ICSEE 2023 7th International Conference on Sustainable Energy Engineering

with workshop ICEMAT 2023

2023 5th International Conference on Energy Management and Applications Technologies

Virtual Conferenece | February 17-19, 2023

Co-sponsored by

Supported by

Media Partner

TABLE OF CONTENT

#CONFERENCE MATERIALS

- Zoom Guidance (click) *For new users.*

1 WELCOME MESSAGE

Dear all,

On behalf of the conference organizing committees, we are delighted to welcome you to the virtual conference 2023 7th International Conference on Sustainable Energy Engineering (ICSEE 2023), along with its workshop 2023 5th International Conference on Energy Management and Applications Technologies (ICEMAT 2023) to be held from February 17-19, 2023, which is co-sponsored by University of Tasmania, Australia.

The objective of the conference is to provide a premium platform to bring together researchers, scientists, engineers, academics and graduate students to share up-to-date research results. We are confident that during this time you will get the theoretical grounding, practical knowledge, and personal contacts that will help you build a long term, profitable and sustainable communication among researchers and practitioners in the related scientific areas.

This year's program is composed of 2 keynote speeches delivered respectively by ***Prof. Tony Wood*** (Fellow to the Australian Academy of Technology and Engineering, Grattan Institute, Australia), ***Prof. Nikos Hatziargyriou*** (FIEEE, National Technical University of Athens, Greece), 3 plenary speeches delivered respectively by ***Prof. Mohammad Rasul*** (Central Queensland University, Australia), ***Prof. Firoz Alam*** (RMIT university, Australia), ***Assoc. Prof. Wenming Yang*** (National University of Singapore, Singapore) and 2 oral sessions. We would like to express our gratitude to all the speakers in these conferences. Special thanks to all of our committee members, all the reviewers, and the attendees for your active participation. We hope the conferences will be proved to be intellectually stimulating to us all.

Finally, we wish you very successful conferences!

Yours Sincerely,

Conference Organizing Committees

2 MEETING AGENDA

Essential Information

Please make sure you are aware of the following details before the conference.

Time Zone

GMT +11 / UTC+11
Sydney Local Time
Please be aware of time difference between this and your region/country.

Name Setting

Keynote Speaker: Keynote-Name
Committee: Position-Name
Author: Paper ID-Name
Listener: Listener-Name

Test Session

Check details of the testing time on **Friday, Feb. 17**, and please make sure to show up on time.

Meeting ID

Room ID: 870 4069 1367
https://us02web.zoom.us/j/87040691367
Room will be open 30 mins in advance.

2 MEETING AGENDA

Room ID: 870 4069 1367
Meeting Link: https://us02web.zoom.us/j/87040691367

Friday
17.02.2023

Zoom Test Sessions

15:00-15:30	15:30-16:00	16:00-17:00
CS031	CS027	[Alternative Time] for participants who are unavailable at allocated time.
CS036	CS045	
CS041	CS013	
CS004	CS017	
CS006	CS0001	
CS026	CS302	
CS0005	CS301	
CS018	CS003	
CS010	CS038	
CS014	--------	

Pre-test for Formal Session

- We will test screen sharing, audio, video function, etc. Please get your presentation slides and computer equipment prepared beforehand.
- All the presenters are required to join the Zoom test sessions on **Feb. 17**, to ensure the meeting run smoothly.
- It may take approximately 3mins to complete the test session, then feel free to leave.

- Please note that times provided in the program are according to Sydney Time (GMT +11 / UTC + 11).

2 MEETING AGENDA

Room ID: 870 4069 1367
Meeting Link: https://us02web.zoom.us/j/87040691367

Saturday
18.02.2023

TIME	ACTIVITY	PRESENTER
Chairman: *Program Co-Chair* **- Yinghui Tian, University of Melbourne, Australia**		
14:00-14:05	**Opening Remarks**	*Conference Chair* **- Prof. Xiaolin Wang** University of Tasmania, Australia
14:05-14:50	**Keynote Speech I** "The Transition to Net Zero: is an Objective of 100% Renewables Realistic"	Prof. Tony Wood Fellow to the Australian Academy of Technology and Engineering, Grattan Institute, Australia
14:50-15:25	**Plenary Speech I** "Onshore and Offshore Wind Energy for Power Generation-Trends and Prospects"	**Prof. Firoz Alam** RMIT university, Australia
15:25-16:10	**Keynote Speech II** "The Interaction of Electric Vehicles with the Power Grid"	**Prof. Nikos Hatziargyriou** Fellow of IEEE, National Technical University of Athens, Greece
16:10-16:30	**Group Photo / Break Time**	
16:30-19:15	**Session 1: Energy Conservation, Thermal Engineering and Energy Management**	CS010 CS027 CS045 CS013 CS017 CS0001 CS302 CS301 CS003 CS014 CS038

- Please note that times provided in the program are according to Sydney Time (GMT +11 / UTC + 11).
- Each talk includes 5-minute Q&A.
- Each oral presentation includes 3-minute Q&A
- Session Group Photo: a picture captured at the end of each session.

2 MEETING AGENDA

Room ID: 870 4069 1367
Meeting Link: https://us02web.zoom.us/j/87040691367

Sunday
19.02.2023

TIME	ACTIVITY	PRESENTER
14:00-14:35	**Plenary Speech II** "Waste to Energy: Production of Automobile Fuels (Diesel and Petrol) from Waste Plastic Pyrolysis Oil"	**Prof. Mohammad Rasul** Central Queensland University, Australia
14:35-15:10	**Plenary Speech III** "Fuel Design for Efficiency Improvement and Pollutions Reduction in Transportation System"	**Assoc. Prof. Wenming Yang** National University of Singapore, Singapore
15:10-15:30		**Group Photo / Break Time**
15:30-17:30	**Session 2: Renewable Energy, Carbon Emission Reduction and Climate Analysis**	CS031 CS036 CS041 CS004 CS006 CS026 CS0005 CS018

- Please note that times provided in the program are according to Sydney Time (GMT +11 / UTC + 11).
- Each talk includes 5-minute Q&A.
- Each oral presentation includes 3-minute Q&A.
- Session Group Photo: a picture captured at the end of each session.

3 KEYNOTE SPEAKER

Room ID: 870 4069 1367
Meeting Link: https://us02web.zoom.us/j/87040691367

Saturday
18.02.2023

Prof. Tony Wood
Fellow to the Australian Academy of Technology and Engineering
Grattan Institute, Australia

14:05-14:50

"The Transition to Net Zero: is an Objective of 100% Renewables Realistic"

Abstract: Australia can achieve a net-zero carbon emissions electricity system without threatening affordability or reliability of supply. However, we should not rush to 100 per cent renewable energy, because ensuring reliability would be costly without major technological advances – especially in the depths of winter when demand is high, solar supply is low and persistent wind droughts are possible. Net-zero by the 2040s is an appropriate commitment.

Bio: Tony has been Director of the Energy Program since 2011 after 14 years working at Origin Energy in senior executive roles. From 2009 to 2014 he was also Program Director of Clean Energy Projects at the Clinton Foundation, advising governments in the Asia-Pacific region on effective deployment of large-scale, low-emission energy technologies. In 2008, he was seconded to provide an industry perspective to the first Garnaut climate change review. In January 2018, Tony was awarded a Member of the Order of Australia in recognition of his significant service to conservation and the environment, particularly in the areas of energy policy, climate change and sustainability. In October 2019, Tony was elected as a Fellow to the Australian Academy of Technology and Engineering.

3 KEYNOTE SPEAKER

Room ID: 870 4069 1367
Meeting Link: https://us02web.zoom.us/j/87040691367

Saturday
18.02.2023

Prof. Nikos Hatziargyriou
Fellow of IEEE

National Technical University of Athens, Greece

15:25-16:10

"The Interaction of Electric Vehicles with the Power Grid"

Abstract: The transportation sector has a significant impact on the environment, being responsible for around 25% of the total greenhouse emissions globally. As a result, the number of EVs in the last years has significantly increased, while many types of EV-charging options are available. In this respect, uncontrolled charging of EVs could provoke significant issues for the grid, which would require significant infrastructure reinforcements. The presentation will discuss smart charging and V2G methodologies that can mitigate the impact of uncontrolled charging on the network. Moreover, synergies among the EV-charging and Renewable Energy Resources (RES) will be presented, indicating the effective shifting of the EV charging demand towards hours with increased RES production and the potential to increase both the number of EV-chargers and the grid's RES hosting capacity. The presentation will also discuss future trends in electromobility in Europe, including interoperability and the need for a unified system approach (EVs - Charging Infrastructures - Services provision - Business activities) for efficiently serving the relevant transportation needs. On-going e-mobility projects in non-interconnected islands will be finally presented.

Bio: Nikolaos Hatziargyriou received the Diploma in Electrical and Mechanical Engineering from National Technical University of Athens in 1976 and the MSC and PhD degrees from UMIST, Manchester, UK in 1979 and 1982, respectively. Since 1984 he is with the Power Division of the Electrical and Computer Engineering Department of NTUA and since 1995 he is full professor in Power Systems. Since April 2015 he is Chairman and CEO of the Hellenic Distribution Network Operator (DEDDIE). From February 2007 to September 2012, he was Deputy CEO of the Public Power Corporation (PPC) of Greece, responsible for Transmission and Distribution Networks, island DNO and the Center of Testing, Research and Prototyping. He is Fellow Member of IEEE, past Chair of the Power System Dynamic Performance Committee, Honorary member of CIGRE and past Chair of CIGRE SC C6 "Distribution Systems and Distributed Generation". He is co-chair of the EU Technology and Innovation Platform on Smart Networks for Energy Transition. He is member of the Energy Committee of the Athens Academy of Science. He is Editor in Chief of the IEEE Transactions on Power Systems and member of the Editorial Board of IEEE Transactions on Sustainable Development and the IEEE Power and Energy magazine. He is included in the 2016 Thomson Reuters' list of the top 1% most cited researchers. More: http://icsee.org/keynote.html

3 PLENARY SPEAKER

Room ID: 870 4069 1367
Meeting Link: https://us02web.zoom.us/j/87040691367

Saturday
18.02.2023

Prof. Firoz Alam

RMIT university, Australia

14:50-15:25

"Onshore and Offshore Wind Energy for Power Generation- Trends and Prospects"

Abstract: Wind energy remains the 2nd most dominant source amongst all renewable energy for power generation after hydro energy. Its global share in 2021 is over 6.6% while hydro 15.3%, solar 3.7%, bioenergy 2.4% and other renewables 0.4%. Coal and gas remain the most dominant energy for base power generation (36.5% and 22.2%, respectively) and other fossil fuels (mainly liquid fuel) constitute roughly 3.1%. Nuclear energy's share of the total global power generation is 9.9%. The global power demand rose 3% in 2022 compared to the year 2021. This paper highlights the current trends and prospects for onshore and offshore wind power generation. It also underscores the need for the sustained annual addition of 250 GW wind power to the global power generation pool as the wind power's share to achieve the United Nations' Net Zero Emissions target by 2050. More: http://icemat.org/plenary.html

Bio: Dr Firoz Alam is a Professor in the School of Engineering (Aerospace, Mechanical and Manufacturing) at RMIT University in Melbourne, Australia. He completed his PhD in vehicle aerodynamics from the same university in 2000. He received his Master's degree (combined with Bachelors) in Aeronautical Engineering with Honours (First Class First) from Riga Civil Aviation Engineers Institute, former Soviet Republic of Latvia in 1991. Prof Alam's research interest includes aerodynamics and hydrodynamics (aircraft, road vehicles, trains, buildings and structures), energy, engineering education (curriculum design, quality assurance and accreditation). He has over 250 publications (including scholarly books, book chapters, journal articles and peer reviewed conference papers). He is currently serving as editor in chief and editorial board member for over half a dozen international scientific journals. Prof Alam is a Fellow of the Institution of Engineers Australia, Chartered Professional Engineer (CPEng), and APEC Engineer. He is an active member of several other professional societies and associations including American Society of Mechanical Engineers (ASME), American Institute of Aeronautics and Astronautics (AIAA), Society of Automotive Engineers USA & Australia, and International Society of Bionic Engineering. Prof Alam is the recipient of RMIT University's best Teacher Award in 2004.

3 PLENARY SPEAKER

Room ID: 870 4069 1367
Meeting Link: https://us02web.zoom.us/j/87040691367

Sunday
19.02.2023

Prof. Mohammad Rasul

Central Queensland University, Australia

14:00-14:35

"Waste to Energy: Production of Automobile Fuels (Diesel and Petrol) from Waste Plastic Pyrolysis Oil "

Abstract: Mixed plastic waste constitutes a large portion of landfill solid waste. Waste plastics can be converted to produce crude plastic oil, but its qualities are critical to industry refining processes. Thermo-chemical conversion using Pyrolysis reactor can be used to thermally decompose plastic waste to produce crude plastic oil, which then can be processed through vacuum distillation and hydrotreatment to produce automobile diesel. This talk will present the findings of a project on "Australian standard diesel from mixed plastic waste: Maximizing recovery" funded by the Australian Government and Industry Partner. The work was carried out using a pilot-scale fixed bed pyrolysis reactor and industrial scale distillation and hydrotreatment set-up to produce Australian standard diesel from mixed plastic waste. The challenges that were overcome to produce Australianstandard diesel from mixed plastic waste will also be presented.

Bio: Mohammad Rasul obtained his PhD in the area of Energy and Thermodynamics from The University of Queensland (UQ), Australia, in 1996. He received his Master of Engineering in Energy Technology from Asian Institute of Technology (AIT), Thailand, in 1990. His first degree is in Mechanical Engineering from Bangladesh University of Engineering and Technology (BUET), Bangladesh, completed in 1987. Currently, he is an Associate Professor in Mechanical Engineering, School of Engineering and Technology, Central Queensland University, Australia. He is specialised and experienced in research, teaching and consultancy in the areas of energy (industrial, building and renewable energy) and thermodynamics (energy intensive process industries). He has published over 240 research articles both in reputed journals and conferences including 7 book chapters. He has edited two books and has supervised a dozen of research higher degree (RHD) students (PhDs and Masters) to completion and attracted about $3 millions research funding. He has published several conference papers and book chapters in the area of project based learning and innovative teaching practices, and have edited a book on Developments in Engineering Education Standards: Advanced Curriculum Innovation. More: http://icemat.org/plenary.html

3 PLENARY SPEAKER

Room ID: 870 4069 1367
Meeting Link: https://us02web.zoom.us/j/87040691367

Sunday
19.02.2023

Assoc. Prof. Wenming Yang

National University of Singapore, Singapore

14:35-15:10

"Fuel Design for Efficiency Improvement and Pollutions Reduction in Transportation System"

Abstract: Transportation system is one of major contributors to fuel consumption and greenhouse gas emissions, to address people's increasing concern on energy crisis and global warming, it is essential to improve the combustion efficiency and reduce the major pollutions of transportation system. In this work, our latest findings on fuel design and its impact on combustion process and emissions formation in IC engines are presented. First, a brief introduction will be given on the sooting tendency of various fuel surrogates with different molecular structures. Then, the impact of biodiesel with different unsaturation level on the performance and emissions formation of IC engine will be presented, followed by an introduction on performance and emissions of IC engine fueled by emulsion fuel with organic nano particles. We will also present our latest investigation results on supplemental gas induction on combustion and emissions formation in IC engines. Finally, the impact of PODE on the sooting tendency will be presented.

Bio: After obtaining his Ph.D degree in 2000, Wenming Yang has been employed as a research fellow in the Department of Mechanical Engineering, National University of Singapore, followed by a teaching instructor and assistant professor in 2006 and 2011, respectively. Since 2017, He has been employed as an associate professor in National University of Singapore. His research interests include: Internal combustion engine fueled by biofuels and blend fuels, development of advanced platform for boilers with high efficiency and low emissions, incinerators and micro power generators etc. He is now looking for Ph.D. candidates with interests in IC engines, waste to energy (WTE) incineration power plant, biomass boilers and CFB boilers.

4 ABSTRACT OF PARALLEL SESSION

01

No-Show Policy

A paper not presented will be removed from the final conference proceedings.

No refund will be approved to authors of those papers.

02

Duration of Presentation

15min

12min for presentation, and 3min for Q&A.

Presenter's certificate will be forwarded by email, one week after the meeting.

03

Report File

a. PowerPoint file
b. PDF file
c. Pre-recorded video

are all acceptable.

Please join conference room at least 10mins before your allocated session.

04

"Best Presentation" Award

It will be selected from each virtual session by the session chair.

Please visit our website a week after the meeting for the info.

The presenter will receive a certificate of "Best Presentation".

- Please note that times provided in the program are according to **Sydney Time (GMT +11 / UTC + 11).**
- **Each oral presentation includes 3-minute Q&A.**

4 ABSTRACT OF SESSION 1

Session 1: Energy Conservation, Thermal Engineering and Energy Management Session Chair:	**Time: 16:30-19:15 // Room ID: 870 4069 1367** Meeting Link: https://us02web.zoom.us/j/87040691367

Time & ID	Presentation
16:30-16:45 **CS010**	Timber houses in the Mediterranean area: a challenge to face ***Tancredi Testasecca**, Università degli studi di Palermo,Italy* Abstract—About 40% of European energy consumption and most of the en-vironmental impacts are related to the construction sector. A key role in de-carbonising the construction sector play the timber buildings. Wood is a sus-tainable resource and has excellent thermo-physical and acoustic characteris-tics compared to traditional building materials, with short production times that affect not only the construction phase but also costs. Although wooden houses are very common in the countries of northern Europe, in Italy and in general in the Mediterranean countries, this type of building is not very widespread today. The hot climate, characterized by a long cooling season, has always directed builders to build massive buildings. Because today building a timber house means creating energy-efficient buildings, it is pro-posed to study the energy-environmental performance of timber buildings in a Mediterranean climate. In this work, the performance of a building made with traditional construction will be compared with a simulated wooden building at different latitudes and climatic conditions. At the same time, a simplified assessment of the economic aspects will be carried out. For each model, the main thermophysical and geometric characteristics necessary to achieve the energy comfort requirements will be identified using MATLAB. The first results show that a wooden house has an energy saving of around 17% with payback times of 10 years compared to a traditional house.
16:45-17:00 **CS027**	Quantitative Simulation Analysis of the Function Intensity of Energy Consumption Indicators on an Office Building ***Weihao He**, Chongqing University, China* Abstract—In the context of carbon neutralization, the requirements for im-proving the energy efficiency of building are growing fast at the same time. Thereby, good energy management is becoming more and more important. In this paper, a typical office building energy consumption model was estab-lished in DeST. Single factor sensitivity analysis through simulation were carried out about the energy consumption evaluation indicators, which are under the category of enclosure structure, air-conditioning system, other equipment and occupants' usage pattern indicators. The building cooling and heating load and energy consumption is calculated, moveover, the im-pact of all indicators on energy consumption is analyzed from the variation range of energy-saving rate. Finally, the result shows that occupants as sub-jective individuals have definite potentiality in achieving energy conserva-tion.

4 ABSTRACT OF SESSION 1

Time & ID	Presentation
17:00-17:15 CS045	Parametric Analysis and Comparative Study of the Transcritical CO2 cycle and the Organic Rankine Cycle for Low-temperature Geothermal Sources ***Kun-Hsien Lu,*** *National Tsing Hua University, Taiwan* Abstract—Geothermal energy at low temperature levels (100oC¬—220oC) is abundant in the nature and it can be used for clean and sustainable power supply. This study analyzes the transcritical CO2 (T-CO2) cycle and the or-ganic Rankine cycles (ORCs) with 90oC¬—150oC hot water as the heat source and ambient temperature at 20oC—10oC to simulate possible geothermal sources. R245fa and R601a are selected as the working fluid for the ORCs. Numerical parametric optimization and comparative study have been con-ducted via MATLAB and NIST REFPROP. The main performance indicators are net power output and heat recovery efficiency of the cycle. The results show that, as heat source temperature increases, the net power output and heat recovery efficiency of the ORCs increase more rapidly than the T-CO2 cycle. On the other hand, as ambient temperature rises, the net power output of the T-CO2 decreases more significantly than the ORCs. The heat recovery efficiencies of all the cycles are slightly affected by the ambient temperature change. In general, based on the assumptions made in this study, the T-CO2 cycle is more recommended in lower temperature environment due to its dominant advantages in both net power output and heat recovery efficiency, while the R245fa ORC is more preferable in higher temperature environment.
17:15-17:30 **CS013**	Research on energy saving optimization of variable flow air conditioning chilled water system ***Linqing Bao****, Chongqing University, China* Abstract—The primary pump variable flow system can realize the variable flow regulation of the chiller to reduce the energy consumption of the pump. However, the final energy-saving effect depends on the effect of chilled water flow on the efficiency of chiller and pump. In this paper, the whole pipe network heat transfer and hydraulic model of different forms of primary pump variable flow water system and the energy con-sumption model of chiller and variable frequency pump are established. The experimental platform of variable flow central air conditioning sys-tem is built. The experimental research on two kinds of water system forms with full on-off control and the combination of on-off control and continuous regulation at the end of the water system is carried out under the two control strategies of constant main pipe pressure difference and constant temperature difference respectively. The operation characteris-tics of the chiller and the variable frequency pump are explored and ver-ified with the theoretical analysis. The results show that the input power of the pump under constant temperature difference control is lower than that under constant main pipe pressure difference control, but the com-prehensive energy consumption and energy saving rate of the chiller and pump under constant temperature difference control strategy are not bet-ter than that under constant main pipe pressure difference control strategy.

4 ABSTRACT OF SESSION 1

Time & ID	Presentation
17:30-17:45 **CS017**	Preliminary multiple linear regression model to predict hourly electricity consumption of school buildings ***Keovathana Run**, University of Montpellier, France* Abstract—Energy predicting gains attention for its ability to manage and control energy consumption in a building. The multiple linear regression model is known for its simplicity and effective when dealing with electricity consumption. In this work, the authors have utilized the Multiple Linear Regression (MLR) model to predict the hourly electricity energy consump-tion, in winter, for school buildings. For the case study, school buildings in the South of France are used. In this model, nine predictor variables are con-sidered, namely, (1) level of indoor CO2, (2) indoor temperature, (3) indoor humidity, (4) outdoor temperature, (5) outdoor humidity, (6) global solar ra-diation, (7) day index (weekday/weekend), (8) time index (occupied/non-occupied) and (9) building net floor area. The first order and two-way inter-action models are constructed using all predictors. The coefficient of deter-mination (R2) is a model evaluation metric that assesses the relationship be-tween the vales of the desired outcomes and those that the model predicts. The results show that the two-way interaction model has better R2 for both training set (R2 = 74%) and testing set (R2 = 77%). However, this model gives underestimated results for higher values of electricity consumption starting from 30kWh/hour. It is also not reliable for one of the buildings as the R2 is only 55% and the inaccuracy rate is 69%. Overall, this model is a starting point for future work to improve its predicting ability by adding oth-er influential explanatory variables.
17:45-18:00 **CS0001**	Structural optimization of liquid-cooled battery modules with different flow configurations ***Hengyun Zhang**, Shanghai University of Engineering Science, China* Abstract—In this paper, the thermal performance of a new liquid-cooled shell structure for battery modules is investigated by numerical simulation. The module consists of 4×5 cylindrical batteries and the liquid-cooled shell, and multiple flow channels inside the shell for the coolant flow. The maximum temperature, maximum temperature difference and pressure drop of the battery module were taken as the performance evaluation indexes, and the expectation function was introduced to obtain the optimal flow channel arrangement of the shell. The temperature rise of the battery in the discharge phase is significantly greater than that in the charging phase. After the battery is charged at a constant current and voltage to the charging cut-off voltage, the battery temperature starts to drop rapidly in spite of the ongoing charging at small current. As the coolant flow rate increases, the maximum temperature of the battery module decreases, but the pressure drop increases significantly, while the temperature difference remains unchanged. Experimental measurement was also conducted to verify the simulation results.

4 ABSTRACT OF SESSION 1

Time & ID	Presentation
18:00-18:15 **CS302**	Study on Fast charging using Phase Change Materials for Electric Vehicle Applications ***Maitane Berecibar**, Vrije Universiteit Brusel, Belgium* Abstract—The world is facing an energy transition, fossil fuels are replaced by electricity through the use of Energy Storage Systems (ESS). This is the case for mobility, Electric Vehicles (EV) are taking the roads replacing the traditional fossil fuel-based vehicles. Although the technology that is in the road is safe and capable to fulfill the transport needs, fast charging is still a pending issue on electric mobility. In order to overcome this bottleneck thermal management systems and heating/cooling systems are key. There are already many different solutions under research on this topic, one of it is the usage of Phase Change Materials (PCM) in the cooling systems as part of the Battery Thermal Management System (BTMS) strategy. In this paper, PCM solutions have been tested at fast charge charging rates, such as, 2, 4 and 6 C-rates. Additionally, a comparison with a more simplistic hybrid cooling system has been done in order to see the advantage of using PCM materials.
18:15-18:30 **CS301**	Self-adaptive Ageing Models for Optimal Management and Planning of Assets in Microgrids ***Thierry Coosemans**, Vrije Universiteit Brusel, Belgium* Abstract—The evolution towards decentralization of the electricity grids leads towards a large increase of new and flexible devices in low & medium voltage smart grid environments such as microgrids and energy communities. In this type of environment, an advanced, dynamic and autonomous asset management system will be essential to ensure grid optimal performance. Self-adaptive ageing modelling algorithms using real-life historical operational data of assets to assess the future capacity, remaining useful life and optimal operational profiles are essential tools in such a context. This paper will propose a modelling methodology for this purpose, based on machine learning techniques using historical data of assets operated in real-life circumstances and with a limited knowledge of asset properties. The process flow of the methodology is explained in detail, as well as the tangible outputs that are generated. The method was applied on a photovoltaic system in a real-life environment and first experimental results are discussed.

4 ABSTRACT OF SESSION 1

Time & ID	Presentation
18:30-18:45 **CS003**	Impact of Smart Hydronic System with Heat Pump On Electricity Load of A Typical Queensland Household ***Adrian Rapucha**, Central Queensland University, Australia* Abstract—Maintaining the stability of the electrical grid becomes more chal-lenging every year. The rapid growth of renewable energy sources (RES) is one of the key reasons. The residential sector is also a large contributor to the destabilisation of the electrical grid due to daily changes in demand. Domestic load is one of the most significant factors in creating peak de-mands, especially residential space conditioning and water heating. One of the possible solutions to minimise the problem is the usage of hydronic cool-ing and heating. This paper will present the results of the analysis of the im-pact of replacing conventional air conditioning and electric water heating with a hydronic system with a heat pump and smart control reacting to grid conditions on the load generated by a typical Queensland household. The study was conducted using measured air conditioning (AC) electrical load and hot water consumption, and wholesale electricity price as an indicator of grid conditions. A series of TRNSYS simulations conducted in this study re-vealed that hydronic systems could not only decrease the household's energy consumption but also positively impact the grid by shifting most of the wa-ter heating and air conditioning load to periods of overgeneration.
18:45-19:00 **CS014**	Comparison of Decomposition Techniques in Forecasting the Quarterly Numbers of Pole-Mounted Transformer Failures *TBA* Abstract—Pole-mounted transformers form a vital, final link between a utili-ty and customers, and their failure means that power cannot be supplied. Adequate spares must be available in order to reduce duration of outages and undesirable consequences thereof. In this paper, the authors developed the forecasts of the quarterly numbers of failures for these transformers, using additive and multiplicative forecasting methods. Thereafter, the accuracies of the developed models are compared on the basis of a number of measures, including the mean absolute deviation (MAD), the mean squared error (MSE), root mean square error (RMSE), and mean absolute percentage error (MAPE). Firstly, the irregular components for additive model (values about the "y equals to zero" line) and multiplicative model values about the "y equals to 1" line), meaning they can be assumed to be 0 and 1 in the fore-casting models, respectively. Secondly, it is found that the residuals of both methods are significantly large in relation to the values of observations of the time series of numbers of quarterly failures, which affects the accuracy of forecasts adversely. Finally, the capabilities of the additive and multiplica-tive decomposition seem to be comparable, with very similar values for measures of accuracy of forecast error obtained very similar, and one method being better than the other only dependent on the measure of forecast error considered.

4 ABSTRACT OF SESSION 1

Time & ID	Presentation
19:00-19:15 **CS038**	A Study on Heat Generation of Lithium Ion Battery Used in Electric Vehicles by Simulation and Experimental ***TBA*** Abstract—Lithium ion battery is commonly used for electric vehicles because it has a good lifespan and has low discharge rate. However, the LIB easily gets heated up gradually as it discharges. The rise in battery temperature is a major concern that needs to be focused on due to the safety aspect. Therefore, the thermal behaviour of LIB is simulated and analysed in this study. The equivalent circuit of the Panasonic 18650 LIB cell is designed in MATLAB using SIMULINK. Then, the battery system is run at an ambient temperature of 25ºC to simulate the heat production of the charging and discharging process at different discharge rates of 0.5C, 1C and 3C. On the other hand, an experiment with a battery system was conducted to check the temperature rise at the same current rate. The temperature rise graph against the state of charge (SOC) for charging and depth of discharge (DOD) for discharging are obtained at 0.5C,1C and 3C by both simulation and experiment and thermal behaviour is analysed. In conclusion, heat generation during battery discharging is higher than the charging process, particularly when conducting the experiment. Overall, both charging and discharging the temperature rise is directly proportional to the SOC and DOD respectively.

4 ABSTRACT OF SESSION 2

Session 2: Renewable Energy, Carbon Emission Reduction and Climate Analysis Session Chair:	Time: 15:30-17:30 // // Room ID: 870 4069 1367 Meeting Link: https://us02web.zoom.us/j/87040691367

Time & ID	Presentation
15:30-15:45 **CS031**	A Design and Fabrication of an Automated Solar Energy Tracker Integrated Four-Sided Reflector Based Box Type Solar Cooker to Increase Efficiency by Absorbing Maximum Solar Energy ***Ashik Mahmud,*** *Rajshahi University of Engineering & Technology, Bangladesh* Abstract—As technology continues to advance, it increases the energy de-mand. As a result, alternative technologies based on renewable energy are conceivable. Another significant contributor to worldwide energy usage has been cooking. Consequently, switching to solar energy for cooking can solve the current energy issue. The box-style solar cooker is the most straightfor-ward tool for gathering incoming solar radiation and transforming it into heat energy. This study discusses the efficiency and power output as exam-ples of thermal performance parameters used to evaluate various cookers. The efficiency of solar cookers has previously ranged from 17 to 25 percent; however, this project raises it by 33 percent. This study uses an automated solar tracking system to improve the performance and efficacy of solar cook-ers. The four-sided reflector-based box-type solar cooker moves following the sun's rotation to extract the most energy for heating it and getting it ready for cooking. This test model of the device based on a servo motor intelligent-ly controlled by an Arduino UNO board.
15:45-16:00 **CS036**	Design and Implementation of an Automated Hybrid Sustainable Energy Generation from Earth-Battery and Solar PV System ***Md. Samiul Islam Borno,*** *American International University-Bangladesh, Bangladesh* Abstract—Day by day, human life depends on advanced technologies, and power is a part of our modern living. Advanced technologies are coming to our fingertips and becoming an integral part of our daily life. With the ad-vancements of civilization, the average energy consumption per head is in-creasing. Power is required to sustain a technological world, and this is where human civilization will face a power crisis in the near future. It is a fact that power-producing fuel resources are limited in nature, and there is a negative impact on the Earth when the fuels get burned to get electrical en-ergy. In this concern, scientists are searching for sustainable green energy for the betterment of planet Earth. The proposed hybrid renewable energy sys-tem could be an alternative solution for the future. This proposed project is based on the hybrid model, which combines photovoltaic cells and the newly introduced renewable energy source, Earth-Battery. This hybrid power model can be a backup for a general solar panel, as solar power has some limita-tions. As a result of combining two renewable energy sources to supply the needed energy, consumers can get more power than with traditional solar power, and battery service life can be extended by using the hybrid energy model.

4 ABSTRACT OF SESSION 2

Time & ID	Presentation
16:00-16:15 **CS041**	Quantitative assessment of low-carbon transition pathways of power generation company considering CCS technology ***Zhou Yu**, The NARI Group Corporation, China* Abstract—Coal power units combined with carbon capture and storage (CCS) technology can provide indispensable flexible low-carbon power for the reliable operation of new energy dominated power systems. Besides, they are one of the most important technical ways for low-carbon development of power generation companies under the goal of carbon neutrality. However, due to the high cost of CCS at this stage, corresponding incentive policies must be introduced to promote the development of coal power CCS for power generation companies. Quantitative assessment of the impact of large-scale CCS development on the low-carbon transition path and economic benefit of power generation companies is the key to supporting relevant policy decisions. Based on the technology-economy-emission simulation model of power generation company transition considering CCS, this paper obtains the power, emission and economic indicators of a power generation company under multiple typical CCS development pathways through simulation, realizes the quantitative evaluation of the low-carbon transition pathway of power generation companies considering CCS, and provides decision-making support for the optimization of CCS development strategy and related policies.
16:15-16:30 **CS004**	Carbon Capture and Storage Technology (CCS) for India: Bottlenecks and their role in adoption ***Krishan Kumar Pandey**, O.P. Jindal Global University, India* Abstract—The atmospheric concentrations and world-wide emissions of CO2 continue to rise despite of increasing efforts of decarbonisation. Clearly, deployment of renewable energy will not be enough to reduce the carbon in the atmosphere. We cannot achieve climate objectives without Carbon Capture and Storage (CCS). Therefore, to take the first step toward CCS in India a detailed study needs to be conducted on feasibility of CCS in India. From the perspective of technological feasibility few research has quantified the potential of carbon capture in India and identified the geographical mapping of the potential. But a prior understanding of the major challenges needs to be the first step before going for detailed feasibility study. The study revisits the growth of CCS in global context and attempts to understand India's commitments on the same. The study further attempts to identify the challenges from the perspective of emitters in Indian context. The study includes both the oil and gas, and fossil fuel-based power generation plants so that the challenges common for both sectors may be considered before initial feasibility analysis. The study finds 6 categories of challenges namely Cost of CCS, Geo-storage capacity, Source sink matching, Supply Chain and building rate, Policy regulations and public acceptance. The study further establishes the relationship among the identified challenges by adopting Interpretive Structural Modelling (ISM) approach. The study identifies the priority areas for policy makers.

4 ABSTRACT OF SESSION 2

Time & ID	Presentation
16:30-16:45 **CS006**	Impact of urban morphology on urban heat island intensity in a Mediterranean city: Global sensitivity and uncertainty analysis ***Fatemeh Salehipour Bavarsad,*** *Università Politecnica delle Marche, Italy* Abstract—Urban microclimate tools are used to estimate the magnitude of Urban Heat Island (UHI) and the effectiveness of mitigation strategies. How-ever, acquiring information for creating reliable models is often challenging. Sensitivity Analysis (SA) and Uncertainty Analysis (UA) can be effectively used to acquire information and make informed decisions even in uncertain scenarios. However, few studies still carry out SA and UA on microclimate models. This study used SA and UA techniques to evaluate the impact of urban morphology on the UHI phenomenon in the Mediterranean climate during a summer heatwave period in Rome, Italy. The Urban Weather Gen-erator (UWG) tool is used, coupled to SA and UA tools. The input parame-ters of four common Local Climate Zones (LCZs) are used to develop the urban model. The UA results show that the highest Urban Heat Island In-tensity (UHII) occurs in LCZ2, the densest district among the selected LCZs. The SA confirms that LCZ parameters such as the mean height of buildings, building surface fraction and aspect ratio are the most influential ones in this study.
16:45-17:00 **CS026**	The Literature Intellectual Structure of System Dynamics on Waste ***Elsa Rosyidah,*** *Institut Teknologi Sepuluh Nopember, Indonesia* Abstract—System dynamics in environmental engineering were used to make the waste system easier to understand as a whole and to create a varie-ty of relevant policy scenarios. The purpose of this study is to map the cur-rent state of global research and future development trends of system dy-namics on waste studies. This study uses a bibliometric intellectual structure approach by analyzing 827 scientific publications over half a century based on the database of Scopus. The findings show that the Chinese Academy of Sciences and China were the most research institutions and countries in the study of system dynamics on waste. The research proposes a concept of GEMWEWS research themes for system dynamics on waste research.

4 ABSTRACT OF SESSION 2

Time & ID	Presentation
17:00-17:15 **CS0005**	Measuring the Financial Impact of Typhoon Due to Climate Change ***Ji-Myong Kim**, Mokpo National University, South Korea* Abstract—The recent increase in abnormal weather and natural disasters has become one of the hottest issues around the world. The 5th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2014) warns of an increase in global average temperature, warming and acidification, an increase in average sea level, and extreme rainfall. Already, Korea is not free from extreme weather events, and the damage caused by natural disasters is increasing every year due to changes in rainfall patterns such as typhoons and heavy rainfall. Therefore, the purpose of this study is to quantify the financial impact of natural disasters caused by global warming. The intensity and frequency of typhoons are analyzed every decade to analyze changes in natural disasters due to climate change, and the amount of financial loss is quantified using the typhoon vulnerability function used in South Korea to prevent distortions from population and wealth. The assessment of increased typhoon risks from climate change and the estimation of damages are very important to government policy-making and insurers' business strategies. Therefore, through this study, it was found that the risk management strategy of various angles could be established by performing the damage prediction of the typhoon caused by climate change based on the rational scenario.
17:15-17:30 **CS018**	Upcycling Trash into Cash Through Repurposing the Bisasar Road Landfill Site into a Solar PV and Energy Storage Site TBA Abstract—The landfill on Bisasar Road in eThekwini has reached the end of its useful life and is undergoing closure and rehabilitation. Converting the landfill into a solar PV and battery storage facility could be a viable contributor to South Africa's energy crisis. However, solar installations in landfills must consider the slope and topography of the ground since these factors directly influence the installation and power-generating capacity. This study assessed the viability of integrating solar PV and batteries at the landfill. The land gradient was analysed using aerial imagery and intervals of spatial contour lines. Five portions of the land totalling 168 000 m2 with suitable gradients for installing solar PV and storage have been identified however only 27 500 m2 is deemed ready for solar and battery installations. Using the Hybrid Optimization Mod-el for Electric Renewables (HOMER) modelling software, the techno-economic opti-misation demonstrates that the least net present cost (NPC) option is to build 5 MW of solar PV, which would cost $2 868 617 and provide an annual revenue of $551 238. Installing 15 MW of batteries requires 5 400 m2. However, it would cost $4 302 926 and generate an additional revenue stream of $798 088 per annum. Combining 5 MW of solar PV and 15 MW of battery storage requires an initial investment of $7 171 543. However, it boosts the annual income by 217% compared to the current revenue generated through the landfill gas to electricity project. All the modelled projects yielded an internal rate of return of more than 20% and a simple payback period of no more than five years, which is deemed favourable for municipal investments.

5 CONFERENCE COMMITTEES-ICSEE

Advisory Committees
• Vladimiro Miranda (IEEE Fellow), INESC TEC and University of Porto, Portugal
• Nikos Hatziargyriou (IEEE Fellow), National Technical University of Athens, Greece
• Tony Wood, Grattan Institute, Australia

Conference Chair
• Xiaolin Wang, University of Tasmania, Australia

Program Chairs
• Michael Negnevitsky, University of Tasmania, Australia
• Hee-Je Kim, Pusan National University, South Korea
• He Cai, South China University of Technology, China

Steering Committee Chair
• Lin Chen, Chinese Academy of Sciences, China; Tohoku University, Japan

Local Organizing Committees
• Ibrahim Sultan, Federation University, Australia
• Farhad Shahnia, Murdoch University, Australia

Technical Committees
• Vignesh Vicki Wanatasanappan, Universiti Tenaga Nasional, Malaysia
• Vladimir Simón Montoya Torres, Universidad Continental, Perú
• Winda Nur Cahyo, Universitas Islam Indonesia, Indonesia
• Fadoua Tamtam, National School of Applied Sciences, Morocco
• Nhlanhla Mbuli, University of Johannesburg, South Africa
• Maitane Berecibar, Vrije Universiteit Brussel, Belgium
• Ramadas Narayanan, Central Queensland University, Australia
• Thadi Joji Rao, Jindal Global University, India
• Thierry Coosemans, Vrije Universiteit Brussel, Belgium
• Muhammad Imran Khan, Hamad Bin Khalifa University, Qatar

5 CONFERENCE COMMITTEES-ICSEE

Technical Committees

- Zhe Li, Johns Hopkins University, USA
- Nikolay Hinov, Technical University of Sofia, Bulgaria
- Chong Wen Tong, University Malaya, Malaysia
- Zainura Zainon Noor, Universiti Teknologi Malaysia, Malsysia
- Smith Eiamsa-ard, Mahanakorn University of Technology, Thailand
- Zijing Zhen, China Electric Power Planning & Engineering Institute, China
- Sanath Alahakoon, Central Queensland University, Australia
- Gopinath Chattopadhyay, Federation University, Australia
- Radu Godina, NOVA University Lisbon, Portugal
- Mahajan Sagar Bhaskar, Prince Sultan University, Saudi Arabia
- Kamal Abdel Radi Ismail, University of Campinas, Brazil
- Tsung- Mou Huang, National Sun Yat-Sen University, Taiwan
- Fariha Tariq, University of Management and Technology, Pakistan
- Tariq Al Zoubi, American University of the Middle East, Kuwait
- Hassan Ali, Collège of North Atlantic Qatar, Qatar
- Iessa Sabbe Moosa, University of Buraimi, Oman
- Ghassan Fadil Lattif Al-Doori, International College Engineering and Management, Oman

5 CONFERENCE COMMITTEES-ICEMAT

Advisory Committees
• Vladimiro Miranda (IEEE Fellow), INESC TEC and University of Porto, Portugal
• Nikos Hatziargyriou (IEEE Fellow), National Technical University of Athens, Greece
• Tony Wood, Grattan Institute, Australia

Conference Chair
• Xiaolin Wang, University of Tasmania, Australia

Program Chairs
• Mohammad Rasul, Central Queensland University, Australia
• Firoz Alam, RMIT University, Australia
• Wenming Yang, National University of Singapore, Singapore
• Michael Negnevitsky, University of Tasmania, Australia

Program Co-Chairs
• Yinghui Tian, University of Melbourne, Australia
• Zhenzhi Lin, Zhejiang University, China
• Hengyun Zhang, Shanghai University of Engineering Science, China

Steering Committee Chair
• Lin Chen, Chinese Academy of Sciences, China; Tohoku University, Japan

Local Organizing Committees
•Ibrahim Sultan, Federation University, Australia
• Farhad Shahnia, Murdoch University, Australia

Technical Committees
• Vahid R. Disfani, University of Tennessee at Chattanooga, USA
• Ramadas Narayanan, Central Queensland University, Australia
• Cornelia Vasile, Laval University, Canada
• Maria Ioannides, National Technical University of Athens, Greece
• Chin-Pao Huang, University of Delaware, USA
• Afsin Gungor, Akdeniz University, Turkey
• Wenbin Yu, Shandong University, China
• Yifei Wang, Harbin Institute of Technology (Shenzhen), China
• Mohamad Fani Sulaima, Universiti Teknikal Malaysia Melaka, Malaysia
• Chong Wen Tong, University Malaya, Malaysia

5 CONFERENCE COMMITTEES-ICSEE

Technical Committees

- Muhammad Raza Ul Mustafa, Universiti Teknologi PETRONAS, Malaysia
- Zainura Zainon Noor, Universiti Teknologi Malaysia, Malsysia
- Smith Eiamsa-ard, Mahanakorn University of Technology, Thailand
- Zijing Zhen, China Electric Power Planning & Engineering Institute, China
- Sanath Alahakoon, Central Queensland University, Australia
- Gopinath Chattopadhyay, Federation University, Australia
- Radu Godina, NOVA University Lisbon, Portugal
- Hady Habib Fayek, Heliopolis University, Egypt
- Hamdy A. Ziedan, Assiut University, Egypt
- T. Ch. Madhavi, SRM University, India
- Kamalakannan K, SRM Institute of Science and Technology, India
- Kamal Abdel Radi Ismail, University of Campinas, Brazil
- Niraku Rosmawati binti Ahmad, Universiti Teknologi PETRONAS, Malaysia
- Tsung- Mou Huang, National Sun Yat-Sen University, Taiwan
- Tariq Al Zoubi, American University of the Middle East, Kuwait
- Fariha Tariq, University of Management and Technology, Pakistan
- Muammer Ozgoren, Necmettin Erbakan University, Turkey
- Nallusamy Nallusamy, SSN College of Engineering, India
- Ahmed Kadhim Hussein, University of Babylon, Iraq
- Iessa Sabbe Moosa, University of Buraimi, Oman
- Ghassan Fadil Lattif Al-Doori, International College Engineering and Management, Oma

If you have any questions, please feel free to contact us any time.

ICSEE 2023
E-mail: icsee_conf@163.com
Tel: +86-13731111131
Web: www.icsee.org

ICEMAT 2023
E-mail: icemat_conf@126.com
Tel: +86-13290000003
Web: www.icemat.org