	105
Y. Liu, H. Sun and Y. Zhao	
<b>INFLUENCE OF GEOMETRIC PARAMETERS OF AN ANNULAR FIN OF DIFFERENT CROSS-SECTIONS ON ITS EFFICIENCY</b>	111
N. Labsi and Y.K. Benkahla	
<b>IMPLEMENTATION OF COGENERATION SYSTEMS IN GREECE</b>	117
P. Pilavachi, C. Roumpeas and S. Minett	
<b>SOX EMISSION &amp; POLLUTION CONTROL AT MELLITAH GAS PLANT</b>	127
M. Hasan, A. Gembri, A. Shibani and M. Abukshim	

#### **CO<sub>2</sub> Kyoto Protocol, sequestration, minimisation**

<b>SELECTION OF FUEL CELL COMBINED CYCLES FOR COST-EFFECTIVE REDUCTION OF CARBON EMISSIONS: P-GRAPH</b>	133
F. Friedler, P. Varbanov and J. Klemes	
<b>TARGETING FOR MINIMUM LOW AND ZERO-CARBON ENERGY RESOURCES IN CARBON-CONSTRAINED ENERGY SECTOR PLANNING USING CASCADE ANALYSIS</b>	139
D.C.Y. Foo and R.R. Tan	
<b>REDUCTION OF GREENHOUSE GASES IN INTEGRATED PULP AND PAPER MILLS - POSSIBILITIES FOR CO<sub>2</sub> CAPTURE AND STORAGE</b>	145
E. Hektor and T. Berntsson	

<b>REFORMING NATURAL GAS FOR CO<sub>2</sub> PRE-COMBUSTION CAPTURE IN COMBINED CYCLE POWER PLANT</b>	151
J.M. Amann, M. Kanniche and C. Bouallou	
<b>MINIMIZATION OF LIFE CYCLE CO<sub>2</sub> EMISSIONS IN THE UTILITY SECTOR OF A PETROCHEMICAL PLANT</b>	157
P. Martinez and A.M. Eliceche	
<b>CARBON DIOXIDE ABSORPTION IN NON NEWTONIAN FLUIDS USING A BUBBLE CONTACTOR</b>	163
D. Gomez-Diaz, J.M. Navaza, L. C. Quintans-Riveiro and B. Sanjurjo	
<b>IN-VEHICLE / OUT-VEHICLE AIR QUALITY AND COMMUTER'S EXPOSURE TO POLLUTANTS</b>	169
A. Chan	
<b>CARBON DIOXIDE ABSORPTION INTO NEW FORMULATED AMINE SOLUTION. (I) SOLUTION VISCOSITY MEASURING AND CORRELATION</b>	175
R.E. Tataru-Farmus, I. Siminiceanu and C. Bouallou	

### Heat exchangers and integrated separation processes

<b>ALTERNATIVE DESIGN APPROACH FOR SPIRAL PLATE HEAT EXCHANGERS</b>	183
M. Picon-Nunez, L. Canizalez-Davalos and A. Morales-Fuentes	
<b>A PHENOMENOLOGICAL MODEL FOR FLUID-DYNAMICS EVALUATION OF STRUCTURED PACKING SYSTEMS</b>	189
G. Bozzano, M. Dente and P. Corna	
<b>OPTIMIZATION OF HEAT EXCHANGER NETWORK WITH FIXED TOPOLOGY BY GENETIC ALGORITHMS</b>	195
R. Bochenek, J. Jezowski and S. Bartman	
<b>IMPROVING CONVENTIONAL DISTILLATION CONFIGURATION FOR TERNARY MIXTURES SEPARATION</b>	201
M. Emtir and A. Etomi	
<b>ACCOUNTING FOR FOULING IN PLATE HEAT EXCHANGER DESIGN</b>	207
A. Gogenko, O. Anipko, O. Arsenyeva and P. Kapustenko	
<b>PLATE HEAT EXCHANGERS FOR ENVIRONMENTALLY FRIENDLY HEAT PUMPS</b>	213
L. Tovazhnyanskyy, V. Sherstyuk, P. Kapustenko, G. Khavin, O. Perevertaylenko, S. Boldyryev and A. Garev	
<b>GRAPHITE PLATE HEAT EXCHANGERS AS ENERGY SAVING TOOL FOR CORROSIVE MEDIA DUTIES</b>	219
P. Kapustenko, O. Perevertaylenko, G. Khavin and O. Arsenyeva	
<b>THE INVESTIGATION OF VAPOR CONDENSATION IN HORIZONTALLY ORIENTED CHANNELS WITH CROSS CORRUGATED WALLS</b>	225
O. Perevertaylenko, E. Nagorniy, L. Tovazhnyanskyy and P. Kapustenko	

## Sustainable processing and production

- NEW PROPOSAL FOR INTEGRATED PRODUCTION OF SUGAR AND BIOFUELS FROM SUGAR BEET** 231  
G. Vaccari, G. Marchetti, G. Lenzini and E. Tamburini
- MODELING OF THE REACTOR-CRYSTALLIZER UNIT OF A PHOSPHORIC ACID PRODUCTION PLANT** 237  
K. Theodosiadis, A. Papadopoulos and P. Seferlis
- DYNAMIC MODELING OF HYDROGEN GENERATION VIA HYDROLYSIS OF SODIUM BOROXYDRIDE** 243  
A. Goncalves, P. Castro, A. Novais, V. Fernandes, C. Rangel and H. Matos
- ORGANOSOLV PULPING PROCESSES SIMULATIONS** 249  
M. Gonzalez, A. Tejado, C. Pena, R. Llano-Ponte and J. Labidi
- ENERGY SAVINGS COMBINED WITH LIGNIN EXTRACTION FOR PRODUCTION INCREASE: CASE STUDY AT A EUCALYPTUS MILL IN PORTUGAL** 255  
C. Laaksometsa, E. Axelsson, T. Berntsson and A. Lundstrom
- ENVIRONMENTAL REFERENCES IN THE LIFE CYCLE ASSESSMENT OF CHEMICAL PROCESSES: APPLICATION TO THE ALUMINIUM TRIFLUORIDE MANUFACTURE** 261  
A. Dominguez, R. Aldaco, M. Margallo and A. Irabien
- DESIGN OF HYBRID HEAT PUMP DRYER - DEHUMIDIFIER FOR DRYING OF AGRICULTURAL PRODUCTS** 263  
C.L. Law, W.R.W. Daud and L.C. Abdullah

## Process integration for sustainable development

- EVALUATION OF NATURAL GAS COMBINED CYCLE PLANTS IN CHINA THROUGH ENVIRONMENTAL MODELING AND MULTI-OBJECTIVE OPTIMIZATION** 269  
H. Li, F. Marechal and D. Favrat
- DESIGN CONSIDERATIONS IN STEAM SYSTEM DEBOTTLENECKING USING PROCESS INTEGRATION** 275  
S. Coetzee and T. Majazi
- THE DEVELOPMENT OF ENERGY SHARING IN INDUSTRIAL AREAS OF JAPAN WITH PINCH TECHNOLOGY** 281  
K. Matsuda
- INTERVAL BASED MINLP SUPERSTRUCTURE SYNTHESIS OF HEAT EXCHANGE NETWORKS** 285  
A. Isafiade and D. Fraser

<b>ASSESSMENT OF PRE-COMBUSTION DECARBONISATION SCHEMES FOR POLYGENERATION FROM FOSSIL FUELS</b>	291
J. Hetland	
<b>OPTIMIZATION OF CONVENTIONAL AND ENERGY-INTEGRATED DISTILLATION CONFIGURATIONS AT DIFFERENT FEED CONDITIONS</b>	297
M. Khalifa and M. Emtir	
<b>NEW ALGORITHMS FOR HEAT EXCHANGER NETWORK OPTIMIZATION</b>	303
M.H. Panjeshahi, H. Rezaii-Dizajikan and A. Alimondegari	
<b>MODELLING OF SMALL-SCALE BIOETHANOL PLANTS WITH RENEWABLE ENERGY SUPPLY</b>	309
B. Liebmann, M. Pfeffer, W. Wukovits, A. Bauer, T. Amon, G. Gwehenberger, M. Narodoslawsky and A. Friedl	
<b>IDENTIFICATION OF A SUITABLE PROCESS SCHEME FOR THE NON-THERMAL PRODUCTION OF BIOHYDROGEN</b>	315
W. Wukovits, A. Friedl, M. Markowski, K. Urbaniec, M. Ljunggren, M. Schumacher, G. Zacchi and M. Modigell	
<b>A SIMULTANEOUS APPROACH FOR DESIGNING OPTIMAL WASTEWATER TREATMENT NETWORK</b>	321
G. Poplewski and J. Jezowski	
<b>OPTIMAL DESIGN OF WASTEWATER TREATMENT NETWORK FOR GLASS CONTAINER PLANT</b>	327
O. Kvitka, I. Dzhygyrey and J. Jezowski	
<b>HEAT EXCHANGER NETWORK SYNTHESIS-A BILEVEL DECOMPOSITION METHOD BASED ON STREAM DATA GROUPING</b>	333
T. Laukkanen and C.J. Fogelholm	
<b>MICROWAVE AND CATALYSIS AS PROCESS INTEGRATION FOR DIESEL SOOT ABATEMENT</b>	339
V. Palma, P. Russo, G. Matarazzo and P. Ciambelli	
<b>APPROXIMATE GRAPHICAL TARGETING FOR WATER NETWORK WITH TWO CONTAMINANTS</b>	347
Y.L. Tan, D.C.Y. Foo, R.R. Tan and D.K.S. Ng	

#### **Dynamic, flexible and sustainable plant operation**

<b>PRODUCTION PLANNING BY PINCH ANALYSIS IN DYNAMIC AND SEASONAL MARKETS</b>	353
J. Ludwig, J. Geldermann and O. Rentz	
<b>KINETIC STUDIES OF THE POLYSTYRENE PYROLYSIS REACTIONAL PATHWAYS</b>	359
P. Costa, F. Pinto, A.M. Ramos, I. Gulyurtlu, I. Cabrita and M. Bernardo	

<b>INTEGRATED MODELLING OF FLUID CATALYTIC CRACKING UNITS</b>	365
J. Gomez Prado, N. Zhang and C. Theodoropoulos	
<b>ROBUST DECENTRALIZED CONTROL FOR FLEXIBLE PLANT OPERATION: CONCEPTUAL DESIGN AND OPTIMAL TUNING</b>	371
L.T. Antelo, O. Exler, J.R. Banga and A. Alonso	
<b>CHANCE CONSTRAINED PROCESS OPTIMIZATION AND CONTROL UNDER UNCERTAINTY</b>	377
H. Arellano-Garcia and G. Wozny	
<b>OPERATION PLANNING UNDER PRODUCT DEMAND UNCERTAINTY IN COMPLEX CHEMICAL PLANTS</b>	383
E. Schulz and S. Diaz	
<b>MODEL BASED PROJECTIVE MONITORING OF PROCESS UNIT PERFORMANCES UNDER UNCERTAINTIES</b>	389
F. Manenti	

## VOLUME II

### Batch processes

<b>SIMULTANEOUS SYNTHESIS OF PROPERTY-BASED WATER REUSE/RECYCLE AND INTERCEPTIONS NETWORKS FOR BATCH PROCESSES</b>	395
D.K.S. Ng, A. Rabie, M. El-Halwagi and D.C.Y. Foo	
<b>THROUGHPUT MAXIMIZATION IN MULTIPURPOSE BATCH PLANTS: S-GRAPH VS TIME POINT BASED METHODS</b>	401
T. Holczinger, T. Majozi, M. Hegyhati and F. Friedler	
<b>SYNTHESIS OF WATER-USING NETWORK WITH CENTRAL REUSABLE STORAGE IN BATCH PROCESSES</b>	409
C.L. Chen, J.W. Tang, Y.J. Ciou and C.Y. Chang	
<b>OPTIMAL BATCHING AND SCHEDULING OF SINGLE STAGE BATCH PLANTS WITH SEQUENCE DEPENDENT CHANGEOVERS</b>	415
P. Castro, M. Erdirik and I. Grossmann	
<b>TOWARDS THE DESIGN OF A ZERO EFFLUENT FACILITY IN THE PHARMACEUTICAL INDUSTRY</b>	421
J. Gouws and T. Majozi	
<b>THERMAL FLUX USE FOR OPTIMAL CONTROL OF A SEMI-CONTINUOUS BATCH REACTIVE RECTIFIER</b>	427
C. Ciornei and V. Lavric	

## **Integration of renewables, biomass and energy conversion technologies**

- SIMULATION OF A STAND-ALONE POWER SYSTEM USING RENEWABLE ENERGY SOURCES AND HYDROGEN STORAGE** 433  
D. Ipsakis, C. Elmasidis, F. Stergiopoulos, S. Vouretakis and P. Seferlis
- ADDRESSING UNCERTAINTIES IN THE DESIGN AND OPERATION OF RESIDENTIAL DISTRIBUTED ENERGY RESOURCES: CASE STUDY OF A MICRO-CHP SYSTEM** 439  
M. Houwing, A. Ajah, P. Herder and I. Bouwmans
- TECHNO-ECONOMIC ASPECTS OF A WOOD-TO-ETHANOL PROCESS:ENERGY DEMAND AND POSSIBILITIES FOR INTEGRATION** 447  
P. Sassner, M. Galbe and G. Zacchi
- EFFECT OF EXPERIMENTAL CONDITIONS ON PYROLYSIS OF PLASTICS MIXED WITH FORESTRY BIOMASS** 453  
F. Paradela, F. Pinto, I. Gulyurtlu, I. Cabrita, N. Lapa and J. F. Santos Oliveira
- CONCEPTUAL DESIGN OF A HYTHANE-BASED INFRASTRUCTURE SYSTEM FOR COMBINED POWER AND DISTRICT HEAT PRODUCTION** 459  
A. Ajah, A. Mesbah, J. Grievink , A.C. Patil, P. Herder and R.M. Stikkelman
- NOVEL TYPE OF TECHNOLOGY FOR BIOMASS UTILIZATION** 465  
L. Urban, V. Masa, M. Pavlas and P. Stehlik

## **Industrial application & optimal design**

- A NOVEL APPROACH TO AUTOMATED MECHANISM RECOGNITION BASED ON MODEL DISCRIMINATION** 471  
J. Schoeneberger, H. Arellano-Garcia and G. Wozny
- MODELING, DESIGN AND OPTIMIZATION OF INDUSTRIAL PHOSPHORIC ACID PRODUCTION PROCESSES** 477  
A. Papadopoulos, K. Theodosiadis and P. Seferlis
- HYDROGEN PURIFICATION BY PRESSURE SWING ADSORPTION** 483  
D. Nikolic, A. Giovanoglou, M. Georgiadis and E. Kikkinides
- MINIMISATION OF FRESHWATER CONSUMPTION IN BREWERY** 489  
H. Tokos and P. Glavic
- ADAPTATION OF PROCESS INTEGRATION MODELS FOR MINIMISATION OF ENERGY USE, CO<sub>2</sub>-EMISSIONS AND RAW MATERIAL COSTS FOR INTEGRATED STEELMAKING** 495  
C. Ryman and M. Larsson
- DYNAMIC MODELLING OF SITE UTILITY SYSTEMS** 501  
W. Kwapinski, D. Zheng, J.K. Kim, J. Klemes and R. Smith

## Industrial & experimental studies

- FOULING INVESTIGATION OF BRAZED PLATE HEAT EXCHANGERS** 507  
D. Kukulka, E. Czechowski, R. Kolodziej and P. Kukulka
- CONTRIBUTION TO THE QUANTITATIVE RISK ASSESSMENT OF CHEMICAL PROCESSES** 513  
V. Václavek, A. Novotna and M. Hartmanová
- PROCESS INTENSIVATION WITH INTEGRATED SEPARATION PRINCIPLES** 519  
H.J. Bart, P. Dimitrova, A. Kostova and M. Schmidt
- WASTE STREAMS IDENTIFICATION FOR WATER NETWORK** 525  
D.K.S. Ng, D.C.Y. Foo and R.R. Tan
- GAS ABSORPTION ENHANCEMENT BY A SURFACE ACTIVE SUBSTANCE** 531  
D. Gomez-Diaz, J.M. Navaza and B. Sanjurjo
- EVALUATION OF SURFACE ROUGHNESS ON THE FOULING OF SURFACES** 537  
P. Kukulka, D. Kukulka and M. Devgun
- SPATIAL MOMENT ANALYSIS: AN APPLICATION TO QUANTITATIVE IMAGING OF SOLUTE DISTRIBUTIONS IN POROUS MEDIA** 543  
O. Paladino, M. Massabo, F. Catania and G. Bracco
- UP TO DATE EXPERIMENTAL FACILITY FOR TESTING LOW-NOX BURNERS** 549  
V. Kermes, P. Skryja and P. Stehlik

## e-learning and e-teaching

- THE USE OF E-ASSESSMENT IN CHEMICAL ENGINEERING EDUCATION** 555  
S. Perry, I. Bulatov and E. Roberts
- E-LEARNING SUPPORT FOR BOLOGNA BASED CURRICULA FOR CHEMICAL ENGINEERING EDUCATION** 561  
A.M. Josceanu, R. Isopescu, P. Postelnicescu, R. Onofrei and V. Plesu
- AN ON-LINE PRE-INDUCTION PACK FOR ENGINEERS (PIPE) IN CHEMICAL ENGINEERING** 567  
E. Ventura-Medina, M. Bannerman, D. Rossiter and S. Perry
- EXPERIENCE WITH APPLICATION OF PROFESSIONAL SOFTWARE FOR TEACHING PROCESS DESIGN** 573  
V. Václavek, A. Novotna and K. Sobeslavová
- SELF LEARNING AND "TRANSDISCIPLINARITY" IN INDUSTRIAL PROCESSES STUDIES OR INDUSTRIAL SURVEILLANCE AT EMAC.TO LEARN COMPLEXITY, TO UNDERSTAND AND ACT IN COMPLEX SYSTEMS** 579  
C. Sablayrolles, M. Falempe and P. Arlabosse



## Energy Efficiency in Buildings and PEPNet (WS)

<b>MICRO-CHP: OVERVIEW OF SELECTED TECHNOLOGIES, PRODUCTS AND FIELD TEST RESULTS</b>	587
V. Kuhn, J. Klemes and I. Bulatov	
<b>INTEGRATING RENEWABLE ENERGY SOURCES INTO ENERGY SYSTEMS FOR THE REDUCTION OF CARBON FOOTPRINTS OF BUILDINGS AND BUILDING COMPLEXES</b>	593
S. Perry, J. Klemes and I. Bulatov	
<b>IEA HPP ANNEX 28 - STANDARD TESTING AND PERFORMANCE CALCULATION FOR INTEGRATED HEAT PUMP SYSTEMS</b>	599
C. Wemhoener and T.H. Afjei	
<b>INHOUSE4000 - EXPERIENCE WITH A PEM FUEL CELL SYSTEM FOR STATIONARY APPLICATIONS IN BUILDINGS</b>	605
K. Grosser, J. Arnold, H. Krause, F. Beckmann, C. Hildebrandt and J Nitzsche	
<b>MULTI-PERIOD OPTIMISATION OF DUAL-MODE HEAT PUMP SYSTEMS</b>	611
W. Zhang, J.K. Kim and J. Klemes	
<b>CUSTOMIZED ABSORPTION HEAT PUMPS FOR UTILIZATION OF LOW-GRADE HEAT SOURCES</b>	617
C. Keil, S. Plura, M. Radspieler and C. Schweigler	
<b>EFFICIENT HEATING VENTILATION AND AIR CONDITIONING IN BUILDINGS</b>	623
W. Grattieri, G.L. Lapini and R. Vanzan	
<b>SMALL-SCALE POLYGENERATION MARKET UPTAKE: THE SLOVENIAN CASE</b>	629
E. Kranjcevic and S. Merse	

## Waste minimisation, processing and management

<b>WASTE AND BIOMASS UTILISATION FOCUSED ON ENVIRONMENT PROTECTION AND ENERGY GENERATION</b>	635
P. Stehlik	
<b>GASIFICATION OF A PLASTIC WASTE IN A PILOT FLUIDIZED BED REACTOR</b>	641
U. Arena, L. Zaccariello and M.L. Mastellone	
<b>CONCEPTUAL APPLICATION OF BIOLOGICAL REMOVAL OF TOXIC METALS: IN SITU CR(VI) REDUCTION</b>	647
K. Meli, E. Bamuza-Pemu, P. Molokwane and E.M.N. Chirwa	

<b>INVESTIGATING PERFORMANCE &amp; RELIABILITY OF STOCHASTIC METHODS FOR OPTIMIZATION OF LOW TEMPERATURE GAS SEPARATION PROCESSES</b>	653
N. Tahouni, R. Smith and M.H. Panjeshahi	
<b>WATER AND WASTEWATER NETWORK RETROFIT THROUGH REGENERATION BY CRITICAL COMPONENT ANALYSIS</b>	659
V. Lavric, P. Iancu and A.E. Plesu	
<b>THE USE OF RAINWATER AS PROCESS WATER IN A FACTORY : SOFTWARE AIDED EVALUATION METHODOLOGY AND CASE STUDIES</b>	665
W. Schiettecatte, J. Helsen and E. Brauns	
<b>BIOREMEDIATION OF ORGANIC POLLUTANTS IN A RADIOACTIVE WASTEWATER: EVALUATION OF FEASIBILITY OF TREATMENT</b>	673
B.O. Oboirien and E.M.N. Chirwa	
<b>A NEW HEURISTIC PROCEDURE FOR THE OPTIMAL DESIGN OF WASTEWATER TREATMENT SYSTEMS</b>	679
J. Teles, P. Castro and A. Novais	
<b>TECHNO-ECONOMIC ASSESSMENT OF REGIONAL BIOMASS USE</b>	685
J. Geldermann	
<b>NEWLY DEVELOPED FACILITIES FOR OFF-GAS CLEANING</b>	691
L. Bebar, D. Jecha, M. Dudekova, R. Dvorak and P. Stehlik	
<b>REDUCTION OF PERSISTENT POLLUTANTS EMISSIONS</b>	697
L. Bebar, T. Parizek and P. Stehlik	

**Early Market Introduction of New Energy Technologies  
in liaison with science and industry (WS)**

<b>PROMOTION AND ASSESSMENT OF EARLY STAGE TECHNOLOGIES BY THE EMINENT INITIATIVE SUPERCRITICAL WATER GASIFICATION TECHNOLOGY AS AN EXAMPLE</b>	703
J. Zeevalkink, J. Koppejan and W. Hesseling	
<b>THE POTENTIAL OF THE EMINENT TOOL IN THE SCREENING AND EVALUATION OF EMERGING TECHNOLOGIES FOR CO2 REDUCTION RELATED TO BUILDINGS</b>	709
S. Perry, I. Bulatov and J. Klemes	
<b>ENERGY PRODUCTION FROM HYDROGEN CO-GENERATED IN CHLOR-ALKALI PLANTS BY THE MEANS OF PEM FUEL CELLS SYSTEMS</b>	715
R.L. Santorelli, A. Schervan and A. Delfrate	
<b>INNOVATIVE SLAGGING GASIFICATION USING THE BRITISH GAS LURGI (BGL) GASIFIER - A CO-GASIFICATION CASE STUDY FOR WESTERN MACEDONIA</b>	721
E. Karlopoulos, N. Koukouzas and A. Katsiadakis	

**OPPORTUNITIES FOR PROCESS INTEGRATED EVAPORATION IN A 727  
EUCALYPTUS PULP MILL AND COMPARISON WITH A SOFTWOOD MILL  
STUDY**

E. Axelsson, C. Laaksometsa, M. Olsson and T. Berntsson

**ASSESSMENT OF A FULLY INTEGRATED SARGAS PROCESS OPERATING 733  
ON COAL WITH NEAR ZERO EMISSIONS**

J. Hetland and T. Christensen

**CRITICAL ANALYSIS OF FUEL CELL COMBINED CYCLES FOR 739  
DEVELOPMENT OF LOW-CARBON ENERGYTECHNOLOGIES**

P. Varbanov, J. Klemes and F. Friedler