Conference Abstract

2016 The 3rd International Conference on Energy and Environment Research (ICEER 2016)

September 7-9, 2016

UPC, Barcelona, Spain

UPC (Universitat Politècnica de Catalunya)
Address: Jordi Girona 1-3 (Aula Master), Barcelona, Spain
http://www.upc.edu/

Assisted by

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Welcome Address

We are pleased to welcome you to the 2016 Barcelona, Spain conference, which will takes place at UPC (Universitat Politècnica de Catalunya) from September 7-9, 2016.

After several rounds review procedure, the program committee accepted those papers to be published in Journals and conference proceedings. We wish to express our sincere appreciation to all the individulas who have contribute to ICEER 2016 conference in various ways. Special thanks are extended to our colleagues in program committees for their thorough review of all submissions, which is vital to the success of the conference, and also to the members in the organizing committees and the volunteers who had delicated their time and efforts in planning, promoting, organizing and helping the conference. Last but not least, our special thanks goes to invited keynote speakers as well as all authors for contributing their latest researches to the conference.

This conference program is highlighted by five keynotes speakers: Prof. Marc Alier, Politecnical University of Catalonia (UPC), Spain; Prof. Carlos Felgueiras, CIETI/ISEP, Portugal; Prof. Nidia Caetano, Polytechcnic of Porto, Portugal; Prof. Helder Santos, Polytechnic Institute of Leiria, Portugal; Assoc. Prof. J. Arbuckle, Department of Sociology, Iowa State University, United States.

One best presentation will be selected from each session, evaluated from: Originality; Applicability; Technical Merit; PPT; English. The best one will be announced at the end of each session, and awarded the certificate over the Dinner. Session group photo will be taken after each session. Please feel free to join us for this memorable experience.

Barcelona is the most culturally rooted of all the cities in Mediterranean Europe. The city is blessed with a number of interesting places that are culturally endowed and they can be explored at length on foot. From the architecture and shopping, to fantastic food and striking religious sights Barcelona city breaks offer something for everyone. We hope your stay in Barcelona will been riching and pleasant!

We wish you a successful conference and enjoyable visit in Barcelona.

Prof. Carlos Felgueiras
ICEER Organizing Committees
Barcelona, Spain

Organizing Committees

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Carlos Felgueiras, CIETI/ISEP, Portugal

Local Chair

Jordi Segalas, Institute of Sustainability, Universitat Politècnica de Catalunia, BarcelonaTECH, Spain (UPC)

Program Chair

Nidia Caetano, Polytechcnic of Porto, Portugal

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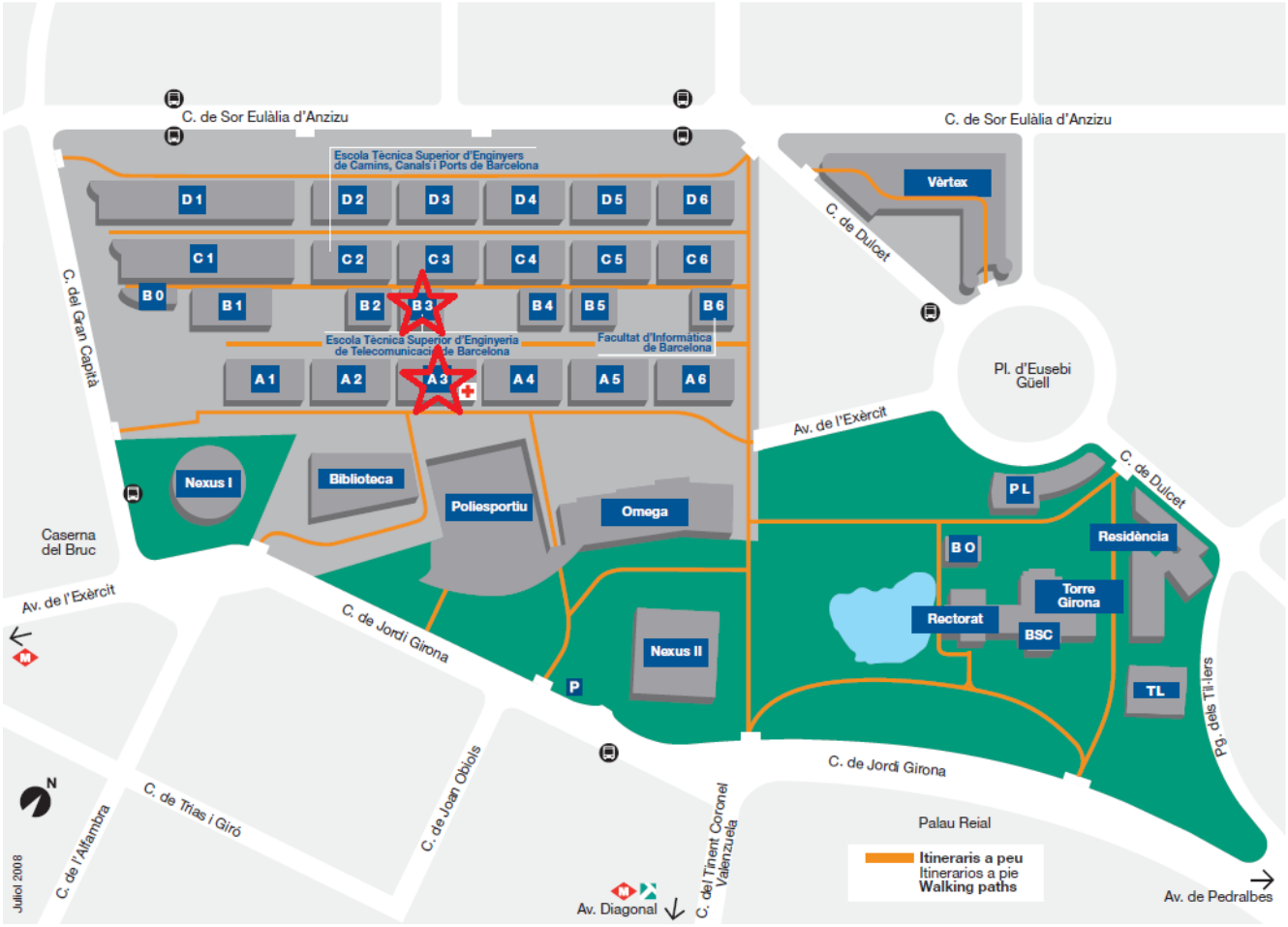
Romeu Hausmann, Regional University of Blumenau (FURB), Brazil
Beleza de Carvalho, Polytechcnic of Porto, Portugal
Carlos Silva Santos, Polytechcnic of Porto, Portugal

Local Information

Conference Venue

UPC (Universitat Politècnica de Catalunya), Campus Nord

Address: Jordi Girona 1-3 (Aula Master), Barcelona, Spain



Aula Màster is in the Building A3

Sala àgora is in the Building B3

Time

UTC/GMT+1

Banks and Foreign Exchange

The Currency is EURO here, you can exchange foreign currency 24hours at the airport, or exchange at the bank, Money exchanger.

Tourist information & Security tips

1 Be inspired by the stunning Sagrada Familia Basilica.
2 Take a behind the scenes tour of FC Barcelona's Camp Nou Stadium.
3 Experience traditional Catalan dancing (Sardana Dancing) near Barcelona Cathedral square.
4 Enjoy a bird's eye view of Barcelona at Tibidabo mountain.
5 Relax at one of Barcelona's beach bars.
6 Enjoy a coffee in the historic Gothic Quarter.

Attention Please:
Please take care of your belongings in the public places, buses, metro. Don't stay too late in the city, don't be alone in the remote area. Be aware of the strangers who offer you service, signature of charity, etc., at many scenic spots.
You can search more Tourist Information and Security tips online.

Weather

The Weather Situation of Barcelona in September

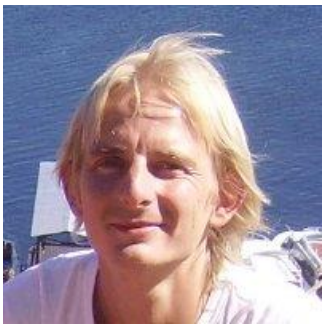
Average daily minimum temperature	Average daily highest temperature
17℃	26℃
The average precipitation	**Average precipitation days**
85 mm	6 days

Emergency
Emergency phone: 112
State patrol phone: 091

Power
 220V

Visit to Universitat Politècnica de Catalunya

Timetable:
9:30am-10:00am A visit to the university- - - More is coming
10:30am-11:30am A report given by Dr. Didac Ferrer Balas



Dr. Didac Ferrer Balas
Head of Sustainability & Equal Opportunities Office at Universitat Politècnica de Catalunya

Title: From Theory to Practice: Experiences of Sustainable Management at UPC

Dr. Didac Ferrer-Balas (Barcelona, 1974) graduated as an industrial & materials engineer since 1997. He obtained a doctorate in materials science in 2001 from the Technical University of Catalonia (UPC-Barcelona Tech). In year 2000, he was appointed as the Coordinator of the Environment Plan of UPC. From 2005 to 2009, he was the director of CITIES (Interdisciplinary Center of Technology, Innovation and Education for Sustainability), and from 2009-2010 the technical director of the Institute of Sustainability (IS.UPC), with a wide number of projects in curriculum development, sustainable education, sustainable management, interdisciplinary research and communication. He is currently the head of the Sustainable Management Office at UPC, as well as coordinator of the Nexus24 Program to promote collaborative work at UPC.

He has been member of the editorial boards of Journal of Cleaner Production and of the journal Sustainability Science, with a particular focus in the field of Sustainability in Higher Education. He has been in the scientific committees and chairs of various international conferences (EESD, AGS, EMSU). He has taught in the Masters of Sustainability at UPC, in the fields of sustainable organizations, industrial ecology and sustainable technology.

He is also co-founder (and innovation director) of Tarpuna, a non-profit cooperative that creates social inclusion through sustainability projects. He develops projects in social fabrication, social farming, energy poverty, collaborative consumption, among other emerging fields. He's been advising the Ajuntament de Barcelona for the Ateneus de fabricació network

Specialties & interests:
Sustainability in higher Education
Social Innovation and entrepreneurship
Collaborative organizations
Public innovation
Creative and resilient communities

Instructions for Oral & Poster Presentations

Oral Presentations

- **Timing:** a maximum of 15 minutes total, including speaking time and discussion. Please make sure your presentation is well timed. Please keep in mind that the program is full and that the speaker after you would like their allocated time available to them.
- You can use CD or USB flash drive (memory stick), make sure you scanned viruses in your own computer. Each speaker is required to meet her / his session chair in the corresponding session rooms 10 minutes before the session starts and copy the slide file (PPT or PDF) to the computer.
- **It is suggested that you email a copy of your presentation to your personal in box as a backup.** If for some reason the files can't be accessed from your flash drive, you will be able to download them to the computer from your email.
- Please note that each session room will be equipped with a LCD projector, screen, point device, microphone, and a laptop with general presentation software such as Microsoft Power Point and Adobe Reader. Please make sure that your files are compatible and readable with our operation system by using commonly used fronts and symbols. If you plan to use your own computer, please try the connection and make sure it works before your presentation.
- Movies: If your Power Point files contain movies please make sure that they are well formatted and connected to the main files.

Poster Presentations

- Maximum poster size is 36 inches wide by 48 inches high (3ft.x4ft.)
- Posters are required to be condensed and attractive. The characters should be large enough so that they are visible from 1 meter apart.
- Please note that during your poster session, the author should stay by your poster paper to explain and discuss your paper with visiting delegates.

Dress Code

- Please wear formal clothes or national characteristics of clothing.

Invited Speakers

Prof. Marc Alier
Politecnical University of Catalonia (UPC), Spain

Marc Alier (1971) received an engineering degree in computer science and a Phd in Sustainability in the Politecnical University of Catalonia (UPC). He is an associate professor at UPC. The last 19 years has worked in research and development related to the e-learning industry. He has participated in the development of several LMS and authoring tools, and has been an online teacher. Since 2001, he has taught project management and computing ethics. He is has been director of a master's program in software for organization management and several post degree courses at UPC School. Since early 2004, he has been a developer of the http://moodle.org community contributing with third part modules and core functionalities such as the Wiki module, the design of the Webservices layer and the IMS LTI consumer. He is also a book author at http://pansingluten.net and http://aprendizdeluthier.com, and a prolific podcaster at http://mossegalapoma.cat and http://zetatesters.com. He is @granludo at Twitter.

"The Death Star Challenge: An Ambitious and Motivating Engineering Project to Promote Astronautics and Transform Society's Vision about Space Research"

Abstract: The race to put a person on the Moon motivated and captivated the imagination of USA society and the community worldwide. This led to an unprecedented investment in science, technology and the space program, which eventually resulted in a successful Moon landing in 1969. Current estimations state that, for every dollar invested in space technology, there is a return of more than five dollars for the country's GDP. However, public opinion worldwide does not perceive this investment as a benefit for the society. The moonshot was a challenge, an idea, a dream that aligned a whole society towards progress. To change society's vision about space, our proposal is to promote an outrageously ambitious, exciting and motivating Engineering project. While this project may be extremely difficult to implement, it can be envisioned, brainstormed, analyzed, and even brought to the attention of policy makers.

Prof. Carlos Felgueiras
CIETI/ISEP, Portugal

Manuel Carlos Felgueiras received the B.S. and Ph.D. degrees in electrical and computer engineering from the Faculty of Engineering, University of Porto, Porto, Portugal, in 1987 and 2008, respectively.
He started is professional in 1987 as electronic designer for automation systems. Later was invited to supervise a test laboratory for verifying the accomplishment of European Standards in thermoelectric household appliances. He started the teaching activity in 1994 as Assistant Professor and later on as Adjunct Professor and researcher with the Department of Electrical Engineering, School of Engineering, Polytechnic Institute of Porto (IPP), Porto, Portugal. His research interests include design for debug and test of mixed-signals, remote experimentation in e-learning and renewable energy sources.
Prof. Felgueiras is member of the Portuguese Engineers Association and also the Global Online Laboratory Consortium (GOLC). He has published about 35 papers and includes the scientific committee of several conferences.

"Sustainability in Buildings"

Abstract: Energy consumption in buildings is responsible for an important share of the global consumed energy. The actual electric energy paradigm carries important consequences at economic and environmental level.
The global development, particularly in the so called BRIC countries, will contribute to deteriorate the already concerning situation.
To outdo this actual issue several aspects were put in perspective, such as the energetic performance of systems and appliances, the use of renewable energy, the decentralized production of energy, among others. However every time we try to solve one problem, new ones arise. The optimal performance only occurs while systems are working under the optimal conditions and those depend on many factors such the adequate maintenance specified by the manufacturer or the user occupancy behaviors. The use of renewable energy can be a difficult process and only feasible for a relatively low share of the total energy involved. The decentralized energy production can bring problems at the energy quality level.
Far from simple, the energy subject poses serious challenges to be solved that involve all players, from consumers to producers, using several layers, from hardware to communications. Important achievements have been reported at several levels all over the world. Some keywords such sustainability and smart grids are frequently used yet they correspond uniquely to generic concepts. Thus the most probable challenge topic is the absence of a structured and accepted infrastructure developed specifically oriented to the energy management. This structure will take some more time to be designed but will probably change and modify the actual electric energy production paradigm. Until then, we will try to contribute with our small steps doing research in this field.
In this paper we will present the actual situation and some developments in the field.

Prof. Nidia Caetano
School of Engineering (ISEP), Polytechnic of Porto (IPP), Portugal

Nídia de Sá Caetano received her B.S. and Ph.D. degrees in chemical engineering from the Faculty of Engineering of the University of Porto (FEUP), Porto, Portugal, in 1987 and 1996, respectively.
She started the teaching activity in 1992 as Assistant Professor and is today Coordinator Professor with the Chemical Engineering Department, School of Engineering (ISEP), Polytechnic Institute of Porto (IPP), Porto, Portugal. She was sub director of the Department for 4 years, having been laboratory director for ten years.
From March 2013 she has been the director of the Master Course in Sustainable Energies of ISEP, in the Mechanical Engineering Department.
Prof. Caetano is member of the Portuguese Engineers Association (OE) and also of the Portuguese Association of Environmental and Sanitary Engineering (APESB) where she is involved in the solid waste section.
She started her R&D career in the LSRE of FEUP in 1987, where she did her PhD research in MTBE kinetic study in a batch reactor and simulation / operation of a fixed bed reactor. Later on (in 1998), she co-funded the LEPAE of FEUP (nowadays LEPABE), where she is senior researcher. She is also collaborator of CIETI, a R&D center at ISEP.
Her research interests include biofuels (waste to energy: biodiesel, bioethanol, biogas, combustion) either from waste biomass, oil or microalgae; efficient use of solar energy for microalgae production; valorization of solid waste and wastewater treatment, always using a sustainability based approach, having participated in several projects with the industry.
She has supervised several Master and PhD students, is the co-author of several book chapters and papers in international journals and conferences. She has also participated in several conference organizing and scientific committees, having presented more than 100 communications. She has been the reviewer of numerous scientific publications in international indexed journals and conferences and projects evaluator.

"New Trends in Energy Production and Utilization"

Abstract: Energy has long been associated with nations' development. Ever since the most ancient times, when man started using fire for heating, cooking or safety purposes, energy availability promoted the growth and development of population. The most conventional and renewable sources of energy – sun, water, wind, biomass – became insufficient to supply the energy needs, and the discovery of coal, natural gas and oil allowed for the possibility of using larger amounts and different kind of energy for new applications, such as industrial production or mobility/transportation, air conditioning and ventilation, communications, etc. But this endless cycle, where people need energy to further progress and where development demands the use of growing amounts of readily available energy, has its drawbacks: use of fossil fuel (FF) and fossil

derived energy (FDE) is limited by the capacity of extraction and by the existence of reserves (limited and not evenly distributed in the world); use of FF and FDE contributes to the emission of large amounts of CO_2, volatile organic compounds (VOCs), and sulfur (SO_x) and nitrogen oxides (NO_x), which in turn have acidification, eutrophication and ozone depletion potential, thus contributing largely to global warming. Therefore, three main approaches have been used to solve the problem of energy availability: 1 – reducing the amount of energy needed, through increasing efficiency of energy distribution (smart grids) and usage; 2 – using other sources of energy than FDE, through the use of nuclear energy (that recently has proven its dangerous risks and that also is not available everywhere), or mainly through the use of renewable energy sources (including residual materials), associated with; 3 – developing new and more efficient energy storage systems. Furthermore, decision makers are starting to define their policies, based on studies that take into consideration the whole cycle of energy production (from the extraction of materials, considering transportation, construction and exploitation of the power units, and even their dismantling and reconversion, after the end of life), in a Life Cycle Assessment (LCA) perspective. Thus, it will be presented a brief insight of all of these approaches with their corresponding interactions, which really shows the new trends in the energy sector.

Prof. Helder Santos
ADAI-LAETA / Polytechnic Institute of Leiria (IPL), Portugal

Helder Manuel Ferreira Santos received his mechanical engineering bachelor's degree at University of Coimbra, Portugal, in 2000 and his master and Ph.D. degrees from Lisbon Technical University, Portugal, in 2006 and 2010 respectively. He started the teaching activity in 2000 as Assistant Professor and is today Adjunct Professor with the Mechanical Engineering Department, School of Technology and Management (ESTG), Polytechnic Institute of Leiria (IPL), Leiria, Portugal.
Prof. Helder Santos is member of the R&D center ADAI-LAETA, Polytechnic Institute of Leiria (IPL) delegation. His research interests include vehicle exhaust gas after treatment systems and waste heat recovery in automotive vehicles.
He has been coordinator of various research projects, some of them with industrial partners. He has also supervised several Master thesis. He has published about 30 papers, 10 of them in international Journals, at the present his h index is 6. He has been the reviewer of numerous scientific publications in international journals and conferences. He has also participated in several conferences, having presented several communications.

"Automotive Vehicle Technologies for Internal Combustion Engine Exhaust Gas Thermal Energy Recovery"

Abstract: Among the existing automotive vehicle internal combustion engine (ICE) waste heat recovery (WHR) techniques, the most relevant are the electrical turbo-compounding (ETC), the mechanical turbo-compounding (MTC), the thermo-electric generator (TEG) and the Rankine cycle (RC) or organic Rankine cycle (ORC). At the present, the Rankine cycle system with water or organic medium seems to be the best solution for heavy-duty truck powertrains. The RC is based on the steam generation in a secondary circuit that represents an indirect method of WHR. This technique has advantages compared with the so-called direct WHR techniques (e.g., ETC and MTC) that use a power turbine fitted to the vehicle exhaust, which has a much higher impact on the engine pumping losses. Rankine cycle Waste Heat Recovery Systems (RC-WHRS) have high potential to improve fuel efficiency of heavy-duty truck powertrains. Selection of the cycle expander, evaporator heat exchanger (HEX) and working fluid are the primary focus of the review, since they are regarded as having the largest impact on system performance. In such a system, the sizing of a compact HEX that can manage the heat load without excessive pressure drop on the gas side is of significant importance. Hence the presentation emphasis on the development of different HEX prototypes and presents modeling and experimental results for the HEX performance. Finally, the presentation focus on the description of the implemented experimental RC-WHRS test bench and presents guidelines for the future works.

Assoc. Prof. J. Gordon Arbuckle,
Department of Sociology, Iowa State University, USA

Dr. J. Gordon Arbuckle Jr. (website) is an environmental sociologist with expertise in quantitative (surveys) and qualitative (focus groups, in-depth interviews) research on farmers' and landowners' motivations and decisions related to soil and water conservation behaviors. He centers his research and extension efforts on increasing the resilience and adaptive capacity of agricultural systems. Arbuckle is co-PI and lead social scientist on the $20m Corn-Based Cropping Systems Coordinated Agricultural Project, a USDA National Institute of Food and Agriculture (NIFA)-funded effort to develop and promote climate-smart agricultural systems in the US Corn Belt. He is also Director of the Iowa Farm and Rural Life Poll, an annual panel survey of Iowa farmers that focuses largely on conservation-related policy, decision making, and behavior. Arbuckle is also PI on a five-year (2015-2020) survey that is examining Iowa farmers' soil and water quality-related awareness, attitudes, and behaviors over time. He is currently Chair of the NIFA multi-state research project NC1190: Catalysts for Water Resources Protection and Restoration: Applied Social Science Research.

"Understanding Farmer Perspectives on Climate Change to Inform Engagement Strategies for Adaptation (and Mitigation?)"

Abstract: This presentation will describe research results and lessons learned from the combined social science and agricultural extension components of a US$20 million project and a US$5 million project focused on climate change and agriculture in the US Corn Belt. The US Corn Belt is one of the most productive agricultural regions on earth, but across much of the region increasingly extreme weather events combined with degradative agricultural practices such as fall tillage and subpar pest management practices have resulted in vulnerabilities in agricultural systems. Research results from surveys of 4,778 farmers and 1,600 agricultural advisors, and in-depth interview research with 159 farmers will be synthesized to summarize what the projects have learned about how to effectively engage farmers in efforts to adapt to the impacts of climate change while reducing greenhouse gas (GHG) emissions and building more resilent agroecosystems. The results from the social science research partnership between the two large projects are helping to guide policy and program development across the region.

Contents of Sessions

Session 1: Electrical Equipment Improvement & Modeling and Simulation

Session 2: Fuels & Combustion

R054-A	Hyo-Jin Kim, So-Yeon Park, and Seung-Hoon Yoo	An Empirical Investigation of the Korean Public's Willingness to Pay for Expanding the Use of Solid Refuse Fuel
R060-A	Se-Jun Jin and Seung-Hoon Yoo	Energy Eonsumption, CO_2 Emission, and Economic Growth: Evidence from Philippines
R051-A	Yong-Cheol Cho and Seung-Hoon Yoo	The External Benefits of Expanding the Micro Photovoltaic Power Generation in Korea: A Contingent Valuation Study
R087-A	Ahmad Farhad Talebi and Meisam Tabatabaei Pozveh	BiodieselAnalyzer©: An Innovative Software to Predict Biodiesel Properties
R089-A	Ahmad Farhad Talebi and Meisam Tabatabaei Pozveh	Enhanced Algal-based Treatment of Petroleum Produced Water and Biodiesel Production

Session 3: Bio-energy & Energy Development

Paper ID	Authors	Title
R001-A	Pradipta Halder	Bioenergy, Bioeconomy and Small-scale Private Forest Owners – A European Perspective
R014-A	Baobei Lyu, Fei Xie, Xin Zhang, Pengxiang Zhao and Xuemei Ma	Establishment of an Allele-Specific SYBR Green real-time PCR Assay for Detecting Resistance of Botrytis Cinerea to Four Fungicides
R021	Tao Junjun and Wang Haihui	Reality in the Kinetic Modelling of Pyrolysis of Plant Fuels
R053	Gianluca Grilli, Giulia Garegnani, Francesco Geri, Marco Ciolli	Cost-Benefit Analysis With GIS: An Open Source Module For The Forest Bioenergy Sector
R136-A	Melih Onay	Investigation of Superoxide Dismutase Activity and Carotenoid Content in Dunaliella Salina under Different Stress Conditions
R3024	Coriolano Salvini and S. Monacchia	A Memetic Computing Approach for Unit Commitment with Energy Storage Systems
R067-A	Gholamreza Bahmannia, Kobra Verijkazemi	Chemical Characterization of Total Petroleum Hydrocarbons (TPH) in Produced Water Discharges for Dispersion Modeling
R031	Ayse Ozyuguran, Serdar Yaman	Prediction of Calorific Value of Biomass from Proximate Analysis

Session 4: Renewable Energy & Battery

Paper ID	Authors	Title
R026	Elizabeth Harrison, David Saad and K. Y. Michael Wong	Optimal Load Shedding in Electricity Grids with Renewable Sources via Message Passing
R003	Zhongwei Deng, Lin Yang, Yishan Cai and Hao Deng	Maximum Available Capacity and Energy Estimation Based on Support Vector Machine Regression for Lithium-ion Battery
R005-A	Shiqiang Qin, Dachuan Jiang, Pengting Li, Shuang Shi and Yi Tan	Recycling of Silicon Scraps from Solar Cell Materials Industry by Electron Beam Melting
P0010	Manuel Ignacio Ayala Chauvin, Jorge Luis Maldonado Correa,	Wind Power Resource Assessment in Complex Terrain: Villonaco Case-study Using Computational Fluid Dynamics

	Edwin Bladimir Paccha Herrera and Carles Riba Romeva	Analysis
R029-A	Zenab Naseem and Sadia Imran	Assessing the Feasibility of Solar Water Pumps in Soan Valley, Punjab, Pakistan
R020	Hocine Belmili, Sabri Boulouma, Bendib Boualem, Almi Med Fay çal	Optimized control and sizing of standalone PV-Wind Energy conversion system
R2007	Barry A. Benedict	Benefits of Scenario Planning Applied to Energy Development
R055	Kamal Anoune, Mohsine Bouya, Abdellatif Ben Abdellah, and Abdelali Astito	Optimizing and Controlling the Productivity of a Flat Plate Collector by Using an Electronic System
R083	Alexandre CHOURAQUI, Constance Bonnefous, Yohan Aknin, Nicolas Seurat and Manon Bottausci	Method to Determine Auto-consumption Profitability
R099	Muhamad Nasir	Nanostructure and Property of Electrospun SiO2-Cellulose Acetate Nanofiber Composite by Electrospinning
R111	Ulas Baran Baloglu and Yakup Demir	Economic Analysis of Hybrid Renewable Energy Systems with V2G Integration Considering Battery Life
R115-A	Jin Joo Kim, Kwang Jae Son, Sang Mu Choi and Young Rang Uhm	Design and Fabrication of Radioisotope-based Micro Battery
R135	Saleh Shalaby, Mohamed Bek and Abd-Elnaby Kabeel	Design Recommendations for Humidification-Dehumidification Solar Water Desalination Systems
R052	Chin-Ting Liao, Wei-Sheng Chen and Kuan-Yan Lin	Recovery Zinc and Manganese from Spent Battery Powder by Hydrometallurgical Route
R3001	Barry A. Benedict	Understanding Full Life-Cycle Sustainability Impacts of Energy Alternatives
R112	C. Wimmler, G. Hejazi, Eduardo De Oliveira Fernandes, Carlos Moreira, and Stephen Connors	Impacts of Load Shifting on Renewable Energy Integration
R3005	Hooman Farzaneh	Development of a Bottom-up Technology Assessment Model for Assessing the Low Carbon Energy Scenarios in the Urban System
R128	Ö. Ayvazoğluyükse and Ü. B. Filik	Estimation of monthly average hourly global solar radiation from the daily value in Çanakkale, Turkey
R3038	Anastasia Ioannou, Andrew Angus, and Feargal Brennan	Stochastic Prediction of Offshore Wind Farm LCOE through an Integrated Cost Model

Session 5: Environmental Pollution & Management

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R039-A	Kai-Lun Chiu, Wei-Sheng Chen and Bi-Cheng Chang	Recovering Germanium from Waste Optical Fiber Cables

R046-A	Kuan-Yan Lin, Wei-Sheng Chen and Chin-Ting Liao	Pressure Leaching of Tantalum from Capacitor Scraps by Hydrofluoric Acid
R048	Ahmad Sheikh Saeed and Urooj Rabail	Assessment of Soil Fluorine Spatial Distribution around Brick Kilns Using GIS Application
R049-A	María del Mar López Guerrero, María Teresa Siles Cordero, Elisa Vereda Alonso, Amparo García de Torres and J. M. Cano Pavón	Detection and Determination of Environmental Pollution by Hg in Environmental Samples (Sea and River Water, and River Sediment) in order to Prevent Dangerous Action of Hg on Existing Ecosystems
R010-A	Yameng Liu, Yongdong Liu, Rugang Zhong, Bin Peng and Henry Schaefer	Effects of Heavy Metal Ions on N-Nitrosodimethylamine (NDMA) Formation
R088	Ahmed Al-Ghamdi	Recycling of Reverse Osmosis (RO) Reject Streams in Brackish Water Desalination Plants Using Fixed Bed Column Softener
R091-A	N. Suwedi, A. T. Alamsyah, D. Sutjiningsih, and Y. Sutrisno Garno	Early Warning Algorithm for Fish Mass Mortality Based on Weather Data: Case of Cirata Lake – West Java, Indonesia
R095	Fei LIN, Peigui Liu, Ting Wei, Honglei Ren, Dan Wu and Yuezan Tao	Contaminate Prediction and Control of Landfills to Groundwater in Coalmine Subsidence Area
R096	C. Areeprasert, J. Asingsamanuntb, S. Srisawat, J. Kaharn, B. Inseemeesak, P. Phasee, C. Khaobang, W. Siwakosit and C. Chiemchaisri	Municipal Plastic Waste Composition Study at Transfer Station of Bangkok and its Possibility of Energy Recovery by Pyrolysis
R123	Thi Thuy Trang Pham, Quang Toan Dinh, and Thi Xuan Hanh Nguyen	The Effects of Socioeconomic Factors on Household Solid Waste Generation and Composition: A Case Study in Thu Dau Mot, Vietnam
R2006-A	Eleonora Obón Estrada, A. Fortuny and A.M. Sastre	Recycling of Rare Earth Elements from Fluorescent Lamp Waste Using Synthetized Ionic Liquids
R3011	Maria Ikram, and Zhi Jun Yan	Statistical Analysis of the Impact of AQI on Respiratory Disease in Beijing: Application Case 2009
R3018	Vlasta Ondrejka Harbulakova, Adriana Eštoková and Alena Luptáková	Contribution to Sustainable Environment through Examination of Durability of Materials in an Aggressive Environment
R3021	Magdalena Ligus	The Assessment of Environmental Benefits of Low-emission Electricity Generation, the Case of Poland
R066-A	Kobra Verijkazemi, Gholamreza Bahmannia	Air Quality Assessment in a General Hospital Based on Particulate Matters and Radon Concentrations
R086-A	Azhar Ali, Anam Khalid, and Durr-E- Shahwar	End of Life Scenarios for Municipal Solid Waste of Defence Housing Authority Lahore, Pakistan

Session 6: Power & Grid System

Paper ID	Authors	Title
R022	Faisal Mumtaz	Planning, Operation, and Protection of Microgrids: An Overview
R028	Hyeon-jin Moon, Eung-Sang Kim, Seung-Il Moon and Ah-Yun Yun	An Analysis of Energy Storage Systems for Primary Frequency Control of Power Systems in South Korea
P0008A	Eder Batista Tchawou Tchuisseu, Dami à Gomila and Pere Colet	Effects of Interacting Dynamic Demand Controlled Appliances on the Frequency Grid Stabilization
P006	T. M. Miranda, F. Romero, P. H. Baumann, A. U. Antunes, D. Takahata, J. C. Neto, L. H. T. F. Neto, Â. C. L. Alves, L. M. Azevedo, S. L. P. Valinho	On the Influence of the Variation Parameters of the Ant Colony Optimization on the Dispatch of Road Crews of Electricity Utility
P0017	Sidnei do Nascimento and Maury Meirelles Gouvêa Júnior	Voltage Stability Enhancement in Power Systems with Automatic FACTS Device Allocation
P0015	Madeline Martinez-Pabon, Timothy Eveleigh and Bereket Tanju	Smart Meter Data Analytics for Optimal Customer Selection in Demand Response Programs
R081-A	Caston Sigauke	Modelling the Effect of Heatwaves on Electricity Demand: A Case Study
R1011	Ezinwanne Osisioma, Fu Zhongwen, and Li Zhijun	Energy Performance and Cost Comparison of MPPT Techniques for PV and other Applications
S1003	Elizabeth Harrison, David Saad, and K. Y. Michael Wong	Optimal Distribution in Smart Grids with Volatile Renewable Sources Using a Message Passing Algorithm
R3023	Coriolano Salvini, P. Mariotti and A. Giovannelli	Compression and Air Storage Systems for Small Size CAES Plants: Design and Off-Design Analysis
S002	Anthony Okumbor and Okonkwo O. R	Empirical Model of Cellular Signal Propagation Loss for Smart Grid Environment
S004	Ramon Martin De Pozuelo, Miguel Ponce de Leon, John Howard, Alan Briones, Jerry Horgan and Julia Sánchez	Software Defined Utility: A Step towards a Flexible, Reliable and Low-cost Smart Grid
R103	Rajprasad Kumar Rajkumar, Lee Wai Chong, Yee Wan Wong and Dino Isa	Modelling and Simulation of Standalone PV Systems with Battery-Supercapacitor Hybrid Energy Storage System for a Rural Household
S005	Brenda Rojas, Monica Alonso, Hortensia Amaris, Lorena Gonzalez	Coordinated Management of Low Voltage Power Networks with Photovoltaic Energy Sources
R030	Jin-Oh Lee, Seung Il Moon and Eung Sang Kim	Determining P-Q Droop Coefficients of Renewable Generators for Voltage Regulation in an Islanded Microgrid

Daily Schedule of Events

September 7th (9:00-17:00)			
9:00-17:00	Polyvalent Space : Registration Staff: Fiona Swift & Celine Xi		
September 8th (9:30-11:30; 14:00-17:30)			
9:30-11:30	➢ A visit to UPC ➢ A report given by Dr. Didac Ferrer Balas		
14:00-17:00	Polyvalent Space : Registration		
14:00-14:15	Room Aula Master : Opening (Prof. Carlos Felgueiras and Prof. Jordi Segalas)		
14:30-15:00	Room Aula Master : Keynote Speech- **Prof. Marc Alier** *The Death Star Challenge: An Ambitious and Motivating Engineering Project to Promote Astronautics and Transform Society's Vision about Space Research*		
15:00-15:30	Room Aula Master : Plenary Speech- **Assoc. Prof. J. Gordon Arbuckle** *Understanding Farmer Perspectives on Climate Change to Inform Engagement Strategies for Adaptation (and Mitigation?)*		
15:30-16:00	Room Aula Master : Keynote Speech- **Prof. Carlos Felgueiras** *Sustainability in Buildings*		
16:00-16:30	Coffee Break & Group Photo		
16:30-17:00	Room Aula Master : Plenary Speech- **Prof. Helder Santos** *Automotive Vehicle Technologies for Internal Combustion Engine Exhaust Gas Thermal Energy Recovery*		
17:00-17:30	Room Aula Master : Keynote Speech- **Prof. N ília S. Caetano** *New Trends in Energy Production and Utilization*		
September 9th (9:00-19:00)			
9:00-12:00	**Room Sala Agora-A:** Session-1: Electrical Equipment Improvement & Modeling and Simulation	**Room Sala Agora-B:** Session-2: Fuels & Combustion	**Room Sala Agora-C:** Session-3: Bio-energy & Energy Development
10:00-10:30	Coffee Break & Poster Session		
12:00-13:00	Lunch Time		
13:00-18:00	**Room Sala Agora-A:** Session-4: Renewable Energy & Battery	**Room Sala Agora-B:** Session-5: Environmental Pollution & Management	**Room Sala Agora-C:** Session-6: Power & Grid System
15:00-15:15	Coffee Break		
18:00-19:00	Dinner Party (Vertex – Garden) – Awards Ceremony		

Author Presentation Abstracts

Session 1: Electrical Equipment Improvement & Modeling and Simulation

Venue: **Sala Agora-A**

Chair: Prof. Carlos Felgueiras

CIETI/ISEP, Portugal

Time: 9:00-12:00

Note:

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* For the best presentation of each session, it's encouraged to award it to student author prior.
* The certification of Oral/Poster presentation, listeners, will be awarded at the end of each session.
* To show respect to other authors, especially to encourage the student authors, we strongly suggest you attend the whole session, and the scheduled time for presentations might be changed due to unexpected situations, please come as early as you could.

R069

Performance Assessment of a Near Room Temperature Magnetic Cooling System

Time: 9:00-9:15

Assoc. Prof. Orhan Ekren, A.Yilanci, M.A.Ezan, M.Kara, and E. Biyik
Ege University Solar Energy Institute, Turkey

In this study, performance of a near room temperature magnetic cooling system was investigated experimentally in terms of temperature span. The current setup has a permanent magnet pairs(0.7 Tesla), a magnetocaloric material(Gadolinium) and a heat transfer fluid (water, ethylene glycol and %10 ethanol-water mixing) furthermore solar energy was used as a power source of liner motion of the magnetic system. The obtained results showed that ethanol-water was the best heat transfer fluid also optimum magnetization-demagnetization period for the system was found 10 s.

R090

Radiant Heating-Cooling Performance Assessment in a Shopping Center in Sopron, Hungary

Time: 9:15-9:30

Assoc. Prof. Orhan Ekren, A.Hepbasli, and E. Biyik
Ege University Solar Energy Institute, Turkey

In this study, performance of a radiant heating-cooling via air source heat pump was investigated. This study is part of a project funded by European Union's seventh framework program for research, technological development and demonstration. In the project it is aimed that a holistic retrofitting solution for commercial buildings to reduce primary energy consumption down to less than 80 kWh/m2 per year and increase the share of renewable energy sources more than 50% compared to the state of the art. In the project, a shopping center called IKVA shopping center located in Sopron, Hungary used as a demo building. In that building a heat pump system integrated with a radiant heating and cooling system is used. In this paper two different cases are compared regarding air source heat pump system; in Case-1 air source of the heat pump is outdoor air, in Case-2 air source is heat recovery unit return air. These two cases are investigated for the same heating and cooling load of the considered retrofitting area in terms of energy efficiency. Based on the simulation results of the demo building, the total heating and cooling demand rates of the first floor (subject to retrofitting) are about 40 kW and 67 kW, respectively. The retrofitting surface area is 984.7 m2. According to the results Cases 2 has about 18% higher energy efficiency than Case 1.

R097-A

An Experimental Study on Pressure Drop and Heat Transfer Coefficient of a Brazing Type Plate Heat Exchanger as an Evaporator Using R-1234ze(E)

Time: 9:30-9:45

Mr. DongChan Lee, Dongwoo Kim and Yongchan Kim
Graduate school of Mechnical Engineering, Korea University,Republic of Korea

The pressure drop and heat transfer coefficient (HTC) of a R-1234ze(E) system were analyzed with respect to average quality entering and exiting a brazing type plate heat exchanger(BPHE) and mass flux G. A BPHE was installed in the test section as an evaporator and its operating temperature conditions were set from 5 to 15 ℃. Water was used as a secondary fluid to supply heat to the evaporator and a cooling chiller was used to control the evaporation temperature by cooling the refrigerant which absorbs heat from the test section. The quality of the refrigerant entering the BPHE was controlled by regulating the power input to the pre-heater; several electric heaters were inserted in a copper pipe. The trend of the pressure drop with respect to quality and G depended mostly on G due to change of the frictional and gravitational pressure drop dominance. The HTC trend also depended on G, but mainly on the quality region because the influence of convective boiling heat transfer and nucleate boiling heat transfer varied by the quality region. The results obtained from the R-1234ze(E) system, a substitute refrigerant system for R-134a due to GWP issue, were compared with that of a R-134a system.

R1010

Simulation of Energy Efficiency Improvement in Induction Motor Drive by Fuzzy Logic Based Temperature Compensation

Time: 9:45-10:00

Dr. Nirudh Jirasuwankul
King Mongkut's Institute of Technology Ladkrabang (KMITL), Thailand

This paper proposes a method of improving efficient energy usage in induction motor drive system when operated under high temperature condition. By confining the drive signal to the prospective domain of that compensated by operating temperature range, an optimum point of driving performance and energy efficiency will be met for the given load torque and speed command. In this study, fuzzy logic has been applied as a temperature compensator and incorporated into the system model in MATLAB-Simulink. Simulation results showed that the system can operate and retain its performance together with efficient utilization of energy under high temperature condition.

Break Time& Poster Session: 10:00-10:30

R108

Numerical Analysis of a Coaxial Impingement Jet and Application for a Laser Welding of AZ91 Magnesium Alloy with Shielding Gas

Time: 10:30-10:45

Ms. Chiraz Boughanmi, Hatem Mhiri, and Philippe Bournot
National Engineering School of Monastir (ENIM), Tunisia

A coaxial jet impinging a vertical heated plate is numerically investigated using the Fluent CFD code. The best numerical simulations are carried out using the k-ω SST turbulence model with considered assumptions. Results obtained by the developed numerical model have enabled to determine the heat exchange coefficients, essentially the average Nu numbers relating to certain Reynolds number for H/D=4 position of the heated plate. A comparison of the accuracy of different turbulent models is proposed in this study. Calculation of these parameters revealed that the heat transfer of coaxial jet is superior at the stagnation zone compared to a single jet. The effect of gravity and buoyancy forces on the heat transfer occurring between the heated vertical plate and the jet leading to a slight increase of the average Nusselt number compared to its of an horizontal disposition.
Subsequently, an industrial application is proposed; the laser welding process. For that, a moving distributed heat source model has been implemented in order to predict temperature distributions through the welding process of a magnesium alloy with the gas shielding and to get an idea about its volume fraction distribution.

S1001

Advanced Control Combined Heat and Power and Photovoltaics (CHPV) for single building

Time: 10:45-11:00

Mr. Al-Khaykan Ameer, Counsell J M, and Stewart M J
University of Liverpool, UK

Commercial Buildings are no longer just national heat and power network energy loads, but they are becoming part of a smarter grid by including their own dedicated heat and power generation. A building integrated approach of Combined Heat and Power (CHP) generation and photovoltaic power generation (PV) known as Combined Heat and power with PV (CHPV) is emerging as a complementary energy supply solution to conventional boilers in the design of sustainable commercial buildings and local energy systems. The merits for the building user/owner of this approach are; to reduce life time energy running costs; reduce carbon emissions to contribute to UK's 2020/2030 climate change targets and provide a more resilient energy supply solution. Soft target markets for CHPV are building clusters such as; public buildings such as hospitals, colleges, universities and buildings and private sector complexes such as retail parks and science parks. The control methodology of CHPV systems is the main research challenge to provide reliable system performance to enhance the successful deployment of these systems. The CHPV solution provides all heating, ventilating and air-conditioning (HVAC) facilities as well as electrical power supply. This power is generated by a locally connected CHP system electrically connected to a private wire network (PWN) which simultaneously allows the utilisation of building side installed PV power generation to be shared with all buildings in the cluster/complex. This paper presents a novel CHPV system design topology for robust, reliable and high performance control of building temperatures and energy supply from the local energy system. This system's topology includes; a hot water network; a central hot water storage system to supply heat to the building; electrically powered ventilation and cooling in the building; a centralised CHP engine and control; centralised gas boiler supply; a thermal hot water store for the heat network and its control; PV array installed on the building and back-up/supplementary power provided by the national grid. The advanced control system solution presented in this paper, aims to achieve desired building temperatures using thermostatic control whilst simultaneously tracking a specified national grid power demand profile. The results from simulations presented in the paper show the efficacy of the novel control strategy of CHPV and complementary gas boilers to control energy utilisation of the building's heat and power whilst tracking a required national grid power demand.

P005

Experimental Investigation on Effects of Central Air Jet on the Bluff-body Stabilized Premixed Methane-air Flame

Time: 11:00-11:15

Mr. Yiheng Tong, Mao Li, Marcus Thern, Wubin Weng, Shuang Chen, Zhongshan Li and Jens Klingmann
Lund University, Sweden

Flame stabilized by a bluff-body is a common scene in many engineering applications due to the enhanced mixing characteristics, improved flame stability, and ease of combustion control. We recently designed a burner which has a conical bluff body with a central air injector. In the current work, effects of the central air jet on the heat load of the bluff body, the flame structures and the flame blowoff limits were investigated. It was found that the central air jet can significantly reduce the heat load to the bluff body. It is a considerable solution to the problem caused by the high heat load in practical applications. The flame structures and blowout limits were altered with the addition of central air jet as well. Different blowout behaviors caused by the air jet were observed and reported. The bluff-body could be cooled down by the center air injection but then it seems not to stabilize the flame any more.

R132 Very Short Term Wind Speed Forecasting using Multivariable Dense Data with WLS-MARMA Model

Time: 11:15-11:30

Tansu Filik and Ümmühan Başaran Filik
Electrical and Electronics Engineering, Anadolu University, Turkey

In this study, very short-term wind speed forecasting problem, which is quite important for the future's electricity market –wind forecasting control algorithms, is investigated. Recently in order to improve forecasting accuracy, multichannel (spatial) methods which uses neighboring (from different locations) wind speed measurements are appeared. But it is not always possible to collect spatially distributed neighboring wind speed values around target location simultaneously. In this study, previously proposed multichannel autoregressive moving average (MARMA) model is applied to local multiple sensor measurements such as wind speed, direction, temperature, pressure, solar radiation etc. instead of neighboring (distributed) wind speed measurements. It is shown with real data set that weighted least squares solution based MARMA model (WLS-MARMA) can give more accurate wind speed estimation results according to other well-known benchmark methods.

R133 Wind Speed Prediction using Artificial Neural Networks Based on Multiple Local Measurements in Eskisehir

Time: 11:30-11:45

Ümmühan Başaran Filik and Tansu Filik
Electrical and Electronics Engineering, Anadolu University, Turkey

On account of power quality and reliability of the wind energy systems, it is important to use the more accurate methods for wind speed prediction. In this study, artificial neural network (ANN) based models, which differently uses multiple local meteorological measurements together such as wind speed, temperature and pressure values, are proposed. It is always possible and cheap to collect such local sensor measurements. In this study, it shown with real data set that if these local data set are recorded with frequent time interval ANN based multivariable model's wind speed predictions can be improved for various cases. In this study, we used a data monitoring system which can sensitively measures in milliseconds time interval and records the values of weather temperature, wind speed, wind direction and weather pressure. The corresponding system is constructed on a hybrid renewable smart home energy system consists of 6 kW on grid, 4 kW off grid solar panels and 1 kW wind turbine in Anadolu University Iki Eylül Campus of Eskisehir. The proposed ANN based multivariable model's root mean square error (RMSE) and mean absolute error (MAE) performances are presented and compared for various cases. The effect of using multiple local variables instead of wind speed only are analyzed and compared with persistence method for benchmark.

R2001-A Transient Convection and Volumetric Radiation Heat Transfer in a Participating Medium

Time: 11:45-12:00

Dr. Raoudha Chaabane, Faouzi Askri, Abdelmajid Jemni, Sassi Ben Nasrallah
Laboratoire d'Etude des Systèmes Thermiques et Energétiques, Ecole Nationale d'Ingénieurs de Monastir, Avenue Ibn El Jazzar, 5019 Monastir, Université de Monastir, Tunisie

In the last decay, the Rayleigh Benard convection problem has attracted a great deal of attention from researchers because of its presence in both nature and industrial applications. Indeed, the convection cells formed from air rising above sunlight-warmed land or water are a major feature of all weather systems. Besides, Rayleigh Benard convection is also seen in the rising plume of hot air from fire, oceanic currents, and sea-wind formation. The literatures indicated that most of the reported works on Rayleigh-Bénard convection do not study the effect of the volumetric radiation in a participating medium. The analysis of the transient conduction-convection radiation finds applications in the design of reactors, heat pipes, combustion chambers, rocket propulsion systems, etc. so, the aim of the present study is extended the mesoscopic Lattice Boltzmann method for analyzing the convection with volumetric radiation in a cavity containing an absorbing, emitting and scattering medium.
The Lattice Boltzmann method is used to compute the radiative term of the energy equation, The LBM, with a double population of a nine-velocity flow and temperature distributions is

also used to calculate the density, velocity and temperature fields. The validity of the proposed method and its applicability for solving transient Raleigh Benard convection with and without radiation are examined.
The Steady state centerline non-dimensional temperature distribution was compared with results available in the literature, to demonstrate the effect of scattering albedo, extinction coefficient, convection radiation parameter, emissivity of walls and the presence of heat generation rate. We provide also temperature contours and streamlines at the Steady-state for the different value of the parameters under investigation.
The recent numerical approach is found to be efficient, accurate, and numerically stable for the simulation of fluid flows with heat and mass transfer in presence of volumetric radiation in participating medium.

R3004-A Developing a new Water Quality Index Modeling Device for Surface Water Quality Evaluation Using FIS based on MADM and Spectrophotometer Device

Time: 12:00-12:15

Heshmat Shirkoul, Sadegh Partani, Roohollah Noori
EstaSazehKarsan Construction Engineering Company, Tehran, Iran

In this paper the new combination of Multi-Attribute Decision Making (MADM) methods and Fuzzy Inference System (FIS) are utilized to developing a new Water Quality Index Model and employing as online software of a new water quality measurement instrument. The WQI model is developed in order to facilitate the water quality consideration and assessment of various physical, chemical and biological variables measured in 15 different sampling stations in the length of Siminehroud River in one year seasonally.
This model depends upon the weights of variables which are selected on the basis of a policy of land use in the area as well as considering nature and probable pollution sources. So that Discharge, DO, NO3-NO3, NO2-NO2, PO4, pH, temperature, TSS, EC, Turbidity, COD, BOD5, Total Cl., Fecal Coli form and Total Coli form are measured and used for model.
In the process of this model, new weights and final index are determined using the Shannon Entropy (modification of weights) and TOPSIS method (first final decision dimension-less index) and then apply on one short time period field data. After definition of membership functions in FIS, the new rule base sets are defined based on the final TOPSIS index. In these process experts comments and ideas are considered as first time weights which modified in Shannon entropy method scientifically. New FIS model is run and verified on two season field data set. All in all, if this model applied in our new complex water quality device, it can be used for in-situ studies for any field studies.
So connection between measuring instrument and model employing a data logger and an interface provides for us a new integrated system that can show the WQI on line in field study. The device in prepared as one portable spectrophotometric device. This device jointed with our soft model via and simple interface.
The paper presents the results of filed and desktop studies combining to develop a new innovative device for surface water quality index modeling. According to the data storage and link that allocated between measurement instrument and model, the device could also drive all graphs, interpolation of quality parameters and WQI behavior during a longitudinal/spatial river field survey.

Session 2: Fuels & Combustion

Venue: **Sala Agora-B**
Chair: Prof. Seung-Hoon Yoo
Seoul National University of Science & Technology, Republic of Korea
Time: 9:00-12:00

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R3010

Fuel Cell Amplifier - A Hybrid Fuel Cell Heating Device for Small Medium Size Buildings

Time: 9:00-9:15

Mr. Robert Staiger and Adrian Tantaub
E ẍpert, Germany

Fuel Cell heating (FCH) systems are now available for new and existing buildings. These micro CHP ́s are more efficient in compare to standard fossil driven heating appliances. A different approach is described in this article. The focus point is using a small PEM fuel cell (FC) and amplifies, over a refrigeration circuit similar as a heat pump (HP), on a higher thermal Energy output. So called fuel cell amplifier (FCA) will use pure "hydrogen" and renewable sources like geothermal, air, ground water, waste energy and others. This article attempts to compare the two micro CHP alternatives, tries to answer question from an environmental and energy economic view, and shows an alternative outlook to this kind of innovative heating technology.
Methodologically a model is used to explain the dependency of environmental and energy economic factors for this heating appliances. The economic and technical data ́s are based on the latest patent application from the author, manufacturer and research institutions. The main objective of this article is to analyze todays FC heating systems in compare to this new innovative FCA unit. The possible outcome could be used for entrepreneurs in the H2 field, researchers and H2 institutions for future energy innovation outlooks.

R057-A

Estimation of the Benefits from Integrated Energy-based CHP's Reducing Thermal Discharge: A Comparison with Coal-fired Generation

Time: 9:15-9:30

Ms. Seo-Hyeon Min and **Seung-Hoon Yoo**
Seoul National University of Science & Technology, Republic of Korea

Large-scale power plants are located near the shore to use seawater as coolant in order to deal with waste heat produced during electricity generation. The used seawater is called thermal discharge. The thermal discharge causes harmful effect on coastal area, and thus it incurs civil complaints filed by fishing villages. Meanwhile, integrated energy business (IEB)-based combined heat and power plant (CHP) is free from emission of thermal discharge because it generates electricity and supplies heating by the power plant's waste heat. This study attempts to measure the benefits of reducing thermal discharge from IEB-based CHP. We took the benefits as additional willingness to pay (WTP) of electric charges per 1kWh. By applied contingent valuation method, the WTP estimate was computed to be KRW 48.62 per 1kWh. This quantitative information could be utilized in switching from coal-fired power generation to the IEB-based CHP.

R012

Effect on Performance and Emission characteristics on Direct Injection Diesel Engine Fueled with Soyabean Diesel

Time: 9:30-9:45

Dr. Jeewan Vachan Tirkey and Shailendra Kumar Shukla
CERD, Mechanical Engineering, IIT(BHU), India

Among the alternative fuels biodiesel and its blends are considered suitable and found more promising fuel for diesel engine. In this experimental study performance and emission characteristics of conventional diesel fuel and biodiesel produced from soybean oil and its blends (B10, B20, B30, B40, and B50) are compared at different engine load and constant engine speed at 1500 rpm. At 10% soybean biodiesel blending with conventional diesel shown the best engine performance in terms brake specific fuel consumption and brake thermal efficiency among the all blending ratios for the five biodiesel blends (B10, B20, B30, B40, B50). It was observed that brake thermal efficiency is higher for all blends compared to conventional pure diesel and reached maximum up to 33.82% (29% higher than pure diesel) for B10, however, brake specific fuel consumption (BSFC) increase as blend increase. BSFC of B10 was much closed to pure diesel. CO emission was increased as load increased, however, decreased for all blends. HC of soybean biodiesel was decreased as compare to diesel for all blends and minimum at B10. NOX emission increases significantly for all blends reached maximum at 75% load and thereafter decrease.

R050-A

Measuring the External Benefits of Developing and Utilizing Marine Bio-diesel: A Choice Experiment Study

Time: 9:45-10:00

Ms. Seul-Ye Lim and **Seung-Hoon Yoo**
Seoul National University of Science & Technology, Republic of Korea

In the situations that the investments in developing renewable energies have been increased to cope with global climate change and renewable fuel standard is supposed to be introduced in Korea, the expansion of bio-diesel use as an alternative to a fossil fuel, diesel has recently attracted an important attention. In particular, in addition to land-based bio-diesel that is mostly dependent on imports, research and development of the marine bio-diesel (MDB) extracted from micro-algae cultivated in sea on a large scale have been vigorously conducted. Therefore, this paper attempts to measure the external benefits of developing and expansively utilizing the MBD. To this end, the study applies a choice experiment (CE) and reports the results from a CE survey of the national 600 households. Reduction in greenhouse gas emissions, abatement of air pollution, new jobs creation, and energy security improvement are considered here as external benefits. The conjoint card consists of the four attributes and price. The respondents figured out the MDB and conducted the value judgments required in CE without difficulty. Marginal willingness to pay (MWTP) estimates for each attribute derived can be interpreted as external benefits. The estimation results show that the MWTPs for a 1% reduction in GHG emissions, a 1% abatement of air pollutant, one hundred new jobs creation, and a 1% improvement of energy security caused by expanding MBD use are estimated to be KRW 949 (USD 0.9), KRW 811 (USD 0.8), KRW 259 (USD 0.2), and KRW 2,446 (USD 2.3) per household per month. The results show that they placed a statistically significant value on the external benefits from the MDB. The findings can provide policy-makers with useful information for evaluating and planning MDB-related policies and projects.

Break Time& Poster Session: 10:00-10:30

R054-A

An Empirical Investigation of the Korean Public's Willingness to Pay for Expanding the Use of Solid Refuse Fuel

Time: 10:30-10:45

Ms. Hyo-Jin Kim, So-Yeon Park, and **Seung-Hoon Yoo**
Seoul National University of Science & Technology, Republic of Korea

Solid refuse fuel (SRF), a solid fuel that is produced from non-hazardous combustible waste, can mitigate greenhouse gas emissions compared with fossil fuels. The Korean Government plans to enhance the ratio of combustible waste converted into SRF from 16% in 2014 to 100% in 2020 by increasing the number of facilities that make and use SRF. This paper

attempts to investigate empirically the Korean public's willingness to pay (WTP) for expanding the use of SRF. The WTP data were obtained from a one-and-one-half-bounded dichotomous choice contingent valuation survey of 1,000 households. Because a considerable number of respondents (62.6%) gave a zero WTP response, we applied a spike model to treat the WTP data with zero observations. The spike model fitted the data well considering that all the coefficient estimates are statistically significant at the 1% level. The yearly mean WTP was computed as KRW 2,479 (USD 2.17) per household for the next 10 years, which is also statistically meaningful at the 1% level. Expanding the value to the national population gives us KRW 46.4 billion (USD 40.5 million) per year. The present value of the total public WTP amounts to KRW 369.0 billion (USD 322.3 million) using a social discount rate of 5.5%. We can conclude that Korean households are ready to shoulder some of the financial burden to expand the use of SRF.

R060-A Energy Eonsumption, CO_2 Emission, and Economic Growth: Evidence from Philippines

Time: 10:45-11:00

Mr. Se-Jun Jin and **Seung-Hoon Yoo**
Seoul National University of Science & Technology, Republic of Korea

The paper investigates the causal relationship among energy consumption, carbon dioxide (CO_2) emissions and economic growth in Philippines. It uses annual data covering the period 1965-2014. Tests for unit roots, co-integration, and Granger-causality based on error-correction model are presented. Causal relationship analysis results are summarized into three branches. First, there are bi-directional long-run causality and strong causality from energy consumption and CO_2 emissions. This means that an increase in energy consumption directly affects CO_2 emissions and that CO_2 emissions also stimulate further energy consumption for long running and strong. Nevertheless, there is uni-directional short run causality from CO_2 emissions to energy consumption. Second, energy consumption and economic growth, there are uni-directional for long-run, short-run and strong causality from economic growth to energy consumption. This means that economic growth can induce energy consumption but not vice versa. Lastly, economic growth and CO_2 emissions exists uni-directional short and long causal relationship from economic growth to CO_2 emissions and bi-directional strong causal relationship. As a result, bi-directional causality is found between energy consumption and CO_2 emissions and economic growth and CO_2 emissions. Uni-directional causality is found between energy consumption and economic growth.

R051-A The External Benefits of Expanding the Micro Photovoltaic Power Generation in Korea: A Contingent Valuation Study

Time: 11:00-11:15

Mr. Yong-Cheol Cho and **Seung-Hoon Yoo**
Seoul National University of Science & Technology, Republic of Korea

The micro photovoltaic (MPV) is a good alternative for reducing greenhouse gas (GHG) emissions in the residential areas. Therefore, the Korean government has planned to expand the MPV power generation from about 2,000 households (6MW) in 2014 to 25,000 households (61MW) by 2017. This article aims to assess the external benefits of this expansion in terms of reducing GHG emissions. To this end, we derive the public's additional willingness to pay (WTP) for the expansion through an increase in electricity bill using a contingent valuation survey of 1,000 Korean households. For the purpose of mitigating the response effect in eliciting their WTP and increasing statistical efficiency in analyzing the WTP data, we employ a one-and-one-half bounded (OOHB) dichotomous choice question format. Furthermore, we use the spike model so as to model zero WTP responses. The mean additional WTP for the expansion is computed to be KRW 15.48 (USD 0.01) per kWh. This value amounts to 12.4% of the residential electricity price, KRW 125.14 (USD 0.11). We can conclude that Korean households are ready to shoulder some of the financial burden of expanding the MPV power generation.

R087-A BiodieselAnalyzer©: An Innovative Software to Predict Biodiesel Properties

Time: 11:15-11:30

Ahmad Farhad Talebi and **Assist. Prof. Meisam Tabatabaei Pozveh**
Agricultural Biotechnology Research Institute of Iran (ABRII), Iran

Increasing urbanization and industrialization has intensified the need for various types of renewable sources energy such as biofuels. Characterization of various biofuels like biodiesel is time-consuming and occasionally very expensive. Information technology (IT) and artificial intelligence have brought about promising achievements by introducing innovative methods capable of predicting the fuel properties. BiodieselAnalyzer© software presented herein could accurately predict biodiesel quality parameters as well as its combustion characteristics. More specifically, BiodieselAnalyzer© in its various versions has made it possible to estimate 16 most important quality characteristics of biofuels prior toe production, saving lots of time and finantial resources. The prediction is performed based on the fatty acid methyl ester profile of any oil feedstocks. It is only required to determine the percentage of fatty acids in an oil sample by Gas Chromatography to have the inputs needed by the software. BiodieselAnalyzer© is capable of predicting the following properties: saturated and unsaturated fatty acids, degree of unsaturation, sponification value, iodine value, cetane number, long chain saturated factor, cold filter plugging point, cloud point, pour point, allylic and bis-allylic position equivalent, oxidation stability, higher heating value, kinematic viscosity and density. The current versions of the BiodieselAnalyzer© is intended for Windows and Android platforms and is publically available at http://www.brteam.ir/biodieselanalyzer.

R089-A Enhanced Algal-based Treatment of Petroleum Produced Water and Biodiesel Production

Time: 11:30-11:45

Ahmad Farhad Talebi and **Assist. Prof. Meisam Tabatabaei Pozveh**
Agricultural Biotechnology Research Institute of Iran (ABRII), Iran

Millions of barrels of produced water (PW) are generated on a daily basis in petroleum-rich regions around the world. A locally isolated microalgal strain identified as Dunaliella salina was used to treat PW herein. The results showed that the application of the PW increased biomass production and lipid content by approximately 120 and 65% compared with the control (sea water), respectively. Consequently, significantly higher lipid productivity values (2–3.6 times) were achieved using the cultures enriched by different ratios of seawater and PW (1 : 1 to 3 : 1). Moreover, bioprospection by FAME profiling revealed that the inclusion of PW in the culture media altered some properties of the resultant biodiesel. More specifically, cold flow properties were improved by PW enrichment while oxidative stability was deteriorated. From the bioremediation point of view, the studied marine strain, D. salina coped well with the salinity fluctuations in wastewater and was found to be highly capable of removing nitrogen by 65% and phosphorus by 40%. Biosorption of toxic heavy metal pollutants such as Ni and Zn were also achieved at considerable rates of approximately 90 and 80%, respectively. Overall, the integrated strategy presented herein seemed very promising in minimizing the operating expenses of PW treatment while concurrently offering a sustainable platform to improve algal biodiesel production both in terms of quantity and quality.

Session 3: Bio-energy & Energy Development

Venue: **Sala Agora-C**

Chair: Prof. Anabela Leitão

Universidade Agostinho Neto

Time: 9:00-12:00

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R001-A

Bioenergy, Bioeconomy and Small-scale Private Forest Owners – A European Perspective

Time: 9:00-9:15

Dr. Pradipta Halder
School of Forest Sciences, University of Eastern Finland

New policies have been emerging in Europe regarding both bioenergy and bioeconomy. Use of forest biomass in producing electricity and heating is expected to grow in Europe by 2020 and beyond. The European Bioeconomy Strategy of 2012 aims to reduce the dependency on fossil fuels, mitigate climate change, and create jobs. Forestry sector can play a significant role in meeting the objectives of the European Bioeconomy Strategy by supplying a range of raw materials for different bio-based industries including the advanced biofuels industry. More than half of Europe's forests are owned by small-scale private forest owners (PFOs) who have diverse objectives related to forest management. However, there are several challenges in mobilizing energy wood from such forests in Europe. The present study aims to analyze different aspects of mobilizing biomass from forests owned by the PFOs and their significance for the bioenergy and bioeconomy related policies in Europe. The study will use data from various sources (e.g. primary data from surveys, interviews, and secondary data from literature). It is expected that the study will generate a new body of knowledge and provide inputs for the future socio-political research related to European bioenergy and bioeconomy strategies.

R014-A

Establishment of an Allele-Specific SYBR Green real-time PCR Assay for Detecting Resistance of Botrytis Cinerea to Four Fungicides

Time: 9:15-9:30

Mr. Baobei Lyu, Fei Xie, Xin Zhang, Pengxiang Zhao and Xuemei Ma
College of Life Science and Bioengineering, Beijing University of Technology, Beijing, China

Chemical fungicides with site-specific mode of action were mainly applied to control various agriculture diseases since 1970s. The indiscriminate use of pesticides leads to a lot of environmental problems all around the world. Grey mold disease, caused by the fungus Botrytis Cinerea (B. Cinerea), is responsible for some severe losses all over the world. After evolving for more than 40 years, B. Cinerea with resistance to at least one fungicide, or even multiple fungicides have existed in many field, because of the ability to change and adapt to the fungicides. A rapid and reliable allele-specific (AS) real-time PCR assay to detect the mutations of four genes was developed, including SdhB, β-tublin, Bos1, and Erg27, which leads to the resistance of B. Cinerea to boscalid, benzimidazoles, fenhexamid and iprodione respectively. Wild and mutational plasmids of the mutational sites were constructed as the standard samples to evaluate the specificity of AS primers. The difference in Ct value of wild and mutational plasmids were more than 12 cycles. All the 19 isolates DNA of B. cinerea obtained were tested by this assay, for which as low as 0.1ng isolates DNA could be detected

and the mutant template mixed with the wild template could be detected down to 0.01%. One of the most significant advantages is that it takes only less than 2 hours for one reaction. In addition, it can avoid contaminations as the reaction was performed in a single closed tube. This method therefore may provide guide significance for the fungicides use in the fields.

R021 Reality in the Kinetic Modelling of Pyrolysis of Plant Fuels

Time: 9:30-9:45

Dr. Tao Junjun and Wang Haihui
State Key Laboratory of Fire Science, University of Science and Technology of China Hefei, China

This work investigated the physical nature of kinetic data for plant pyrolysis obtained by using global single component reaction model (GSCRM). The mass change and rate data of leaf and stem (twig) samples of 12 coniferous and broadleaf plant species were collected at a constant heating rate in an inert atmosphere. The kinetic data for pyrolysis of the plant samples were retrieved by using GSCRM, and then were compared with those obtained by the multi-component reaction model. It was found that the apparent activation energy for pyrolysis of leaf samples varies from 43 to 80 kJ mol 1, whereas that of the stems (twigs) ranges between 84 and 110 kJ mol 1. The activation energy determined for the decomposition of the hemicellulose, cellulose and lignin of the samples essentially fluctuates in narrowed ranges. Further analyses revealed that the apparent activation energy obtained from GSCRM is essentially dominated by the cellulose content of the samples, which does not correspond to the energy barrier of any reactions occurring during plant pyrolysis. Nevertheless, GSCRM is still useful in the theoretical modeling of plant pyrolysis because of its practicability and reasonable accuracy exhibited.

R053 Cost-Benefit Analysis With GIS: An Open Source Module For The Forest Bioenergy Sector

Time: 9:45-10:00

Mr. Gianluca Grilli, Giulia Garegnani, Francesco Geri, Marco Ciolli
University of Trento, Italy

This paper introduces a novel methodology for the optimal use of forest biomass for energy purposes, by means of GIS procedures. The method allows the identification of the most suitable area for a power plant, starting from the energy demand and the local availability of wood resources. After the site identification, the procedure conducts a cost-benefit analysis, including financial and environmental flows. The described methodology has been automatized in GRASS GIS, which is a free and open source GIS software, and now constitutes a downloadable add-on. In this contribution, we tested such procedure in a case study in Italy, the alpine valleys of Gesso and Vermenagna in Piedmont region (North-West of Italy).

Break Time& Poster Session: 10:00-10:30

R136-A Investigation of Superoxide Dismutase Activity and Carotenoid Content in Dunaliella Salina under Different Stress Conditions

Time: 10:30-10:45

Dr. Melih Onay
Yuzuncu Yil University, Turkey

Microalgae are important economical biomass sources of industrial area such as food, cosmetics, byproduct and biofuel. D. Salina is one member of the genus Dunaliella (Chlorophyceae, Volvocales), is an extremely halotolerant, and a unicellular biflagellate marine green microalgae. They produce reactive oxygen species during cellular respiratory electron transport systems and photosynthetic electron transport systems. Production of reactive oxygen species can increase under unsuitable stress conditions. But, microalgae try to survive some adaptation strategies such as active compounds, carotenoid production, and antioxidant enzyme systems, super oxide dismutase, under these conditions, microalgae can produce high amounts of carotenoids and more than 90% of commercial β-carotene are chemically synthesized in industry and it can be used as pro-vitamin A in food, additive at cosmetic industry and food colouring agent. In this study, we examined the antioxidant

enzyme, superoxide dismutase, activity and active compound, the carotenoid content, on various stress conditions such as high irradiance (and 50 between 250 µmol photons m-2 s-1) salt concentration, temperature (and 4 between 37 0C), and some nutrient deficiencies (Cu, Na, Mn, Zn, Fe). In conclusion, the results presented that the superoxide dismutase activity and the carotenoid content changed in D. salina under different stress conditions. Carotenoid content most likely increased under stress conditions.

R3024

A Memetic Computing Approach for Unit Commitment with Energy Storage Systems

Time: 10:45-11:00

Assoc. Prof. Coriolano Salvini and S. Monacchia
Dipartimento di Ingegneria-Universit à degli Studi ROMA TRE, Via della Vasca Navale 79, Italy

The increasingly utilization of renewable energy sources calls for the introduction of energy storage systems to match the electric demand along the time. The intermittency and unpredictability of renewable energy source availability cause relevant problems in terms of grid balance and stability. Energy storage systems can give a relevant contribution in providing clean and efficient grid ancillary services (frequency control, grid balance, reserve, etc.) required to ensure stable and safe grid operations. On the other side, capital costs required to install an appropriate energy storage capacity could be prohibitive. To explore the potential benefits achievable by installing energy storage devices in an electric grid, a generalized unit commitment algorithm has been developed. The adopted approach integrates original memetic operators into a genetic algorithm. To evaluate the optimal amount of energy storage, the memetic computing approach has been coupled with a recursive quadratic programming optimizer. The computational code has been applied to a test case available in literature. Results show a good capability of the proposed algorithm to find really satisfactory solutions in reduced computational time.

R067-A

Chemical Characterization of Total Petroleum Hydrocarbons (TPH) in Produced Water Discharges for Dispersion Modeling

Time: 11:00-11:15

Dr. Gholamreza Bahmannia, Kobra Verijkazemi
Department of Management, South Pars Gas Complex,, Phase 12 Gas Plant, Asaluyeh, Iran

The discharge of produced water accounts for the largest volume of waste associated with offshore oil and gas production operations. With the development and expansion of Iran's offshore gas reserves in the South Pars fields, there is concern over the potential long-term impacts of produced water discharges in the Persian Gulf. To deal with this emerging issue, the present study focused on chemical characterization of oily components in produced water of all operational platforms. The measurement of oil in produced water is important for both process control and reporting to regulatory authorities. The concentration of oil in produced water is a method-dependent parameter, which is traditionally evaluated using reference methods based on infrared (IR) absorption or gravimetric analysis, although Gas Chromatography and Flame Ionization Detection (GC-FID) have recently become more accepted. In this paper at first the quantity and quality of produced water are measured and reported for one year and some statistical reviews has done. Determination of the oil content of effluent water - Extraction and infra-red spectrometric and OSPAR Reference Method which is the standard method for dispersed oil in produced water analysis in the UK for both oil and gas facilities was used as standard method. Statistical analysis showed that data of platforms are acceptable and useful for mathematical modeling input which is an effective tool for the management of Persian Gulf operational platforms' oily water discharges Oil dispersion model, which includes hydrodynamic model and qualitative water model from produced water, has been done for a year for each discharge location and validated by lab test analysis.

R031 Prediction of Calorific Value of Biomass from Proximate Analysis

Time: 11:15-11:30

Dr. Ayse Ozyuguran and Serdar Yaman
Istanbul Technical University, Turkey

Biomass is one of the renewable and sustainable energy sources that does not lead greenhouse gas emissions. Efficient use of biomass energy will help to solve problems resulting from fossil fuels. However, the main concern relevant to use of this energy is mainly related to low calorific value of biomass. Therefore, calorific value is the key parameter to evaluate the fuel quality of a special biomass material in energetic applications. In this context, twenty-seven different biomass species that represent very wide range of biomass materials such as herbaceous and woody biomasses, nut shells, fruit stones, stem and husks, pulps, and agricultural residues have been characterized by proximate analysis (moisture, volatile matter, fixed carbon, and ash contents). Then, various empirical equations which contain linear and nonlinear terms have been tested in order to predict the higher heating values (HHV) of full sample set from the proximate analysis results. For this purpose, ordinary least square (OLS) method was implemented. It was concluded that since biomasses used in this study have different structures and fuel characteristics, the predicted HHVs for the full sample set were a bit different from the experimental HHVs and the r2 of these equations varied in the range of 0.812-0.837, while standard deviations were between 1.469 and 1.493 MJ/kg. Nevertheless, considering the number of the biomass species used in this study and their differences in properties, these standard deviations may be regarded in the acceptable limits.

Session 4: Renewable Energy & Battery

Venue: **Sala Agora-A**

Chair: Prof. Carlos Felgueiras & Co-chair: Prof. Nidia Caetano

Polytechnic of Porto, Portugal

Time: 13:00-18:00

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R026

Optimal Load Shedding in Electricity Grids with Renewable Sources via Message Passing

Time: 13: 00-13:15

Ms. Elizabeth Harrison, David Saad and K. Y. Michael Wong
Aston University, United Kingdom

The increased penetration of volatile and intermittent renewable energy sources, such as wind and solar, as generators in electricity grids challenges existing power distribution methods. The current dispatch method was not designed to consider such high levels of volatility; this paper suggests and analyses a principled algorithm called message passing which complements current techniques due to its probabilistic nature which inherently accommodates fluctuations such as those of renewable sources. Message passing is based on statistical physics methodologies and passes probabilistic messages locally as conditional probabilities in order to find the approximate global optimal solution for a given objective function. The computational complexity of the algorithm increases linearly with the system size, allowing it to solve large-scale non-convex resource allocation problems. By representing fluctuations as Gaussian probability distributions, we show how message passing considers fluctuations effectively within a network and is used to prioritise consumers in the event of insufficient resource. We demonstrate the efficacy of the algorithm in managing load shedding and power distribution on a synthetic benchmark IEEE network and discuss the role of weights in the trade-off between minimising load shedding and transmission costs.

R003

Maximum Available Capacity and Energy Estimation Based on Support Vector Machine Regression for Lithium-ion Battery

Time: 13:15-13:30

Dr. Zhongwei Deng, Lin Yang, Yishan Cai and Hao Deng
Shanghai Jiao Tong University, China

The practical application of electric vehicle needs a battery management system to monitor the battery states in real-time, accurate and robust. The state of charge (SOC) which means the ratio of the remaining capacity over the maximum available capacity (MAC) is a crucial index of battery. While the state of energy (SOE) which is similarly defined as the ratio of the remaining energy over the maximum available energy (MAE) provides better embodiment of electric vehicle driving range than SOC. In order to calculate the SOC and SOE, usually the MAC and MAE need to be derived in advance. Besides, the MAC and MAE can be used to indicate the state of health of battery, and keep invariant in a relatively long time. However the estimation of these two parameters is a difficult task due to the complicated and comprehensive influences by temperature, aging level and discharge rate. In this paper the data-driven algorithm, namely least squares support vector machine is implemented to accurately estimate the MAC and MAE, and the influences of temperature and degradation are taken into consideration. Meanwhile, the effect of discharge rate is

compensated by multiplying the current correction term according to the Peukert's law. The experiment results verify the proposed methods have excellent MAC and MAE estimation accuracy for LiFePO4 battery.

R005-A

Recycling of Silicon Scraps from Solar Cell Materials Industry by Electron Beam Melting

Time: 13:30-13:45

Mr. Shiqiang Qin, Dachuan Jiang, Pengting Li, Shuang Shi and Yi Tan
Dalian University of Technology, China

The growing demand of solar-grade silicon is driven by the development of solar cells industry. Silicon takes up most of the photovoltaic market as a commonly used raw material for solar cells. There are nearly 120,000 tons of silicon scraps which are wasted due to the high content of inclusions, mainly SiC and Si3N4, during the directional solidification process to produce solar-grade silicon. To recycle these silicon wastes may tremendously save resources and reduce production cost. In our research, electron beam melting (EBM) was used to understand SiC migration in multi-crystalline silicon. EBM will affect impurity migration during the process since the advantages of high temperature, high vacuum, high temperature gradient and strong ability of melt stir and convection it possesses. As a result, we found that SiC continually precipitates at the ingot bottom and inclusion-free silicon ingot is obtained. The presence of Si3N4 can be heterogeneous nucleation agent for SiC to nucleate continually. It is also found that oxygen plays an important role on the migration of the dissolved carbon. The formation of carbon-oxygen complexes tend to migrate to ingot top since oxygen can transfer from silicon melt to vacuum environment during EBM. The nucleation and sedimentation of SiC can be attributed to the comprehensive effect of melt convection, temperature gradient and the solidification process. The results shed light on the behavior of SiC and Si3N4 inclusions in silicon and can be a guidance to recycle silicon scraps.

P0010

Wind Power Resource Assessment in Complex Terrain: Villonaco Case-study Using Computational Fluid Dynamics Analysis

Time: 13:45-14:00

Mr. Manuel Ignacio Ayala Chauvin, Jorge Luis Maldonado Correa, Edwin Bladimir Paccha Herrera and Carles Riba Romeva
Universitat Politècnica de Catalunya, Spain

This paper describes a complex terrain wind farm case study in the Ecuadorian Andes. The Villonaco Wind Farm is located in southern Ecuador, 640 km of Quito, where it has been operational since 2013 at an altitude of 2700 m a.s.l. with 16.5 MW power output. For this site, a case study was performed to evaluate different types of wind assessment methodologies in complex terrain. Wind assessment in complex terrain is a more demanding task than site assessment in flat terrain: modelling wind conditions with standard linear models such as WASP do not sufficiently reproduce wind conditions in complex terrain. The main objective of this paper is to compare actual power production from an existing wind farm with power production predicted by Meteodyn WT, which is a CFD tool based on a nonlinear flow model. The results of this work show that the calculation of the annual energy production of the Villonaco Wind Farm using Meteodyn WT is equal to 69.0 GWh / year, with a capacity factor of 50%, which matches closely the measured output during the period of analysis.

R029-A

Assessing the Feasibility of Solar Water Pumps in Soan Valley, Punjab, Pakistan

Time: 14:00-14:15

Ms. Zenab Naseem and Sadia Imran
Lahore School of Economics, Pakistan

Energy is considered to be life line of any economy and most vital instrument of socioeconomic development of a country This paper explores the option of solar energy being socially, economically and environmentally viable. Primary data of 36 households have been collected from Soan valley, Kallar Kahar. First, we analyzed data from 36 households to see the viability of Solar energy in irrigating the land. 12 households each that use diesel water pumps, electric pumps and solar water pumps are compared in terms of

economic viability and net present value (NPV) to see that if the cost of the installation and running of solar pump is economically viable. Secondly, we assessed the social impact of the solar water pumps in comparison with diesel and electric through interviews of a randomly selected sample. Third, we did an environmental impact assessment through an LCA with the help of a software.

R020 Optimized Control and Sizing of Standalone PV-Wind Energy Conversion System

Time: 14:15-14:30

Dr. Hocine Belmili, Sabri Boulouma , Bendib Boualem, Almi Med Fay çal
Unit é de D éveloppement des Equipements Solaires, UDES/, Algeria

This paper presents an advanced optimization method for a PV-Wind energy conversion system. This method is based on the use of an advanced control of DC-DC and AC-DC regulator in PV-Wind standalone system. Under this topology a fuzzy logic control is applied to extract the maximum power point of the photovoltaic generator (PVG) and the wind generator (WG). As consequences an optimal sizing of the system by reducing their total cost is designed.

R2007 Benefits of Scenario Planning Applied to Energy Development

Time: 14:30-14:45

Prof. Barry A. Benedict
University of Texas at El Paso, USA

Scenario planning was first used effectively by Royal Dutch Shell approximately 40 years ago. The company recognized that efforts to predict exactly the future are unlikely to be very successful. The premise of scenario planning is that organizations look at possible future trends and project several possible futures (or scenarios). The intent is to project enough such scenarios, even unlikely ones, that they "bracket" possible futures. This enables one to assess the ability of their policy, process, or design to perform positively within any of the scenarios and thus represent a truly robust choice. This paper briefly describes some examples of use of scenario planning within the energy sector, as well as some unusual factors that may influence the outcomes.

R055 Optimizing and Controlling the Productivity of a Flat Plate Collector by Using an Electronic System

Time: 14:45-15:00

Mr. Kamal Anoune, Mohsine Bouya, Abdellatif Ben Abdellah, and Abdelali Astito
Laboratory of Renewable Energies and Advanced Materials, International University of Rabat (UIR), Morocco

The Flat Plate Collector (FPC) is a thermal solar collector used in housing or residential applications. It allows the conversion of solar radiation to thermal energy (e.g. hot water). In this paper we propose a new approach that improves the hot water production through the combination between a simple and improved architecture model (e.g. electronic control & thermal process) of the FPC. While the optimization of the thermal energy efficiency is guaranteed by using an electronic architecture that controls the mono-axial tracker and provides the on request of the hot water by using an electric resistance. Finally, we have conducted several experimental tests aiming the comparison between the stationary and improved FPC, while we use several curves and graphics in order to present the gain obtained in the thermal energy taking into consideration the global solar radiation, thermal energy production, electrical power consumption and residential consumer behavior of hot water.

Break Time: 15:00-15:15

R083

Method to Determine Auto-consumption Profitability

Time: 15:15-15:30

Mr. Alexandre CHOURAQUI, **Constance Bonnefous**, **Yohan Aknin**, **Nicolas Seurat** and Manon Bottausci
ECE Paris School of Engineering, France

Recognition of the notion of "sustainable development" in 1997 Kyoto climate protocol agreement fostered the evolution of mentalities and the appearance of many eco-citizen behaviors. In this context, it is interesting to focus on a new mode of consumption termed auto-consumption. Auto-consumption is possible with all renewable energies, but here only solar energy has been considered. Present study aims at giving clues for the choice of energetic consumption management mode. This includes economical, technological and energy optimization for a photovoltaic solar installation, using self-consumption. It enables to achieve key results such as finding cities location where auto-consumption is theoretically profitable, and/or electricity price limit necessary to make it profitable.

R099

Nanostructure and Property of Electrospun SiO_2-Cellulose Acetate Nanofiber Composite by Electrospinning

Time: 15:30-15:45

Dr. Muhamad Nasir
Indonesian Institute of Sciences (LIPI), Indonesia

SiO2-cellulose acetate nanofiber has been synthesized by electrospinning process in high humidity environment. The optimum synthesis of nanofiber was obtained in following condition; applied voltage 21 kV, distance between nozzle to collector 15 cm, polymer solution flow rate 0,004 mL/h, polymer concentration 17% w/v, SiO2 concentration 1% w/v, mixture of acetone and N-N DMAc (2:1) as solvent and average humidity 75%. SiO2-cellulose acetate nanofiber with average diameter 598 nm has smooth morphology without bead on fiber string after characterized by scanning electron microscopy. Specific functional group of silica and cellulose acetate on nanofiber were analyzed by ATR-FTIR spectroscopy. Vibration band peak at around 1020 cm-1 and 1747 cm-1 showed functional group C-O and C=O of cellulose acetate, respectively. Vibration band peak at around 3448 cm-1 showed stretching of OH group of cellulose acetate. Silica in nanofiber was identified in vibration band peak at around 460 cm−1 for Si–O–Si bending and at around 808 cm-1 for symmetric stretching vibration of the Si–O–Si. Small amount of SiO2 in cellulose acetate nanofiber gave significantly impact of wetting property of nanofiber. Spreading time of water droplet to complete wetting on surface of cellulose acetate nanofiber was 37 second. Water droplet on SiO2-cellulose acetate was stable for several minute. SiO2-cellulose acetate nanofiber has potential application for water purification and lithium ion battery separator.

R111

Economic Analysis of Hybrid Renewable Energy Systems with V2G Integration Considering Battery Life

Time: 15:45-16:00

Mr. Ulas Baran Baloglu and Yakup Demir
Tunceli University, Turkey

Hybrid renewable energy systems considered as candidate solutions for environmental problems. Solar energy and wind energy are important components of these systems, but both of them cause fluctuations in the grid. Batteries of Electric Vehicles (EVs) can be connected to the grid to create an ancillary resource. These systems known as Vehicle to Grid (V2G) and they could be the most suitable solution to the fluctuation problems of renewable resources. In this paper, economic analysis of V2G is investigated from various perspectives. The findings of this study indicate that battery aging costs of a V2G system can be minimized with an intelligent energy management system, and these systems are both economically and environmentally better alternatives to fossil-fuelled generators.

R115-A

Design and Fabrication of Radioisotope-based Micro Battery

Time: 16:00-16:15

Ms. Jin Joo Kim, Kwang Jae Son, Sang Mu Choi and Young Rang Uhm
Korea Atomic Energy Research Institute (KAERI), Republic of Korea

A radioisotope battery that converts the decay energy of a radioisotope into electricity offers advantages for application requiring a long lifetime without recharging. It is used in many low-power applications because it can operate effectively under extreme environmental conditions. For a betavoltaic battery, beta rays emitted from a beta source can cause the generation of an electron-hole pair onto a semiconductor, and produce electricity. And combining the solar cells or secondary cells can produce the new hybrid battery. A radioisotope used as a power source is the important factor affecting the performance of a betavoltaic battery. Ni-63, pure beta emitter with a low energy spectrum and long half-life, is widely used as the power source. In this study, we fabricate a betavoltaic battery using Ni-63. The electroplating was carried out to form Ni deposits. The plating bath was composed of 0.2 M Ni ions, and a current density of 10 mA/cm2 and pH=4. A prototype for electroplating radioactive Ni-63 was also established. And lastly, we design radioisotope-based hybrid battery using Ni-63 for space or military applications.

R135

Design Recommendations for Humidification-Dehumidification Solar Water Desalination Systems

Time: 16:15-16:30

Dr. Saleh Shalaby, Mohamed Bek and Abd-Elnaby Kabeel
Tanta University, Egypt

In this work, the humidification-dehumidification solar desalination systems (HDHSDS) are outlined and general recommendations for the future work are given. The effect of mass flow rates and temperatures of saline water and air on the productivity of the desalination system are taken a lot of interest in this work. From the detailed analysis already published, it is concluded that the productivity of the HDHSDS significantly increases when the temperature of the feed water increases, so, high temperature solar water collectors as parabolic trough or evacuated tube collectors are recommended for these systems. On the other hand, the effect of air temperature on the productivity of the HDHSDS is insignificant. Thus, the utilization of solar air heater is not recommended in these systems. Based on these recommendations, three research points are suggested for future work: using the recovered PV thermal energy for heating the feed water in the HDHSDS. This will provide an annual fresh water productivity more than 833 L per one m2 of PV in addition to 278 kWh of electricity, using phase change material (PCM) with melting temperature around 90 ˚C as a thermal energy storage medium to provide feed water with high and almost constant temperature during the day and keeps the system in operation 24 h/day, using the thermal energy rejected from the thermal power cycles for water heating in the HDHSDS.

R052

Recovery Zinc and Manganese from Spent Battery Powder by Hydrometallurgical Route

Time: 16:30-16:45

Mr. Chin-Ting Liao, Wei-Sheng Chen and Kuan-Yan Lin
National Cheng Kung University, Taiwan (R.O.C)

This research focus on the recovery of zinc and manganese from spent Zn–MnO2 battery electrode powder, containing 30.1% of manganese and 25.6% zinc. Metals recycling are reductive leached by sulfuric acid and selective precipitated by sodium hydroxide. The effects of sulfuric acidity, leaching time, solid-liquid ratio, reaction temperature were investigated. Zinc can totally dissolved in sulfuric acid, but leaching rate of manganese is only 60% because of the existence of Mn (IV). Ascorbic acid, citric acid and oxalic acid were tested as the reducing agent. And ascorbic acid performs the better efficiency than the others. The optimal reductive leaching condition were determined as 0.5 mol/L of sulfuric acid, 20 ml/g, 25˚C, ascorbic acid dosage 10g/L for 2hours. Leaching efficiency of the two metals were up to 98%. After leaching step, Zn2+ and Mn2+ were selectively precipitated from the solution by sodium hydroxide. Adjusting pH to 13 for Mn(OH)2 precipitation and then adjust pH value to 10 to precipitate Zn(OH)2 and the hydroxides convert to MnO2 and ZnO by calcination respectively. The recovery rates are about 91% for Zn and 94% for Mn

with high purity. The metal oxides can be secondary raw material to achieve circulation of resources.

R3001

Understanding Full Life-Cycle Sustainability Impacts of Energy Alternatives

Time: 16:45-17:00

Prof. Barry A. Benedict
University of Texas at El Paso, USA

Pragmatic and reliable methods for assessing sustainability remain difficult for many organizations. Further, understanding the three elements of sustainability over the full life cycle of products and processes is essential. In some cases, understanding environmental issues is the easiest area. However, economic and social issues are less well understood. Life Cycle Sustainability Analysis is a framework for reviewing all three areas and enabling not only full coverage but understanding balancing and interactions between the elements. This paper reviews the three elements of sustainability, life cycle assessment, and analysis and evaluation of the three elements over a life cycle. These frameworks will be described so as to facilitate development of ways to help decision makers present proposals and illustrate results. Means are presented to enable illustration of findings to both expert and non-expert audiences. Specifically, uses of the life cycle sustainability triangle and the life cycle sustainability dashboard will be presented. Examples will be presented for a comparison of solar PV panels. Other examples include alternative energy sources in Mexico to 2050, contrasting alternative vehicles, and electricity scenarios in the UK to 2070.The paper is intended to help practitioners better understand linkages between the three elements of sustainability and ways to analyze them.

R112

Impacts of Load Shifting on Renewable Energy Integration

Time: 17:00-17:15

Mr. Christian Wimmler, Golnar Hejazi, Eduardo De Oliveira Fernandes, Carlos Moreira, and Stephen Connors
University of Porto, Portugal

Renewable energy generation, mainly from time variable sources, has increased rapidly in recent years. For energy planners capacity sizing in new generation units becomes a challenge, especially because end-user interactions occur on the demand side through smart grid development as well as adoption of smart appliances that may lead to significant changes in consumer behavior. Hence, renewable energy generation may be curtailed more frequently in hours where the expected demand is lower than generation from renewable sources as well as back-up and baseload units. Demand side measures should be considered more thoroughly to define capacity limits. An analysis of load shifting is performed for São Miguel Island, Azores, and indicates that through defined rules of load shifts the base load limit can be elevated and new limits for the maximum installed capacity can be set. The effects of load shifts, especially in isolated systems, should be considered in the decision making since investments in additional renewable energy capacities can be limited and back-up capacities can be reduced.

R3005

Development of a Bottom-up Technology Assessment Model for Assessing the Low Carbon Energy Scenarios in the Urban System

Time: 17:15-17:30

Assoc. Prof. Hooman Farzaneh
Institute of Advanced Energy, Kyoto University, Japan

This paper explores an approach based on a systematic-integrated modeling framework which helps to investigate the optimal behavior of an urban energy system. The model allows us to: 1) analyze the impacts of various demographic scenarios, 2) test and evaluate different policy measures for deploying patterns of efficient use of energy resources and emissions mitigation in the system and 3) test technological and system level solutions such as centralized versus decentralized energy supply networks. A highly resolved optimization technique using mathematical programming is applied to identify the cost-effective measures for achieving specific energy and emissions reduction-targets. The model then is applied to identify the optimal energy flow from available energy resources (Fossil,

Renewable and external sources) to the end-user level in selected cities of Asia.

R128 Estimation of monthly average hourly global solar radiation from the daily value in Çanakkale, Turkey

Time: 17:30-17:45

Özge Ayvazoğluyükse and Ümmühan Başaran Filik
Electrical and Electronics Engineering, Anadolu University, Turkey

Solar energy has come into prominence due to its sustainability, emission-free and ease of use considering the harmful nature of fossil resources in recent years. Accurate information on global radiation is essential to achieve the goal of planning and projection of a solar power system. Global solar radiation measurements provided by meteorology lack of reliability and some of the data are missing. At this point, global solar radiation estimation has an important role in designing energy systems that are based on solar energy. In this study, six different global radiation models are considered to estimate the monthly average hourly global radiation from the daily value in Çanakkale, which is located in the northwest of Turkey. The models are validated with hourly global radiation measurements provided by the Turkish State Meteorological Service. Based on the analysis of mean absolute bias error (MABE), root mean square error (RMSE), mean bias error (MBE) and t-statistical test, accuracy of the existing models is obtained. The results indicate that the Collares - Pereira and Rabl model modified by Gueymard (CPRG) is the most accurate one, and this model is proposed to obtain the hourly global radiation averaged over the months in elsewhere that has the similar climate with the northwest of Turkey.

R3038 Stochastic Prediction of Offshore Wind Farm LCOE through an Integrated Cost Model

Time: 17:45-18:00

Ms. Anastasia Ioannou, Andrew Angus, and Feargal Brennan
Cranfield University, UK

Common deterministic cost of energy models applied in offshore wind energy installations usually disregard the effect of uncertainty of key input variables – associated with OPEX, CAPEX, energy generation and other financial variables – on the calculation of levelized cost of electricity (LCOE). The present study aims at expanding a deterministic cost of energy model to systematically account for stochastic inputs. To this end, Monte Carlo simulations are performed to derive the joint probability distributions of LCOE, allowing for the estimation of probabilities of exceeding set thresholds of LCOE, determining certain confidence intervals. The results of this study stress the importance of appropriate statistical modelling of stochastic variables in order to reduce modelling uncertainties and contribute to a better informed decision making in renewable energy investments.

Session 5: Environmental Pollution & Management

Venue: **Sala Agora-B**

Chair:

Time: 13:00-18:00

Note:

* Session photo will be taken at the end of the session.
* Copy PPT/PDF on conference laptop 10 minutes earlier before each session starts.
* For the best presentation of each session, it's encouraged to award it to student author prior.
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* To show respect to other authors, especially to encourage the student authors, we strongly suggest you attend the whole session, and the scheduled time for presentations might be changed due to unexpected situations, please come as early as you could.

R038-A Spent Thin Film Targets Resources Recycling Technology

Time: 13:00-13:15

Mr. Yu-Chi Wang, and Wei-Sheng Chen and Kai-Lun Chiu
National Cheng Kung University, Taiwan (R.O.C)

The spent thin film targets from display panel have become a big issue since the smartphone appeared. The waste of these targets have great impact on the environment and should be properly treated. This study focuses on the spent transparent conductive Zinc oxide (GZO & IGZO) thin film targets. The targets contain gallium, indium and other rare metals. We expect to recycle gallium and indium from the targets effectively. The coating layer of the targets is peeled off and analyzed, found that indium is in the coating part while gallium is in the matrix. Different concentration of HNO3 been used as leaching agents under different solid-liquid ratio and different temperature. After leaching, the extraction of gallium and indium has been studied. We attempt to enrich gallium and indium from nitrate solutions by D2EHPA and strip by hydrochloric acid. These metals will then be recycled and purified as oxides by chemical precipitation and calcination after separation. We expect to get ~99.9% overall fraction recovery with ~99% purity of gallium and indium oxide. After the recovery of rare metal, zinc oxide can also be recovered effectively. These oxides will eventually back to the manufacture processes.

R039-A Recovering Germanium from Waste Optical Fiber Cables

Time: 13:15-13:30

Dr. Kai-Lun Chiu, Wei-Sheng Chen and Bi-Cheng Chang
National Cheng Kung University, Taiwan (R.O.C.)

In recent years, global demand of germanium (IV) metal rises significantly, and it will be in short supply. Additionally, it is urgent to develop an effective recycling process to recycle high concentration germanium (IV) from the large amount of waste optical fiber cables. In this study, we use solvent extraction to separate selectively germanium (IV) from silicate ion. In acidic chloride conditions, N,N-dioctyloctan-1-amine(Alamine336) and tributyl phosphate (TBP) in kerosene were used as organic phases for solvent extraction. In addition, tartaric acid was used as complexing agent to improve the germanium extraction rate. So the recovery rate of germanium (IV) increases significantly to over 99.5%, and this recycling method is low impact on the environment. Germanium (IV) is the lack of resources in the world, and it is also the scattered precious metal.Therefore, the waste optic fiber cable has recovered economic benefits and necessities.

R046-A

Pressure Leaching of Tantalum from Capacitor Scraps by Hydrofluoric Acid

Time: 13:30-13:45

Mr. Kuan-Yan Lin, Wei-Sheng Chen and Chin-Ting Liao
National Cheng Kung University, Taiwan (R.O.C.)

With the rapid development of small electronic device in recent years, the electric wastes of tantalum capacitor are in a substantial increase. The recovery from tantalum capacitors scraps not only decrease the electric wastes but also reserve the tantalum resources. This study will focus on leaching tantalum from capacitor by hydrofluoric acid. However, tantalum capacitors are sealed with epoxy resin which would reduce the efficiency of tantalum recovery. It is better to remove the epoxy resin before leaching. The pretreatment processes include crushing, sieving and magnetic separation to separate epoxy resin from capacitor. The pressure leaching process by using hydrofluoric acid after the removal of epoxy resin. The acid concentration, leaching time, leaching temperature and solid-liquid ratio in the leaching process were examined. The leaching efficiency of tantalum from capacitor will reach up to 99% with the optimal condition. The optimum parameters of tantalum leaching in this study were HF concentration of 15% v/v, leaching temperature of 180 ℃ with 10 atm pressure, solid-to-liquid ratio of 5% w/v and leaching time of 120 min.

R048

Assessment of Soil Fluorine Spatial Distribution around Brick Kilns Using GIS Application

Time: 13:45-14:00

Dr. Ahmad Sheikh Saeed and Urooj Rabail
Fatima Jinnah Women University, Pakistan

Soil fluorine is naturally occurring micronutrient and also considered as essential element for health of humans and animals. But higher concentration of soil fluorine leads to water pollution and also cause damages to plants. Brick kilns are one of main source of Fluorine emission in form of Hydrogen Fluoride which accumulate in the surrounding soil. So it is need to identify soil fluorine pollution hotspots necessary for improved and better management. ArcGIS is very useful application for analyzing spatial variation and mapping of pollution. In present study cluster and outlier analysis based on Local Moran Index was used to know the geo-statistically significant hotspots area. For interpolation and prediction, Inverse Distance Weighting method was used to analyze the spatial distribution patter of fluorine in soil around brick kilns.

R049-A

Detection and Determination of Environmental Pollution by Hg in Environmental Samples (Sea and River Water, and River Sediment) in order to Prevent Dangerous Action of Hg on Existing Ecosystems

Time: 14:00-14:15

Ms. María del Mar López Guerrero, María Teresa Siles Cordero, Elisa Vereda Alonso, Amparo García de Torres and J. M. Cano Pavón
University of Málaga, Spain

Determination of mercury using a mini-column as solid phase extraction (SPE) has several advantages over other techniques such as: it is rapid, reproducible, high pre-concentration factors can be attained and it requires only small volumes of solvents. In this study, a simple and fast methodology for the detection and determination of mercury is proposed. The method is based on the vapour generation of mercury by using NaBH4 as reducing reagent, and as solid phase extractant based on mesoporous silica with 1,5-bis(di-2-pyridyl) methylene thiocarbonohydrazide (DPTH) chemically bonded to the surface. This resin was applied with very good results, on the determination of total mercury in environmental samples by ETAAS. The precision (RSD), accuracy and limit of detection (LOD) were used to evaluate the characteristics of the procedure. The detection limits obtained was 0.009 μg L-1, with RSDs 3.7 % for 0.2 μg L-1, 4.8 % for 1 μg L-1 and enrichment factors 4. Furthermore, the method proposed has permitted the determination of Hg with a reduction in the analysis time, reagents and sample volume and a sample throughput of about 18 h-1. The optimum conditions established were applied to the determination of Hg in sea water, lake and river water.

R010-A

Effects of Heavy Metal Ions on N-Nitrosodimethylamine (NDMA) Formation

Time: 14:15-14:30

Ms. Yameng Liu, Yongdong Liu, Rugang Zhong, Bin Peng and Henry Schaefer
Beijing University of Technology, China

Heavy metals as pollutants have caused severe threats to the environment and human health. Nitrosodimethylamine (NDMA) is a probable human carcinogen. In this research, the mechanism of NDMA formation as affected by heavy metal complex [MONO]+ (M=Cd, Pb, Hg) was investigated using density functional theory (DFT) method. The results showed that the formation of NDMA from the reaction of DMA with NO2 could be catalyzed by the heavy metal complex. Three possible NDMA formation pathways are obtained at B3LYP/6-311+G(d,p), LANL2DZ level. Moreover, we found that one molecule of [MONO]+ (Pathway 1, M=Cd, Hg; Pathway 2, M=Cd, Pb, Hg) reacts directly with DMA via two different pathways, forming different transition states to produce NDMA. Another mechanism (Pathway 3) showed that two [CdONO]+ molecules will produce N2O3 which reacted with DMA to give NDMA. These findings will expand our understanding of the environmental significance of heavy metal ions and help develop efficient methods to prevent the formation of carcinogenic nitrosamines.

R088

Recycling of Reverse Osmosis (RO) Reject Streams in Brackish Water Desalination Plants Using Fixed Bed Column Softener

Time: 14:30-14:45

Dr. Ahmed Al-Ghamdi
Royal Commission for Jubial and Yanby, Saudi Arabia

Brackish water reverse osmosis desalination plants disposes a huge amount of saline concentrated streams that contains total dissolved solids more than 10,000 mg/L which considered as environmental and economical drawback. This study investigates the concentrates reuse and introduce the possible application of Fixed Bed Column Softener for softening of RO concentrate streams as a suitable feed to secondary reverse osmosis (RO) process. Experimental tests were conducted using a continuous Fixed Bed Column Softener apparatus. Artificial RO concentrate was tested as feed to the Fixed Bed Column using limestone seeds. The product was evaluated in terms of its suitability as feed to secondary RO process. The results obtained indicated that the Fixed Bed Column process has the potential to accomplish calcium ion concentration reduction from its initial value of 361 mg/L to the value of 39.03 mg/L and the bicarbonate concentration reduction from 1199 mg/L to 651 mg/L. The Stiff–Davis saturation index (SDSI) was reduced from 1.62 to 0.103. Langelier Saturation Index (LSI) of the concentrate is reduced from 1.6 (High scale forming) to 0.07 (low scale forming) by operating the fixed bed operation. The treated water has properties of low fouling potential that facilitate its recycling in secondary RO plants.

R091-A

Early Warning Algorithm for Fish Mass Mortality Based on Weather Data: Case of Cirata Lake – West Java, Indonesia

Time: 14:45-15:00

Dr. Nawa Suwedi, Abimanyu T. Alamsyah, Dwita Sutjiningsih, and Yudhi Sutrisno Garno
Agency For The Assessment and Application of Technology (BPPT), Indonesia

Fish mass mortality (FiMMo) in a Cirata Lake occured almost every year. It can make economic losses, a lake water pollution, social problems, and disruption to a supply of freshwater fish for Jakarta and West Java province. To solve this problems, some researchers have tried to develop an early warning systems. Their early systems are based on a water quality data and a seasonal conditions. It have been accurate but still not meet the timely principle. Their early warnings were still too close to the FiMMo occurance. Therefore, this study will be focused on development of the FiMMo early warning that can meet the principle of accurate and timely. It will be based on weather data such as cloud cover, rainfall, surface temperature and wind. When a weather conditions surrounding the Cirata Lake satisfy a criteria: (i) a percentage of cloud cover during one-day measurements > 80%, (ii) a percentage of average cloud cover during 3 days measurements $\geqslant$ 90%., and (iii) an average of daily air temperature $\leqslant$ 26.5oC, then the FiMMo be predicted will occur. Those criteria have been applied for weather data around the Cirata Lake between January, 1st to

31rd 2013 and between January, 1st to 31rd 2014 and shown results of accurate and timely.

Break Time: 15:00-15:15

R095

Contaminate Prediction and Control of Landfills to Groundwater in Coalmine Subsidence Area

Time: 15:15-15:30

Dr. Fei LIN, Peigui Liu, **Ting Wei**, **Honglei Ren**, **Dan Wu** and **Yuezan Tao**
Hefei University of Technology, China

To predict the transportation of leachate and evaluate the impact on subsurface groundwater system, a landfill located in coalmine subsidence area of Huainan, Anhui province, China was taken as an example. The geological and hydrogeological conditions were analyzed, and a three-dimensional solute transport numerical model was built based on groundwater modeling system (GMS). This paper aimed at the prediction and control of NH3-N under the monitored natural attenuation (MNA) in the coalmine subsidence area and four scenarios were listed as follows: (1) natural state without the biodegradation, (2) natural state with the biodegradation, (3) closure state without the biodegradation, (4) closure state with the biodegradation. The results showed that the leachate could be controlled well by anti-seepage wall and that the biodegradation played an important role in MNA process of the NH3-N in leachate. In addition, the feasibility of anti-seepage measures was put forward in terms of the control of leachate in landfill and conclusions according to the evaluation could be applied for actual contamination sites.

R096

Municipal Plastic Waste Composition Study at Transfer Station of Bangkok and its Possibility of Energy Recovery by Pyrolysis

Time: 15:30-15:45

Dr. Chinnathan Areeprasert, Jarudej Asingsamanuntb, Supachot Srisawat, Jeerattikul Kaharn, Bundit Inseemeesak, Phatavee Phasee, Chanoknunt Khaobang, Wichai Siwakosit and Chart Chiemchaisri
Kasetsart University, Thailand

Characterization of municipal plastic waste (MPW) was performed at one of Bangkok city's waste transfer station. Based on the investigated MPW composition at the transfer station, the pyrolysis of waste plastic was performed. Since HDPE (57.4%), LDPE (17.4%), and PP (7.3%) contributed to major composition of the MPW, they were chosen for energy recovery test via pyrolysis. Additionally, to resemble the current MPW composition, mixture of HDPE and LDPE at the ratio of 2:1 was subjected to the pyrolysis test as well. Results showed that heating value (HV) of oil product was significantly higher than that of the raw plastic waste. The highest HV of oil product was approximately 49 MJ/kg from LDPE followed by 47 MJ/kg from the mixture of HDPE and LDPE, 43 MJ/kg from PP, and 42 MJ/kg from HDPE, respectively. Yield of the oil product was highest from the pyrolysis of LDPE (60%). Energy recovery from plastic via pyrolysis was 75%, 59%, 50%, and 49% for LDPE, mixture of HDPE and LDPE, PP, and HDPE, respectively. Results from GC-MS of pyrolysis oil showed that different types of raw materials gave very different sets of chemical compounds. Various alkanes and alkenes type of hydrocarbon were found in the produced pyrolysis oil.

R123

The Effects of Socioeconomic Factors on Household Solid Waste Generation and Composition: A Case Study in Thu Dau Mot, Vietnam

Time: 15:45-16:00

Ms. Thi Thuy Trang Pham, Quang Toan Dinh, and Thi Xuan Hanh Nguyen
Thu Dau Mot University Vietnam

To develop an effective planning of household solid waste handling infrastructure, it is important to measure the amount, composition of the waste generation and determine the determinant factors affecting waste generation. This paper estimated the household solid waste generation rate and its composition in Thu Dau Mot city by using face to face collect method. The study also determined the socio-economic factors influencing the waste generation of the households in the city by using Ordinary Least Square (OLS) regression.

In total, 300 sample households were selected for the study by using a stratified random sampling methodology. The results indicated that the average household solid waste (HSW) generation in Thu Dau Mot was 0.76 kg/household/day. These wastes comprised of six categories of wastes and with the largest component of organic waste (67%). The effect of income, household size and environmental concern on household waste generation is found to be statically significant at 1%. This study suggests new insights concerning the role of socioeconomic characteristics in affecting the generation of household waste in Thu Dau Mot city.

R2006-A

Recycling of Rare Earth Elements from Fluorescent Lamp Waste Using Synthetized Ionic Liquids

Time: 16:15-16:30

Ms. Eleonora Obón Estrada, A. Fortuny and A.M. Sastre
Universitat Politécnica de Catalunya, Departament d'Enginyeria Química, Spain

Rare Earth Elements (REEs) are a group of 17 metallic elements that have an essential role in the current development model. Unfortunately their availability is limited although REEs are not scarce on Earth's crust. The exploitation of these metals has been considered a challenge due to several issues related with their mining. Urban mining of REEs from end-of-life products and industrial waste streams seems to be a good alternative to provide a new source of metals besides geological resources.A study of REES recovery from solid fluorescent lamp waste leachate by liquid extraction using synthetized ionic liquids called AliOli and AliDec has been carried out. Ionic liquids have become an environmentally friendly alternative to conventional organic solvents. Studies on the extractability of the ILs showed that they were able to remove REEs from the leachate. The effect of HNO3 and HCl as leachants over leaching and extraction processes was studied and compared and it was found that there was not a substantial difference between the experimental values obtained. AliOli showed to be more selective for REEs extraction than AliDec. Increasing the selectivity of REEs extraction process by introducing intermediate steps would be a goal for the upcoming research.

R3011

Statistical Analysis of the Impact of AQI on Respiratory Disease in Beijing: Application Case 2009

Time: 16:30-16:45

Dr. Maria Ikram, and Zhi Jun Yan
Department of Management Sciences, COMSATS Institute of Information Technology Park Road Chak Shehzad, Pakistan

China being the largest developing country is facing the worst air pollution issues in the world. Furthermore, largest increased health risk was observed among Chinese population in the previous studies. Due to this, Environmental health is a current global concern among epidemiological researchers. In the proposed study, an application case of Beijing during 2009 was taken for example. Statistical analysis was carried out to evaluate the impact of air quality index (AQI) and AQI with different concentration levels on respiratory disease (RD), genders and various age groups. The results proved to be significant and could be helpful for Chinese government to maintain the sustainable development with appropriate urgency in Beijing.

R3018

Contribution to Sustainable Environment through Examination of Durability of Materials in an Aggressive Environment

Time: 16:45-17:00

Dr. Vlasta Ondrejka Harbulakova, Adriana Eštoková and Alena Luptáková
Technical University of Kosice, Faculty of Civil Engineering, Slovakia

The paper presents the results of leaching tests of concrete samples with 5 wt. % cement´s replacement by fly ash and applies the statistical approach to an interpretation the results. Concrete samples with of two types of fly ashes, originating from anthracite and lignite burning, respectively were exposed to solution of Al2(SO4)3 to sulphate corrosion testing. Deterioration process was manifested by leaching the elementary components of concrete (Ca, Si, Fe, Al) and particular pH changes of leachates in 5 cycles. The leached-out

concentrations of elements from concrete matrix measured by X-ray fluorescence method (XRF) and measured pH values were used for the subsequent statistical analysis. A dependency between pH of leachates and leaching trends of Ca and Al, respectively, was confirmed. The correlation coefficients ranged 0.79 – 0.85. No significant differences between durability of concrete materials based on black or brown-coal fly ashes regarding to leachability were noticed.

R3021 The Assessment of Environmental Benefits of Low-emission Electricity Generation, the Case of Poland

Time: 17:00-17:15

Assoc. Prof. Magdalena Ligus
Wroclaw University of Economics, Poland

The paper focuses on the valuation of environmental external benefits of low-emission electricity generation. The empirical research results of valuing benefits from improving air quality in Poland using contingent valuation method (CVM) and hedonic pricing method (HPM) are presented. The research is used to estimate the environmental benefits indicator of low-emission electricity generation, after the procedure proposed by the author. The result of the original research is confronted with the alternative research conducted in the CASES (Cost Assessment of Sustainable Energy Systems) Project of EC in 2008.

R066-A Air Quality Assessment in a General Hospital Based on Particulate Matters and Radon Concentrations

Time: 17:15-17:30

Dr. Kobra Verijkazemi, Gholamreza Bahmannia
Department of Environmental Engineering, Graduate School of Environment and Energy, Science and Research Branch, Islamic AzadUniversity, Tehran, Iran.

Concentrations of PM10, PM2.5, PM1 and 222Rn and meteorological variables (atmospheric pressure, air temperature, and relative humidity) were measured simultaneously to find relationship betweenthemusing multivariate statistical methods. Total of 1512 samples for PM and 196 samples for Radon were measured insix medical treatment floors and outdoor atmosphere at Imam Khomeini Hospital in Tehran, from June 2014 to June 2015, seven days at each season. A time-series analysis was conducted to evaluate the associations of indoor/outdoor PMs and Radonin the hospital sections. ThePM10, PM2.5 and PM1 average concentrations were 27.75, 20.05, 15.50 μg/m3 with a ranges of variation between 7-49 μg/m3, 6-37 μg/m3 and 5-33 μg/m3, respectively. The results also showed the average of Radon emissions for six studied floors from basement to the top were 56.1, 36.5, 46.2, 32.2, 28.3, 20.8 and 18.5 Bq/m3respectively.
Multivariate Manova analysis for four variables (season, week day, floor no. and location) and throughPillai's Trace ،Wilks' Lambda ،Hotelling's Trace and Roy's Largest RootMethods were used for providing table of Tests of Between-Subjects Effects for PM10, PM2.5, PM1 arrays.The Stepwise Linear Regression which used to evaluate the relationship among air condition parameters include: temperature, pressure, and relative humidity and PM concentrations showed that increasing of pressure and decreasing of temperature were associated withincreasing of all types of PM but the temperature had more effect on PM1 and PM2.5rather than PM10 but pressurewas so forPM10.
Statistical analysis meaningfully showed the highest mean amount of radon (73.5Bq/m3) in Nursery locations especially in cold seasons and downer floorsand the lowest mean amount (8.4Bq/m3) in outdoor locations. Finally, based on stepwise regression model, It can reported that the concentration of222Rn and PM2.5 and ambient pressure showed reverse and direct correlation respectively. Linear model had more than 50 percent reliability in correlations but study should be continued by others to find more correlations between Radon and other parameters.

R086-A End of Life Scenarios for Municipal Solid Waste of Defence Housing Authority Lahore, Pakistan

Time: 17:30-17:45

Azhar Ali, Anam Khalid, and Durr-E- Shahwar
College of Earth & Environmental Sciences, University of the Punjab, Pakistan

To evaluate environmental impacts of different methods for MSW final disposal to achieve environmental sustainability. Environmental aspects of different scenarios for municipal solid waste management (MSWM) by applying life cycle assessment (LCA) tool were evaluated in this study. Research question of this study is, “What alternative will be the best ranked in MSW treatment sustainably”? A seven days survey was conducted at Kamahan Dump site in Defence Housing Society (DHA), Lahore to evaluate physical and chemical characterization of MSW. ASTM D5231-92(2003) standard procedure was followed for sampling. Different scenarios were analyzed including MRF, Incineration, Bio gasification, composting and landfilling with energy recovery for the treatment of MSW. With defined system boundaries, positive and negative impacts of selected categories were assessed for all scenarios through LCA using EaseTech modeling. The results revealed that food waste (58.98%) is the major component of MSW. All components of MSW solid waste have calorific value especially of polythene bags and wrappers because of higher combustible content. Scenario 1 contributes some negative loads on the environment such as highest impact on terrestrial eutrophication (64.91 kg PO4eq) and then photochemical oxidation (8.814 kg C_2H_4). Scenario 5 has the highest global warming potential (3040 kg CO_2 eq). Incineration is the process indicating less burden on environment compared to other scenarios except in case of ionizing radiations (5.124 kg U235-Eq). Negative values represent the least emission of incineration option in order to get energy. It avoids maximum amount of CO_2 emissions and GWP (-2577 kg CO_2eq). Different waste scenarios were developed in this study and in all the scenarios the best environmental suitable technique was revealed to be incineration. Highest environmental impacts were observed in landfilling scenario and the least in incineration with respect to different impact categories especially in CO_2 equivalents by using LCA tool.

Session 6: Power & Grid System

Venue: **Sala Agora-C**

Chair: Assoc. Prof. Coriolano Salvini, Dipartimento di Ingegneria-Universit à degli Studi ROMA TRE, Italy

Time: 13:00-18:00

Note:

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* To show respect to other authors, especially to encourage the student authors, we strongly suggest you attend the whole session, and the scheduled time for presentations might be changed due to unexpected situations, please come as early as you could.

R022

Planning, Operation, and Protection of Microgrids: An Overview

Time: 13:00-13:20

Mr. Faisal Mumtaz
Hamad Bin Khalifa University, Qatar

The significance of microgrids is growing rapidly. Microgrids have a huge potential in boosting the sustainable growth. A microgrid can operate in grid-connected or islanded mode. In islanded mode, microgrids can provide electricity to the rural areas with lower cost and minimum power losses. In grid-connected mode, microgrids can help in supporting the main grid in many ways with voltage control, frequency control, and can provide more flexibility, control, and reliability. However, successful operation of a microgrid requires proper planning and there are major challenges regarding the operation, control, and protection of microgrids that need to be tackled for successful deployment of microgrids. Depending on the mode of operation (grid connected mode or islanded mode), necessary control strategies and protection schemes are required. Several methods have been proposed in the literature for the successful operation of a microgrid. This paper presents an overview of the major challenges and their possible solutions for planning, operation, and control of islanded operation of a microgrid.

R028

An Analysis of Energy Storage Systems for Primary Frequency Control of Power Systems in South Korea

Time: 13:20-13:40

Dr. Hyeon-jin Moon, Eung-Sang Kim, Seung-Il Moon and Ah-Yun Yun
Seoul National University, Republic of Korea

Energy storage systems (ESSs) have a quick response and outstanding functions when used for frequency regulation. This paper examines the effect of an ESS used in conjunction with the primary frequency control (PFC) of a power system in South Korea. A simple low order system frequency response (SFR) model is used to undertake a simulation with MATLAB Simulink. The simulation includes gas, hydro and steam turbines and the ESS with the PFC. The results show that the ESS has a remarkable effect in the PFC and that it is more efficient in a weak grid. When more ESSs are added, the substitution effect is weaker according to the simulation results.

P0008A

Effects of Interacting Dynamic Demand Controlled Appliances on the Frequency Grid Stabilization

Time: 13:40-14:00

Mr. Eder Batista Tchawou Tchuisseu, Dami à Gomila and Pere Colet
IFISC(CSIC-UIB), Spain

In this work we review the operation of the power grid from the point of view of complex systems science, and discussed how smart devices that dynamically control their demand can be used to stabilize the load and reduce frequency fluctuations. We show than including direct interaction/communication between smart devices improve the overall performance of the system as compared with smart devices that monitor only system wide variables such as the frequency.

P006

On the Influence of the Variation Parameters of the Ant Colony Optimization on the Dispatch of Road Crews of Electricity Utility

Time: 14:00-14:20

Tiago M. Miranda; Fabio Romero, **Mr. Paulo H. Baumann**, Alden U. Antunes, Dário Takahata, João Castilho Neto, Leonardo H. T. Ferreira Neto, Ângelo C. L. Alves, Luisa M. Azevedo, Sérgio L. P. Valinho
Daimon Engenharia e Sistemas, Brazil

This paper shows the application of Ant Colony Optimization algorithm for the dispatch of road crews for electric network services in an electricity utility, and the impact of the variation of some parameters (number of ants, pheromone evaporation and pheromone importance) on the construction of the routes to be taken by each crew team. The methodology takes as input a set of calls request by the consumers, ranked by their importance. Thus, the algorithm is able to create the routes to be taken by each road crew, to select the sequence in which the service calls will be met by the teams in the same day and the ones that will have to be met on another day in order to better satisfy the Company's and clients' financial interests and targets. A computer program has been developed to apply this method.

P0017

Voltage Stability Enhancement in Power Systems with Automatic FACTS Device Allocation

Time: 14:20-14:40

Sidnei do Nascimento and **Mr. Maury Meirelles Gouvêa Júnior**
Graduation Program in Electrical Engineering Pontifical Catholic University of Minas Gerais Belo Horizonte, Brazil

The voltage stability problem in modern power systems is an issue related to the system constraints and voltage collapse. Research studies in this area have sought alternatives to improve the performance of the power system without expansion. Flexible AC Transmission System (FACTS) is an example of modern device able to control the reactive power flow in a more efficient way. This paper proposes an automatic FACTS device allocation process based on evolutionary algorithm. The model aims to enhance the voltage stability of power systems. The results showed that the proposed method enhanced the voltage stability in IEEE system benchmarks, and the method outperformed other probabilistic and heuristic optimization methods.

P0015

Smart Meter Data Analytics for Optimal Customer Selection in Demand Response Programs

Time: 14:40-15:00

Ms. Madeline Martinez-Pabon, Timothy Eveleigh and Bereket Tanju
George Washington University, USA

This paper describes a methodology to predict customers' eligibility to participate in Demand Response (DR) programs using real electricity data collected from customers over time by smart meters. These types of programs have been proposed to improve generation capacity as load demand increases and the two-way communications (between utilities and users) are enabled. Instead of installing new power plants in smart grids, utilities encourage users to shift their electricity consumption from peak hours to off-peak hours. The number of successfully recruited customers participating in demand response programs is usually low, and resources are wasted on recruitment efforts. The results of our research reflect that it is possible to predict with more than 90% accuracy which customers are good targets for DR program participation based on their consumption patterns and lifestyles. These data could ultimately improve the recruitment process for DR programs.

Break Time: 15:00-15:15

R081-A Modelling the Effect of Heatwaves on Electricity Demand: A Case Study

Time: 15:15-15:35

Dr. Caston Sigauke
University of Venda, South Africa

Demand of electricity significantly increases as a result of heat which builds up with consecutive days of extreme high temperatures. The paper discusses the modelling of the effect of heat waves on average daily electricity demand in South Africa using a multivariate adaptive regression splines model and a peaks - over - threshold model for the period, years 2000 to 2010. The temperature data is initially detrended using a time varying threshold. We then obtain an optimum fixed threshold using extremal mixture models after which we decluster the exceedances and fit the generalized Pareto distribution (GPD) to cluster maxima. Empirical results show that the developed modelling approach provides a good fit of the GPD to cluster maxima. We then estimate the marginal increases in electricity demand for unit increases of temperature above the time varying threshold. We show that as temperature increases and converges to its upper bound, the marginal increases also converge. This modelling approach helps system operators in scheduling and dispatching of electricity during the heatwave period.

R1011 Energy Performance and Cost Comparison of MPPT Techniques for PV and other Applications

Time: 15:35-15:55

Ms. Ezinwanne Osisioma, Fu Zhongwen, and Li Zhijun
School of Electrical Engineering, Hebei University of Technology, Tianjin, China

Maximum Power Point Tracking (MPPT) is a means to extract maximum power from PV panels at different levels of irradiance. This paper examines some of the MPPT techniques used in PV applications with respect to their energy performance and general costs. It also gives an insight on the factors that should be considered in choosing the appropriate technique for specific applications. The reviews done in this paper are expected to be useful for MPPT users, designers and commercial manufacturers of PV systems.

S1003 Optimal Distribution in Smart Grids with Volatile Renewable Sources Using a Message Passing Algorithm

Time: 15:55-16:15

Ms. Elizabeth Harrison, David Saad, and K. Y. Michael Wong
Aston University, United Kingdom

The design of future electricity grids will allow for renewable energy generators to be effectively incorporated into the network. Current methods of economic dispatch were not designed to accommodate the level of volatility and uncertain nature of sources such as wind and solar; here we demonstrate how an optimization algorithm called message passing, which is based on principled statistical physics methodologies and is inherently probabilistic, could be an alternative way of considering source volatility efficiently and reliably. The algorithm iteratively passes probabilistic messages in order to find an approximate global optimal solution with moderate computational complexity and inherently consider source volatility. We demonstrate the capabilities of message passing as a distribution algorithm in the presence of uncertainty on synthetic benchmark IEEE networks and show how the volatility increase effects distribution costs.

R3023 Compression and Air Storage Systems for Small Size CAES Plants: Design and Off-Design Analysis

Time: 16:15-16:35

Assoc. Prof. Coriolano Salvini, P. Mariotti and A. Giovannelli
Dipartimento di Ingegneria-Universit à degli Studi ROMA TRE, Via della Vasca Navale 79, Italy

The present paper is addressed to the design and off-design analysis of a compression and storage system for small size CAES plants capable of absorbing electric power in the range of hundreds of kilowatt. The system of interest is constituted by an intercooled /aftercooled

multi-stage reciprocating compressor and a man-made reservoir obtained by connecting large diameter steel pipe sections. A specific methodology for preliminary sizing and off-design modelling has been developed. During the charging phase the electric power absorbed along the time changes according to grid requirements and the pressure ratio increases continuously. In order to ensure an appropriately wide range of operations, particular attention has been paid to the selection of the most suitable compressor capacity control device. Given the capacity regulation margin of the compressor and the actual level of charge of the reservoir, the proposed approach allows the instant-by-instant the evaluation of minimum and maximum electric power absorbable from the grid. The developed tool gives useful information to appropriately size the compression system and to manage it in the most effective way.

S002

Empirical Model of Cellular Signal Propagation Loss for Smart Grid Environment

Time: 16:35-16:55

Mr. Anthony Okumbor and Okonkwo O. R
Delta State Polytechnic, Nigeria

Wireless communication technologies in smart grid covers a variety of environments such as indoor, outdoor, and electric-power-system facilities. The characteristics of wireless and power line communication channel in smart grid networks are usually in terms of several parameters such as propagation (path) loss and attenuation, time dispersion and so on. Today, a number of empirical propagation prediction models for mobile radio communication systems are available in the literature. However, the accuracy of these models suffers when they are used in an environment other than that for which they have been developed. In this research work, the log-normal shadowing method was used to model mobile cellular signal propagation loss in a smart grid environment. The data used for this analysis were gathered between 2012 and 2013 in a suburban area cellular link in Niger-delta Nigeria. The measured data were applied to some propagation loss model equation and analyzed using linear regression method to obtain the link parameters such as the propagation loss exponent n = 3.38, the standard deviation = 9.2dB, to formulate the model equation = 75.16 + 33.8logd for the design of a mobile radio link in the test bed areas. The knowledge shared here will assist researchers apply the concept to other geographical environments, it will assist system engineers determine signal strength in error and as efficient propagation loss prediction tool thus improve the quality of wireless signal and also the model can be use as validation tool where measurement is done in different geographic areas.

S004

Software Defined Utility: A Step towards a Flexible, Reliable and Low-cost Smart Grid

Time: 16:55-17:15

Mr. Ramon Martin De Pozuelo, Miguel Ponce de Leon, John Howard, Alan Briones, Jerry Horgan and Julia Sánchez
La Salle - Universitat Ramon Llull, Spain

The Smart Grid relies in Information and Communication Technologies (ICT) but usually there is still a lack of integration in their deployment. They are designed as separated systems and managed that way too. In addition, the changes in the electric network are so complex and dependable on a very rigid hardware architecture. Based on the work done in the European project FINESCE, this paper presents the “Software Defined Utility” (SDU) concept, which advocates the migration of the utility infrastructure to software systems instead of relying on complex and rigid hardware based systems. This new approach provides a prospective view on the evolution of power systems that will benefit from software systems and high-speed data network infrastructures. More concretely, as a first SDU building block, the paper proposes a data storage and management system based on a hybrid cloud infrastructure to meet the storage requirements of electric utilities. In this regard, the following dimensions have been analysed: the most appropriate methodology to select where data resources should be allocated; security requirements and threads taking into account its deployment in a critical infrastructure like a Smart Grid.

R103

Modelling and Simulation of Standalone PV Systems with Battery-Supercapacitor Hybrid Energy Storage System for a Rural Household

Time: 17:15-17:35

Assoc. Prof. Rajprasad Kumar Rajkumar, Lee Wai Chong, Yee Wan Wong and Dino Isa
The University of Nottingham Malaysia Campus

This paper presents the comparison between the standalone photovoltaic (PV) system with battery-supercapacitor hybrid energy storage system (BS-HESS) and the conventional standalone PV system with battery-only storage system for a rural household. Standalone PV system with passive BS-HESS and semi-active BS-HESS are presented in this study. Two control strategies, Rule Based Controller (RBC) and Filtration Based Controller (FBC), are developed for the standalone PV system with semi-active BS-HESS with the aim to reduce the battery stress and to extend the battery lifespan. All the models are simulated with the actual 24-hours solar irradiation profile and rural household load profile. The simulation results show that the system with semi-active BS-HESS prolongs the battery lifespan by significantly reducing the battery peak current up to 8.607% and improving the average SOC of the battery up to 0.34% as compared to the system with battery-only system.

S005

Coordinated Management of Low Voltage Power Networks with Photovoltaic Energy Sources

Time: 17:35-17:55

Ms. Brenda Rojas, Monica Alonso, Hortensia Amaris, Lorena Gonzalez
Universidad Carlos III de Madrid, Spain

Over the last decades, active power networks have reached great attention due to the incorporation of distributed energy resources into low voltage power systems. In this paper, a decentralized energy management strategy is proposed as an efficient way to minimize both active power losses and voltage profile deviation of an distribution power network with photovoltaic solar farms, and also at the same time, aims to improve the reliability and the security of supply. The coordinated energy management concept relies on a two-step optimization approach based on genetic algorithms (GA) and MINLP, in which a multi-objective function is used which takes into account reliability and operational technical constraints in its formulation. The suitability of the proposed methodology is tested on an existing low voltage power system, in which two aspects are considered: firstly, determining the optimal allocation of PV units and secondly, establishing the optimal reschedule of the active power of the generation units participating in the energy mix and minimizing both the real power losses and voltage deviation of the entire power system.

R030

Determining P-Q Droop Coefficients of Renewable Generators for Voltage Regulation in an Islanded Microgrid

Time: 17:55-18:15

Mr. Jin-Oh Lee, Seung Il Moon and Eung Sang Kim
Seoul National Univ., Republic of Korea

In this paper, we propose a novel method for determining the active power-reactive power (P-Q) droop coefficients of renewable generators in an islanded microgrid. Intermittent output power of a renewable generation causes voltage deviation. For voltage regulation, P-Q droop has considerable effect. The calculation of P-Q droop coefficients is based on the voltage sensitivity value derived by Jacobian matrix. To achieve the desired P-Q droop coefficient, it is necessary to reflect active power-frequency (P-f) and reactive power-voltage magnitude (Q-V) droop scheme widely used in an islanded microgrid. The P-f droop characteristic is applied by regarding the renewable generator as a slack bus and the Q-V droop characteristic is applied by adding the additional term to Jacobian matrix. The proposed method was modeled and simulated by MATLAB/Simulink to prove its effectiveness.

Poster Session

Venue: **Sala Agora-A**

Time: 10:00-10:30

Note:

* The certification of Oral/Poster presentation, listeners, will be awarded at the end of each session.

* To show respect to other authors, especially to encourage the student authors, we strongly suggest you attend the whole session, and the scheduled time for presentations might be changed due to unexpected situations, please come as early as you could.

R027

MPPTjs: A JavaScript Simulator for PV Panels Used in a PBL Application

Prof. Romeu Hausmann, Laio Oriel Seman, Luiz Alberto Koehler and Eduardo Augusto Bezerra
Regional University of Blumenau (FURB), Brazil

Current concepts used in engineering training take into account not only teaching traditional math and physics, but also critical thinking, engagement with society, and ecological awareness. This work proposes the application of Project-Based Learning (PBL) as a way to include renewable energies subjects in the classroom. The methodology was employed in 37 students of a one semester course of the Electrical Engineering major of the Blumenau Regional University, Brazil. To assist in the process, a web application entitled MPPTjs was developed, aiming to facilitate the understanding of the students about photovoltaic panels and maximum power points tracking (MPPT). Finally, a questionnaire was applied to assess the impact of the project.

R2005-A

A Study on Reduction of CO_2 Emission and Heating Performance of Heat Pump System for agriculture

Prof. Youn-Cheol Park and Mr. Byungyong Jeon
Jeju National University, Republic of Korea

This Study was conducted to evaluate heating performance and reduction of CO_2. The heat pump system installed at 100 m2 greenhouse. A heat pump system which located at jocheon-ri in Jeju Island. And consisted with a heat storage tank, a plate heat exchanger, fan coil units, solar collectors, a 4-way valve, a temperature expansion valve, a turbo fan. Working fluid of the system used R410a and controlled by sensors located inside of the greenhouse. This system using a two kinds heat sources such as heat from storage tank and outdoor air heat. As results, heating capacity in outdoor air source mode is 19.9kW and COP is 12.9 when average outdoor temperature was 10.5 ℃. In heat from storage tank mode, heating capacity is 21.4kW and COP is 13.4 when outdoor temperature was 7.3℃. CO_2 emission quantity of Heat pump system for agriculture were 2.92 tCO_2/year. The other hand, CO_2 emission quantity of kerosene boiler were 4.1 tCO_2/year. Consequently, Reductions of CO_2 emission quantity we were 28.8%.

R047-A

Platinum-silver Nanoparticle Supported Catalyst via a New Method for Methanol and Ethanol Oxidation

Prof. Gao Jianping, Feihui Li and Wei Wang
Tianjin University, China

Pt/Ag nanoparticles supported on reduced graphene oxide (Pt-Ag@RGO) were synthesized via a facile and environment- friendly method. GO acted as the reductant, stabilizer as well as support for the Pt-Ag nanoparticles (NPs) that were formed through spontaneous redox reaction happened between AgNO3, Na2PtCl4 and GO. It can be called a green method

because of no need of additional reductant or surfactants. After the Pt-Ag@rGO hybrids were characterized with X-ray diffraction, X-ray photoelectron spectroscopy, transmission electron microscopy and Raman spectroscopy, their electrocatalytic performance towards the oxidation of methanol and ethanol was investigated. Compared with Pt@rGO, the Pt-Ag@rGO hybrids have even higher electrocatalytic activity and stability, so the present work provides an approach to fabricate Pt-Ag/rGO hybrids that have potential applications in direct alcohol fuel cell.

R040 Numerical Simulation of Wellhead Back Pressure in Under-balanced Drilling

Jie Zhang, Junwu Zou, Yuesheng Shao, Yuanchang Zhao, Wenlong Zhang
State Key Laboratory of Oil and Gas Reservoir Geology and Exploitation, Southwest Petroleum University, Chengdu, Sichuan, China

Based on the application of liquid-phase under-balanced drilling in a vertical well, this paper studies the wellhead back pressure on annular gas-liquid two-phase flow characteristics and its impact on the law of gas cut speed. Annular gas-liquid two-phase flow transient calculation model and a model of gas cut during drilling are established in this study. These two models are used to calculate the changing law of wellhead back pressure under constant and variable bottom hole underbalanced. The calculation result shows that a risk of excessive gas cut or wellhead back pressure exists when uncovering gas reservoir under constant underbalanced. The wellhead back pressure needed for using variable negative pressure to keep gas cut speed unchanged remains stable after a period of growth. The needed wellhead back pressure is mainly affected by gas cut speed, formation permeability, time to apply wellhead back pressure, and other factors. The simulation calculation result is compared with the wellhead back pressure value collected on site in real time. Results show that the changing trend is roughly the same.

R3019 Effect of Oxidation Coefficient on Products Sewage Sludge Treatment in Supercritical Water

Mr. Guike Lin, Donghai Xu, Zhijiang Ma, Shuzhong Wang and Yang Guo
Xi'an Jiaotong University, China

Supercritical water treatment is a promising technology for sewage sludge disposal. The influences of oxidation coefficient (OC) as well as temperature on products of sewage sludge treatment in supercritical water were studied systematically. The results show that CO_2 yield obviously increased with raising OC or temperature. Oxidant helped to convert N-containing compounds into N_2. A small amount of oxidant increased H_2 yield but excess oxidant decreased it. OC had significant effect on the COD (chemical oxygen demand) and NH_3-N (ammonia nitrogen) concentration of liquid products. Most of organic compounds disappeared at OC=1.0 as temperature changed from 450 ℃ to 500 ℃, and diethyl phthalate was main stubborn substances in the liquid phase. The contents of some elements (such as Si, Al and Ca) in solid residue were almost double compared with those in dry basis SS.

R074-A Quantifying Effect of Eco-Town Design Factors on Sunlight and Outdoor Thermal Environment

Prof. Seonghwan Yoon and Sukjin Jung
Dept. of Architecture, Pusan National University, South Korea

Pt/Ag nanoparticles supported on reduced graphene oxide (Pt-Ag@RGO) were synthesized via a facile and environment- friendly method. GO acted as the reductant, stabilizer as well as support for the Pt-Ag nanoparticles (NPs) that were formed through spontaneous redox reaction happened between AgNO3, Na2PtCl4 and GO. It can be called a green method because of no need of additional reductant or surfactants. After the Pt-Ag@rGO hybrids were characterized with X-ray diffraction, X-ray photoelectron spectroscopy, transmission electron microscopy and Raman spectroscopy, their electrocatalytic performance towards the oxidation of methanol and ethanol was investigated. Compared with Pt@rGO, the

Pt-Ag@rGO hybrids have even higher electrocatalytic activity and stability, so the present work provides an approach to fabricate Pt-Ag/rGO hybrids that have potential applications in direct alcohol fuel cell.

R041 Effect of PCM in Improving the Thermal Comfort in Buildings

Dr. Derradji Lotfi, Farid Boudali Errebai and Mohamed Amara
CNERIB, Algeria

A thermal dynamic simulation was realized with the TRNSYS 17 software, using type 204, to compare the thermal behaviour of an office having conventional walls with another office having walls incorporating phase change materials (PCMs). The simulation was performed for the climate zone of Algiers (Algeria), on a top floor office, 3.5 m length, 3 m wide and 3 m high. The simulation results showed that the use of phase change materials in the concrete ceiling and the hollow brick walls has increased the office temperature by 3 to 4 ℃ in the winter period. The results also show that the presence of the phase change materials in the walls reduced the overheating in the summer period, decreasing the indoors air temperature by 7 ℃.

R033 The Utilization of Waste Magnesite in the Production of the Cordierite Ceramic

Prof. Ayşegül Aşkın, **İlknur Tatar**, and **Şule Kılınç**
Eskişehir Osmangazi University, Turkey

In this study, in which the aim was the evaluation of industrial wastes, magnesite powder waste generated during the magnesite processing is used as an alternative raw material for cordierite ceramic production. The waste occurs during the magnesite ore dressing process, is very small in size, and its stockpiling is difficult. On the other hand, cordierite ceramics comprises magnesia MgO as the main ingredient. This situation has brought the waste magnesite can be assessed in the cordierite ceramic. The cordierite ceramics is used in applications that require high thermal shock resistance due to their low coefficient of thermal expansion. In this work, cordierite composition was composed firstly with raw magnesite (CR) and secondly with waste magnesite (CW). The prepared cordierite composition was sintered between 1300-1350 ℃ at various temperatures and heating rates. The sintered samples were analysed with DTA, XRD and their bulk density, water absorption and porosity were determined. After sintering the cordierite composition prepared with waste magnesite at 1325 ℃ and 3 ℃/min, a single-phase cordierite production was successfully obtained with the values of 1.64 g/cm3, 36.5%, and 22.5% for the bulk density, the porosity, and the water absorption, respectively. As a result, it is proposed that the magnesite powder waste could be an alternative raw material for the cordierite production.

R037 Thermal Behaviour of a Dwelling Heated by Different Heating Systems

Mr. Farid Boudali Errebai, Lotfi Derradji and Mohamed Amara
Centre National d'Etudes et de Recherches Intégrées du Bâtiment (CNERIB), Algerie

In a house, the choice of the heating mode is an important factor to ensure the thermal comfort of occupants in the winter period. This choice can also contribute to reduce heating needs resulting in a reduction of energy consumption and also a reduction of greenhouse gases emissions. We present in this article a numerical simulation of the thermal behaviour of the indoors air flow, using a Computational Fluid Dynamics software. The main objective of this paper is the evaluation of the thermal comfort in the dwelling through temperature profiles of the ambient air in a room heated by various systems (floor heating, hot air blowing heating and radiator heating) using the same heating power. The results were used to predict the overall thermal comfort in the dwelling model for all the three heating cases. They have shown that for the same heat power in the dwelling, the average indoors temperature is 19.7 ℃ for radiator heating, 20.4 ℃ for the low temperature floor heating and 20 ℃ for the electric heat pump heating.

R113-A

Flexible and Stretchable EMI Shielding Silver Nanoparticles / Polymer Composite

Ms. Hyun Kyung Lee, **Ms. Eunjoo Kim**, Jae Kyoung Lee, Seungsik Oh, Dae Young Lim, Youngjoung Kang and Eui Sang Yoo
KITECH(Korea Institute of Industrial Technology), Republic of Korea

The widespread interest of electromagnetic effect on human health or near electronic devices has triggered a vigorous expansion in the development of high performance electromagnetic interference (EMI) shielding materials. A Highly conductive and stretchable electromagnetic interference shielding (EMI) materials were developed by silver nanoparticles/ elastomeric polymer (NPs/SBS) composite [1]. This materials show superior conductivity and EMI shielding efficiency due to highly incorporated silver NPs forming electrical percolation. In addition, this composite can endure hundreds of cycles of stretching tests with moderate conductivity and EMI shielding efficiency. These experimental results clearly demonstrate that this superior flexible and stretchable property of silver NPs/SBS composite can be easily applicable to EMI shielding materials of next generation electronics such as wearable electronics and printed electronics.

R114-A

Characteristics of Organic-Inorganic Hybrid Piezoelectric Materials for Textile Energy Harvesting Devices

Ms. Jae Kyoung Lee, **Mr. Seungsik Oh**, Hyun Kyung Lee, Eunjoo Kim, Dae Young Lim, Byeong-Kwon Ju, and Eui Sang Yoo
KITECH(Korea Institute of Industrial Technology), Republic of Korea

Recently, energy harvesting electronics from human activity has a potential, which can resolve future personal life. Textile electonics demands the systems with flexiblity and easy fabrication. ZnO nanowires(NWs) and PVDF(Polyvinylidene fluoride) inorganic-organic hybrid piezoelectric materials were found to be suitable for wearable electronics[1]. In this study, ZnO NWs based on hydrothermal reaction were arrayed parallel to a polyimide flexible substrate. PVDF solution were spin-coated on the ZnO NWs array on flexible substrate at 1000 rpm for 60 sec. The ZnO NWs array can occur piezoelectricity by itself and may assist poling phenomenon of PVDF. The higher number of ZnO-NWs in a same area (the density of NWs), higher voltage and current we could get. The maximum value in this study were 12 mV and 4.5 nA, respectively. During the growth of NWs by hydrothermal method, density of nanowires depended on the position of bottom Au electrode in D.I. Water solvent. We have demonstrated nano piezoelectric energy harvesting electronics using inorganic-organic hybrid. Our device showed a high performance and feasibility as the power source for textile electronics.

R080-A

Stretchable e-Textile Gas Sensor Based on Reduced Graphene Oxide

Assoc. Prof. Hyung-Kun Lee, Yong Ju Yun, Won G. Hong, and Do Yeob Kim
Electronics & Telecommunications Research Institute (ETRI)/ University of Science & Technology, Republic of Korea

Textiles with electronic functions (e-textiles) have been investigated for applications in wearable electronics. We report a stretchable gas sensor by coating reduced graphene oxides on a stretchable yarn that can be elongated up to 400% compared to its original length without changing an electrical resistance in order to develop wearable gas sensor applications. Optimal coating concentration of graphene oxide and its effective reducing condition were investigated to prepared stretchable and durable gas sensor using BSA as a molecular glue. We found that stretchable yarn showed no change of resistance upon 5000 times stretching treatments with 100% strain. Furthermore, the stretchable yarn showed 45% response to 1 ppm of NO2 gas under 45% relative humidity, which is 3 times higher response to what we obtained using conventional cotton yarn coated with reduced graphene oxide (15% reponse@NO2 1.25 ppm). Characterizations and other gas sensor behaviors including fast recovery and selectivity to NO2 will be also discussed.

R3029-A

Removal of Cu(II) Ions as Nano Thin Films from Aqueous and Non-aqueous Solutions by Low Cost Chemical Deposition Technique

Prof. Dr. Sawsan Mohamed Said Haggag and I. A. M. Abdel-Hamid
Chemistry Department, Faculty of Science, Alexandria University, Egypt

In this study, we report an efficient, easy, simple, green, and low cost method for rapid and complete removal of Cu(II) ions as [Cu(o-AP)2] nano thin films via the application of the bottom-up static Layer-by-Layer self-assembly (LbL-SA) chemical deposition technique. The removal product [Cu(o-AP)2] nano thin films were characterized by metal analysis, FT-IR, and scanning electron microscopy (SEM). The affecting experimental variables optima for the removal of Cu(II) ions from different aqueous and non-aqueous matrices via the LbL-SA were focused and explored. These optimum conditions were obtained at a solution's pH of 6.70, an immersion time of 30 s, 10 immersion cycles, a substrate surface area of 76.0 cm2, at a solution temperature of 48◦C, and a Cu(II) ions initial concentration of 10-4 mol L-1. The removal of Cu(II) ions was also studied under the influence of some coexisting interfering ions. The method has been successfully applied and examined for extraction of copper in different aqueous and non-aqueous matrices. The study showed that the removal of Cu(II) ions as [Cu(o-AP)2] nano thin films was achieved completely (100.00 %) and fast using low cost static LbL-SA chemical deposition technique under mild conditions.

R3030-A

Dissolved Labile and Non-labile Trace Metal in EL-MEX Bay and the Eastern Harbor, Alexandria, Egypt

Dr. Mona Elnaggar, **Dr. Omayma Hassan Abdel Hamid**, O.H.Abdel-Hamid, M.F.EL-Naggar and H. M. Faragallah
Institute of Oceanography and fisheries, Egypt

The present work is an attempt to study the effect of pollution on the trace metals (Fe and Cu) in their dissolved labile and non-labile forms in the surface and bottom waters collected from two areas, EL-Mex Bay (subjected to effluents from Umum agricultural drain) and .the eastern harbor (subjected to waste water from the sewer of Alexandria at Kayet Bay). The determination of the respective labile and non-labile forms was made using chelating cation exchange resin (chelex-100) and total dissolved metals. Some of hydrographical parameters as (hydrogen ion concentration, salinity and dissolved oxygen) were also studied. The relation between these parameters and labile and non-labile forms were investigated. The results revealed that the non-labile Fe and Cu forms are more abundance than that of labile forms in the two areas, Fe in their labile and non-labile forms is more abundance than that in the corresponding of Cu, also EL-Mex bay is more concentrated with the two metals than Eastern harbor. Also the distribution of the two metals forms depending on the distributions of dissolved oxygen and salinity in the two areas.

R120-A

New Ferroaluminophosphate Zeolite Composites Containing $CaCl_2$ for Thermochemical Energy Storage Application

In Park and Jeasung Park
Korea Institute of Industrial Technology, Republic of Korea

New composite materials consisting of a ferroaluminophosphate zeolite ($FAPO_4$-5) and calcium chloride with various ratio (0 – 50 wt%) were prepared by impregnation and spray drying method. The prepared $FAPO_4$-5 exhibited 147 m^2/g of specific surface area, 0.062 cm^3/g of micropore volume, and 0.104 cm^3/g of total pore volume. Maximum capacity of $CaCl_2$ in the micropore of $FAPO_4$-5 was calculated to be approximately 12 wt%. From X-ray diffraction patterns and N_2 adsorption-desorption isotherms of the composites the most of $CaCl_2$ was impregnated in the micropore at <10 wt% of $CaCl_2$ and $CaCl_2$ crystals were positioned in the textural pore and external surface of $FAPO_4$-5 at >10 wt%. Fully hydrated $FAPO_4$-5 and $CaCl_2$ desorbed water molecules less than 100 and 140 ℃, respectively. The composite materials exhibited higher energy density than those of individual materials, $FAPO_4$-5 and $CaCl_2$. It is noticeable that the desorption temperature of

the composites is less than 100 ℃, which is a preferable property for low temperature heat storage systems.

R098-A Exergy-based Sustainability Assessment of Continuous Photobiological Hydrogen Production Using Anaerobic Bacterium Rhodospirillum Rubrum

Assist. Prof. Meisam Tabatabaei Pozveh, Ali Dadak and Mortaza Aghbashlo
Biofuel Research Team (BRTeam), Islamic Republic of Iran

Thermodynamic modeling of the photobiological hydrogen production from syngas using light-dependent bacteria Rhodospirillum rubrum in a continuous photobioreactor was performed. The investigated bioreactor was evaluated for its exergetic performance parameters from both conventional exergy and eco-exergy points of view. These analyses were applied for selecting the best operational conditions in terms of flow rate of the liquid media and agitation speed with regards to sustainability and renewability issues. The results achieved revealed that the process exergy efficiency of the bioreactor was in the range of 14.71–22.90% and 14.71–22.84% using conventional exergy and eco-exergy concepts, respectively. Generally, the exergetic performance parameters of the bioreactor during the 540 h of the fermentation process using both concepts did not display noticeable differences due to the slow growth of the microorganisms and the low volume of the bioreactor. Nevertheless, the eco-exergy approach is strongly recommended for analyzing bioreactors used for hydrogen production due to the presence of the living organisms in the system. The results of the present survey proved that exergy analysis and its extensions could enable engineers and researchers to identify the most environmentally- and economically-benign pathways for renewable fuels production by providing inclusive information on process improvement potentials.

R117-A Evaluation of Producing Ethanol Native Strains Isolated in Bagasse and Sugar Cane Juice

Dr. Guadalupe Bustos Vázquez, Rodríguez-Durán, N.A., Del Angel-Del Angel, A., Rodríguez-Durán, N.R.
Universidad Autonoma de Tamaulipas, Mexico

Currently in the world, the development of new technologies to make rational use of the large amount of waste that is produced in industries and that by not conveniently be recycled or processed generate serious environmental and ecological damage. Misuse of current energy sources brings a progressive contamination and/or increasing greenhouse gases, what motivates seeking to improve the environment as a necessity. The role of the isolation of strains of yeast in ethanol production is certainly one of the challenges of modern biotechnology in the search for alternatives to reduce these problems, besides giving added value to the large amount of waste generated during some processes such as sugar cane. Bagasse and cane juice are raw material with high capacity in the growth of these microorganisms. The *Saccharomyces* genus stands out because of its higher efficiency in the conversion of sugars, and its tolerance to high concentrations of ethanol and SO_2, and it is the fermentative genus par excellence (Rainieri and Pretorius, 2000). However, there is growing interest in the use of new native strains able to survive industrial conditions and compete with wild yeasts. In the present study yeasts were isolated in tube inclined of cane juice through a spontaneous fermentation and of bagasse using YPD agar adding an antibiotic and incubated at 29 ℃ for times of 24 to 48 hours achieving growth well defined colonies.
The fermentations were conducted with a volume of 120 mL medium at 29 °C ± 1 °for 48h and 100 rpm. Samples were taken every 12 hours to assess the behavior of the strain. Cells were stained with methylene blue solution and counted in a Neubauer chamber to estimate viability. Moreover, cell growth was evaluated by determination of cell dry mass. The consumption of total sugars was performed by determining total sugars through Brix. The consumption of sugars and generation of product was determined by high-performance liquid chromatography. The various strains isolates of sugarcane juice showed better productivity of ethanol yields (Yp/s) between 0.40 and 0.78 higher than those obtained with bagasse (Yp / s <0.46).

R134 Assessing the Aquatic Environment Quality Contaminated with Heavy Metals as a Result of Polymetallic Mining in the North-West Region of Romania using Pollution Indices

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The main objective of this paper is the assessment of surface water quality polluted with various heavy metals (HM) using the quality indices and the information submitted may be useful for the competent authorities and the public. Cadmium (Cd), iron (Fe), manganese (Mn) and zinc (Zn) were determined from water samples of Socea Valley using the Atomic Absorption Spectrometry technique. The calculated water quality indices indicate that the monitored surface water between 2011-2014 years was deteriorating due to the former mining activities from this area. Most of the HM levels were highest compared to the acceptable standard limit. The level of Hevy Metal Evaluation Index (HEI) shows that the water quality falls within the low quality class and the values of Degree of Contamination (CdI) shows a high contamination. Also, the correlation matrix was performed between the analyzed heavy metals. The results obtained for the Pearson'*r* coefficient showed positive values for all heavy metals and between Fe and Mn the value of *r* being 0.933. All data revealed that the water from Socea Valley is not safe especially for drinking and irrigation purposes.

R116-A Revalorization of Aqueous Stream from Corn Milling Industry by the Extraction of Biosurfactants and its Application in the Elimination of Burnt Oil from Contaminated Sand

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A decontamination process based on the utilization of a biosurfactant extracted from corn steep liquor (CSL) has been developed to eliminate oil from contaminated sand. Nowadays, huge amount of petroleum-derived oil is dropped in the environment due to certain oil spillages producing important environmental impacts in water and soil environmental sites. Burnt oil has several toxic compounds like polycyclic aromatic hydrocarbons (PAHs) that produce many toxic and harmful effects on human health. Synthetic surfactants are widely used in treating oil spills to disperse oil and accelerate its mineralization by favoring the solubilization of this hydrophobic contaminants, however synthetic surfactants used in environmental remediation or cleaning processes are often toxic and harmful to the ecological function. Therefore, in this work a biosurfactant extracted form CSL was used for the elimination of burnt oil from contaminated sand. This biosurfactant consist of a lipopeptide composed by C16 ad C18 fatty acids and amino acids.
Biosurfactant was extracted from CSL using liquid-liquid extraction following the protocol stablished by Vecino et al., (2015). Sand was contaminated with 5% (w/w) of burnt oil, stirred vigorously for 30 min to promote the homogeneous distribution of oil in sand and left to rest for 72h at room temperature. After that, 5 g of contaminated soil were decontaminated with 150 mL of biosurfactant aqueous solution, containing about 200 mg/L of biosurfactant. Experiments were run between 6 and 42h in a batch operation system at room temperature with an agitation of 150 rpm. The amount of oil removed from sand was quantified gravimetrically.
The experimental results obtained suggest that biosurfactant extracted from corn steep liquor may have a great potential, as an ecofriendly-washing agent, for the treatment of oilcontaminated sand.

R100-A

Clouds observations with newly developed high resolution FMCW cloud profiling radar FALCON-A in arctic station

Prof. Toshiaki Takano, Yohei Kawamura, Hiroyuki Nakata and Tamio Takamura
Chiba University, Japan

Observation of clouds with radars in millimeter wave range is one of the most powerful methods to derive information on interior of clouds. We have developed new cloud profiling FMCW (Frequency Modulated Continuous Wave) Doppler radar named FALCON-A in W-band 94GHz and installed at the Arctic Station in Ny-Alesund, Svalbard, Norway, N79 deg. as a part of GRENE Arctic Climate Change Research Project, Japan. FALCON-A consists of two 1m-diameter antennas and has high spatial resolution of 0.18 degree FWHM, which corresponds to 15m FWHM at the height of 5 km. A high range resolution of 48m is realized with the FMCW type radar, which is about several times higher than that of normal pulse type radar. Output power of FALCON-A is as small as 1W. Although its small output power, FALCON-A has enough sensitivities to observe thin clouds at high altitude up to 15 km and has high resolution in Doppler measurements. Using FALCON-A, we started regular observations in 2013 September at Ny-Alesund even in the winter days. Observations of cirrocumuli appeared on 2013 Sept. 16 show granular structure of cirrocumuli appeared at the height around 5 km. Lower layer of the cloud around 4 km, contrary, are falling with biased trajectory. These fine structures are obtained with high spatial resolution of FALCON-A. These results of observations with FALCON-A would be useful to investigate characteristics of clouds in various cases in Arctic region and be useful for investigations of climate change and global warming.

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