

Welcome to the second edition of the Institute of Energy Policy and Research (IEPR) Newsletter which covers news and updates for the months April to June 2021. Please do keep in touch with us at [IEPR@uniten.edu.my](mailto:IEPR@uniten.edu.my).

## Highlights

- How COVID-19 Changes the Gas Market and What is the Implication to Malaysia?
- Energy Studies on Transition of Electricity Market in Malaysia

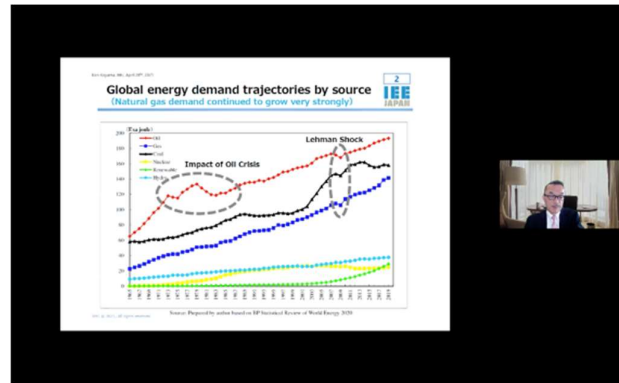
## Perspectives

- Attaining Net Zero Carbon Emissions by 2050: Is Malaysia Ready for the Challenge?
- Smart Grid Project in Malaysia
- The impact of the COVID-19 Pandemic on Solid Waste Generation during MCO 1.0 in Peninsular Malaysia

## Publications

- Page 6-8

## Live Webinar: How COVID-19 Changes the Gas Market and What is the Implication for Malaysia?



By Dr Norsyahida Mohammad

Wednesday, 28th April 2021 – The fourth live webinar series conducted under the auspices of the Chair of Energy Economics of Energy Commission at Universiti Tenaga Nasional (UNITEN) and entitled 'How COVID-19 Changes The Dynamics of Gas Market and What Is The Implication to Malaysia' was conducted by IEPR, featuring the Chair of Energy Economics, Prof. Dr. Ken Koyama. The live webinar was moderated by the Head of Publication Unit of IEPR, Dr. Amar Hisham Bin Jaafar.

The speaker highlighted that the demand for natural gas and liquefied natural gas (LNG) is steadily increasing which indicates natural gas and LNG are becoming the preferred energy resources around the world. The speaker reiterated that from 2000 to 2019 there has been a steady increase in the importation of LNG by the OECD Asia. Factors that are responsible for the increasing demand for LNG in Asian countries include economic growth, the need to protect the environment, the lower price of natural gas compared to other energy resources, competition with coal, the future of nuclear energy, competition within the renewable energy sector, competition with liquefied petroleum gas (LPG) and the impact of impact of gas/power market reform.

Professor Dr. Ken Koyama highlighted the effect of the COVID-19 pandemic on the gas market from early 2020. In addition, the Biden's administration's policy on the global energy market has had an impact on the energy market in Asia being the centre of world energy demand, as well as being affected by waves of carbon-neutral targets and advanced innovative technology for lower carbon energy. At the end of the live webinar, the speaker reiterated that the global economy is in its recovery stage and it is expected that the supply of LNG will gradually attract attention as the global economy recovers. The 90-minute live webinar was attended by 80 participants from various organizations within and outside Malaysia.

SCAN FOR INFO



# Live Webinar: Energy Studies on the Transition of Electricity Market in Malaysia

**LIVE WEBINAR**

YOU'RE INVITED TO JOIN  
**UNITEN-OIES SHARING SESSION**

**ENERGY STUDIES ON TRANSITION OF ELECTRICITY MARKET IN MALAYSIA**

**DATE**  
08 April 2021  
(Thursday)

**TIME**  
4.30pm - 5.30pm  
(GMT +8 KL)

**PLATFORM**  
Microsoft Teams

In this live webinar, Dr. Rahmat will be sharing the findings of the study on electricity supply industry reform in Peninsular Malaysia. The study engaged with key stakeholders in the energy (electricity) industry in Malaysia and their concerns and opinions had been considered for the competitive electricity market. The findings from the study were based on the development of electricity supply industry in Malaysia in the face of the existing challenges, current market structures, limited resources and potential opportunities in the industry. This webinar will be a good platform to acknowledge the proposed reforms of electricity market in Peninsular Malaysia, having learned experiences from other countries.

**Register at:**

**Assoc. Prof. Dr. Amanuddin Shamsuddin**  
Moderator/Project Leader  
Universiti Tenaga Nasional

**Dr. Rahmat Poudineh**  
Speaker/Senior Research Fellow/Director of Research, Electricity Programme  
Oxford Institute for Energy Studies

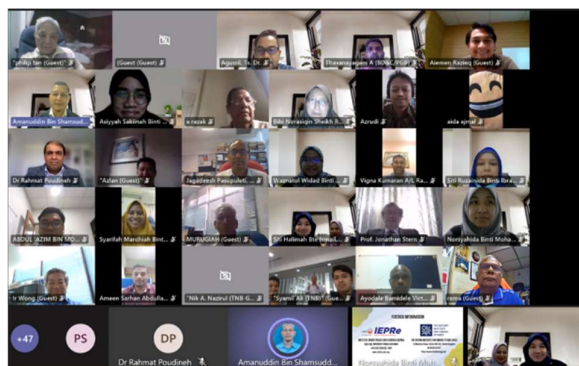
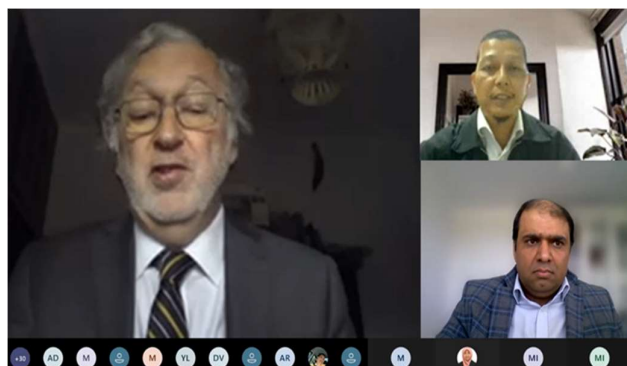
**Prof. Bassam A Fattouh**  
Panelist/Director  
Oxford Institute for Energy Studies

**Organised by**  
IEPR, OIES, UNITEN

**Supported by**  
IEPR, OIES, UNITEN

**Thursday, 8<sup>th</sup> April 2021** – A UNITEN-OIES Sharing Session: Energy Studies on the Transition of the Electricity Market in Malaysia was conducted to share the findings of a study entitled 'Electricity Supply Industry Reform and the Design of a Competitive Electricity Market in Malaysia' which was completed under the aegis of TNB, UNITEN and Oxford Institute of Energy Studies (TNB-UNITEN-OIES) Fellowship Program in Energy Policy. The project leader, Assoc. Prof. Dr. Amanuddin Shamsuddin gave the welcoming remarks, followed by opening remarks by Prof. Jonathan Stern, Distinguished Research Fellow of the Gas Research Programme, OIES. A presentation of the energy studies was given by Dr. Rahmat Poudineh, Senior Research Fellow and Director of Research, Electricity Programme, OIES

Dr. Rahmat Poudineh gave an overview of the Malaysian energy sector and the evolution of the Malaysian Electricity Supply Industry (MESI). Challenges faced by MESI include lack of an incentive to procure lower-cost fuel for electricity generation, high tariffs due to surplus capacity, an outdated power purchase agreement (PPA) framework, lack of incentive for capital expenditure spending, uncompetitive industrial tariffs, and a non-cost reflective pricing mechanism which resulted in inefficient energy usage. The speaker highlighted the design of the energy market, particularly generation and the retail market. In addition, he reiterated that the Malaysian electricity sector needs to include indirect supporting policies for renewables alongside direct supporting policies, production-based schemes, investment-based schemes and burden sharing of renewable support schemes. It was also pointed out that there is a trade-off between market compatibility and the investors' incentive while balancing responsibility and prioritising dispatch.



This live sharing session aimed to provide a clearer understanding of the challenges facing the transition of the electricity market in Malaysia. The one-hour sharing session was successful and attended by 85 participants representing various energy-related organizations and researchers within and outside Malaysia.

**SCAN FOR INFO**

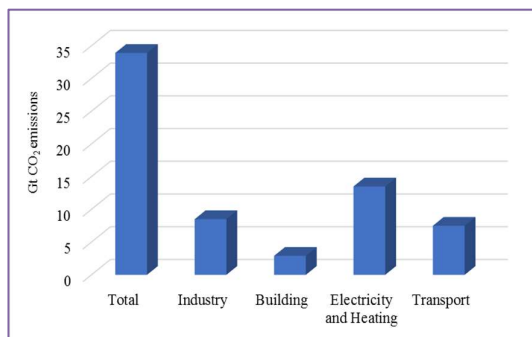


# Perspective: Attaining Net Zero Carbon Emissions by 2050: Is Malaysia Ready for the Challenge?

By Dr. Ayodele Bamidele Victor

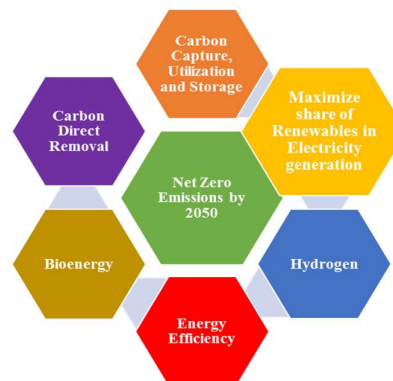
The International Energy Agency recently released a report on the roadmap for the global energy sector to attain net-zero carbon emissions by 2050. A glance at the 2020 global CO<sub>2</sub> emissions depicted in Figure 1 reveal that 33.9 Gt CO<sub>2</sub> was emitted globally, of which 8.5 Gt CO<sub>2</sub>, 2.9 Gt CO<sub>2</sub>, 13.5 Gt CO<sub>2</sub>, and 7.5 Gt CO<sub>2</sub> were emitted by industry, building, electricity and transport sectors, respectively. The electricity and heating (energy) sector accounted for the highest CO<sub>2</sub> emission. Therefore, the sector holds the key to responding to the world's climate challenge. According to the IEA report, the CO<sub>2</sub> emissions from the energy sector has increased by 60% since the United Nations Framework Convention on Climate Change was signed in 1992. Although globally there is a growing commitment and actions to mitigate CO<sub>2</sub> emissions, these efforts still fall short of what is required to alleviate the increase in the global temperatures by 1.5 °C in order to prevent the devastating effects of climate change.

Figure 1: CO<sub>2</sub> emissions by sector in 2020 (IEA, 2021)



The IEA Roadmap to net-zero by 2050 offers a pathway to attaining a formidable and critical goal as well as setting out more than 400 milestones for what is required, and when to decarbonize the global economy in the next 30 years. The report revealed that attaining net-zero emissions requires the massive deployment of all available clean energy technologies such as renewables, electric vehicles and energy-efficient building retro-fits. The technologies that are currently at the demonstration or prototype phase are expected to help in facilitating the reduction of CO<sub>2</sub> emissions in 2050 by more than half of the current emissions. Moreover, a rapid shift from the use of fossils such as coal, oil, and gas was one of the strategies that can facilitate the attainment of Net Zero emissions.

Figure 2: Strategies to attain Net Zero Emissions by 2050



Source: IEA 2021 Report on Net Zero by 2050

## Implications for Malaysia based on the summary of the IEA report for policymakers.

1. The energy sector is the source of around three-quarters of greenhouse gas emissions today and holds the key to averting the worst effects of climate change, perhaps the greatest challenge humankind has faced.
2. The global pathway to net-zero emissions by 2050 detailed in the report requires all governments to significantly strengthen and then successfully implement their energy and climate policies.
3. The path to net-zero emissions is narrow; staying on it requires immediate and massive deployment of all available clean and efficient energy technologies.
4. Governments need to provide credible step-by-step plans to reach their net-zero goals, building confidence among investors, industry, citizens and other countries.
5. Ever-cheaper renewable energy technologies give electricity the edge in the race to zero.
6. Reaching net zero by 2050 requires further rapid deployment of available technologies as well as widespread use of technologies that are not on the market yet.
7. The biggest innovation opportunities concern advanced batteries, hydrogen electrolysers, and direct air capture and storage.
8. Clean energy innovation must accelerate rapidly, with governments putting R&D, demonstration, and deployment at the core of energy and climate policy.
9. A transition of the scale and speed described by the net zero pathway cannot be achieved without sustained support and participation from citizens.
10. Some of the changes brought by the clean energy transformation may be challenging to implement, so decisions must be transparent, just and cost-effective.

Energy transitions have to take account of the social and economic impacts on individuals and communities and treat people as active participants

Reference: International Energy Agency (2021). *Net Zero by 2050 A Roadmap for the Global Energy Sector*



# Smart Grid Project in Malaysia

By Dr . Zeitley Karmilla bt Kaman

The Paris Agreement (PA) which is a Multilateral Environmental Agreement (MEA) under the United Nations Framework Convention on Climate Change (UNFCCC) aims to strengthen the global response to climate change threats, in conjunction with the sustainable development goal (SDG) and endeavours to eradicate poverty. Under the Paris Accord, Malaysia has committed to reducing Greenhouse Gas (GHG) emissions by 45% by 2030 concerning our 2005 GDP. This target was set with 35% of it on an unconditional basis and 10% on a conditional basis upon receipt of climate finance funding, technology transfer and capacity building by developed countries [1]. In line with the strategic goal of reducing GHG emission in cities in Malaysia,

Universiti Tenaga Nasional (UNITEN) in collaboration with Malaysian Industry-Government Group for High Technology (MIGHT) and TNB Research Sdn. Bhd. (TNBR), is conducting a 3-year project for the Smart Grid Project from 2020 to 2022. The project is led by MIGHT, an agency under the Prime Minister Department appointed as a National Executing Partner by the United Nations Industrial Development Organization (UNIDO) for the implementation of Global Environmental Facility (GEF) 6 – Sustainable City Development in Malaysia. The objectives of the project are as follows:

- i. To establish a strong regulatory framework and policy input for the government and various stakeholders.
- ii. To build awareness and institutional capacity and promote investment in climate risk mitigation technologies through demonstration projects.
- iii. Through demonstration, the project will support innovation and technology transfer of Renewable Energy (RE) and the integrated Smart grid system at a key early stage in Malaysia.

The project comprises four components which are:

1. Smart grid regulatory framework and policy input,
2. Capacity building for Smart grid,
3. Awareness programs for Smart grid, and a
4. Smart grid demonstration project.

UNITEN has been appointed to deliver the first three components while TNBR formulated the demonstration project in Melaka. Recognizing that urban planning and grid modernization encompasses a large number of different aspects, that its success is highly dependent on the expertise available in the planning and how well local conditions are taken into account, a team of experts and researchers from many backgrounds including (but not limited to) engineering, energy policy and regulation, renewable energy, GHG emission reduction, data analytics, cybersecurity, energy management and social science from University Tenaga Nasional is engaged in the project.

This project is expected to be completed by 2022 and will support Smart grid enforcement in Malaysia by establishing dedicated key groups that have had Smart grid training, holding awareness-raising events concerning the Smart grid and setting up effective pilot demonstrations of Smart grid tools and systems.

Furthermore, the expected outcome of the project will eventually bring to fruition the concept of a sustainable city in Malaysia. The Smart Grid Demonstration Project, to be rolled out from 2020 to 2022, will involve online integration of existing sustainable energy technologies in Melaka. These will include the generation and use of renewable energy such as small- and large-scale solar systems, electric vehicles and charging stations, batteries, energy-efficient buildings, smart electricity meters etc to achieve the goal of reducing Greenhouse Gases emissions while supporting the development of a Sustainable City through sustainable energy projects.

The Smart Grid Demonstration Project is one of the components of the Sustainable Cities Development Project which started in 2017 under the Global Environment Facility (GEF6) organization and which saw the participation of 28 cities in 11 countries around the world. GEF, as a Funder, has appointed the United Nations Industrial Development Organization (UNIDO) as the International Project Manager and MIGHT as the National Implementing Agency (NEA). The Ministry of Housing and Local Government (KPKT) is the ministry that leads the Sustainable Cities Development Project which, as part of its remit, has the Smart Grid Project while the Energy Commission (ST) is the Chair of the National Smart Grid Technical Committee (TC). Apart from UNITEN, TNBR and Perbadanan Teknologi Hijau Melaka (PTHM), MIGHT also collaborates with other strategic partners such as KPKT, Ministry of Energy and Natural Resources (KETSA), Energy Commission (EC), Sustainable Energy Development Authority Malaysia (SEDA Malaysia), SIRIM Berhad, the Malaysian Communications and Multimedia Commission (SKMM), Malaysian Green Technology Corporation (MGTC), the Department of Standards Malaysia and industry players First Solar Malaysia Sdn Bhd and System Consultancy Services Sdn. Bhd. [2]

The goal of this project is to reduce GHG emissions in cities in Malaysia. Ideally, this will be achieved by providing support for the development and enhancement of a national regulatory framework and policy input in an integrated and inclusive manner with the two-pronged goal of: (i) an integrated approach to urban planning and management that is guided by an evidence-based, multi-dimensional and broadly inclusive planning process that balances economic, social and environmental resource considerations, and (ii) building awareness and institutional capacity, and promoting investment in climate risk mitigation technologies through demonstration projects. The project is in line with the goals of sustainable development or Sustainable Development Goals (SDG), Goal 7: Affordable and Clean Energy, Goal 11: Urban and Sustainable Society, Goal 13: Action Against Climate and Goal 17: Partnerships for the Goals.

#### Reference:

[1] Ministry of International Trade and Industry (MITI), 11 December 2017.

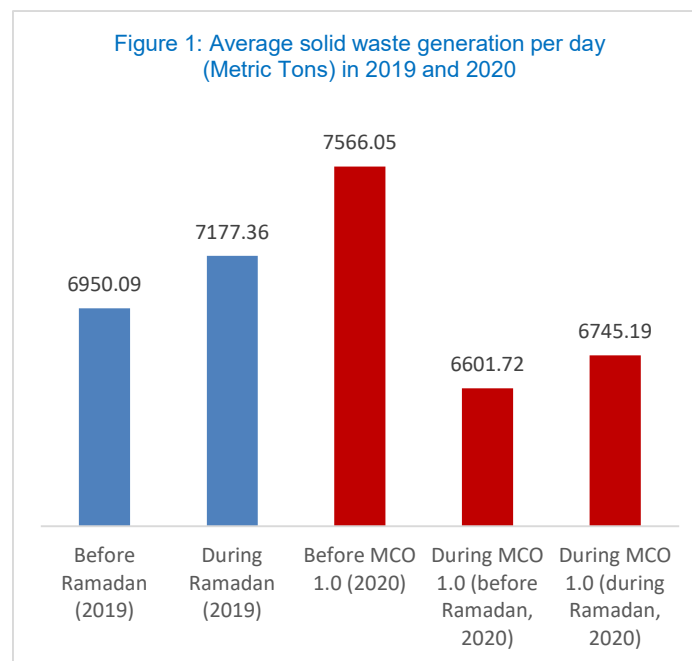
[2] Mohd Qaharuddin Abdullah. *Implementation of Smart Grid Project in Delivering GHG Emission Commitment*. Global Net-Zero Action Conference, Kuala Lumpur, 9 June 2021

## Perspective: The impact of the COVID-19 Pandemic on Solid Waste Generation during MCO 1.0 in Peninsular Malaysia

By Dr. Saraswathy Kasavan

The world has witnessed various positive environmental implications nationwide including improved quality of clean rivers and air during movement control orders (MCO 1.0) brought about by COVID-19. However, these outcomes are not the same in the context of solid waste management, especially the generation of food waste, plastics and clinical waste. This pandemic has changed the percentage composition and quantity of waste generation and posed solid waste management problems for stakeholders. During pandemic Covid-19, many types of clinical waste are combined with domestic waste, including face masks, gloves and personal protective equipment (PPE). It causes the amount of non-virus-infected waste to merge with the infected waste during an outbreak. Practices that do not separate waste in the right way will cause solid waste to be contaminated with viruses and raise the risk of spreading the virus. Identification, collection, segregation, storage, transportation, treatment and safe disposal are essential aspects of effective clinical waste management to prevent the spread of the virus. Most countries have implemented many activities and ways to reduce the spread of the COVID-19 virus; these include physical distancing, self-quarantine, avoiding large gatherings, working from home, sending students back to their homes, providing online education, reducing travel, limiting visits to stores, wearing face masks and the use of sanitisers (hygienic products). These steps have indirectly prompted communities to increase online shopping and have goods delivered to their homes. Concerns about safety and hygiene during a pandemic led to a significant increase in wasteful packaging of goods (such as unnecessary paper, plastic and boxes). Panic buying increased the disposal of perishable products and leftovers which ultimately generated a large amount of waste.

The solid waste data was collected from January 1st to June 4th at the landfill of 8 states. According to SWCorp data, the trend of solid waste generation during MCO 1.0 (average 6,601,72 tan metric/day) was lower than before MCO 1.0 (average 7,566.05 tan metric/day) and during Ramadan (average 6,745.19 tan metric/day) (Figure 1).



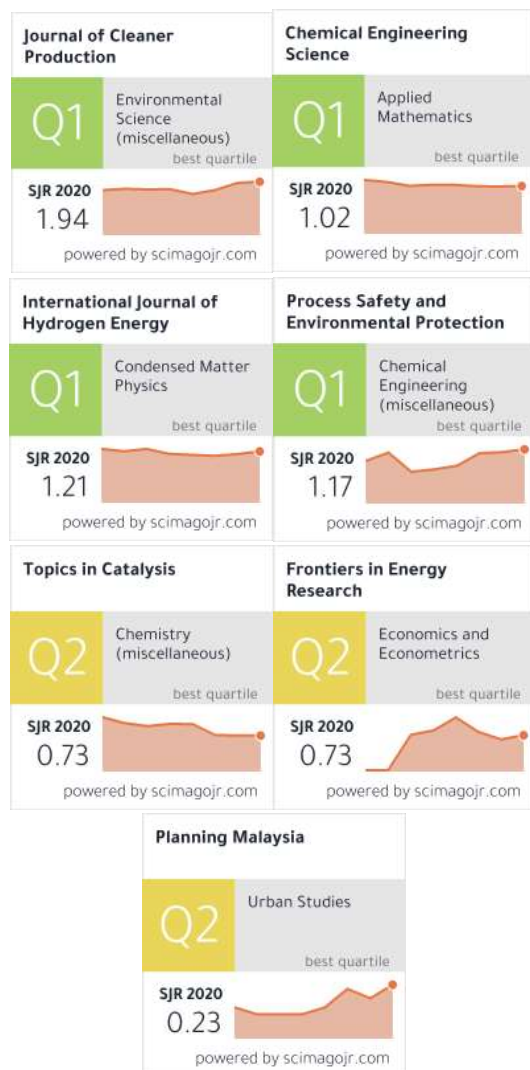
The trend for solid waste generation from the industrial sector has drastically decreased; however, domestic solid waste among households has increased slightly. Malaysia's Muslims preferred the celebration of Ramadhan in 2020 over considerations of health safety associated with the outbreak of COVID-19; however, the government limited operating hours and the number of traders in the Ramadhan bazaars to avoid the risk of spreading COVID-19 in public places. In addition, the government started to encourage people to buy food from the bazaars online by creating e-bazaar applications. For example, the states of Selangor and Kelantan use e-bazaars as a platform to consumers order their needed food via online.

The results of SWCorp data show an increasing trend in solid waste generation by 3.27% during Ramadan 2019 compared to before Ramadan 2019. However, a decreasing trend in solid waste generation by 6.02% during Ramadan 2020 compared to Ramadan 2019. This study provides information on solid waste generation in Peninsular Malaysia, especially during the pandemic COVID-19. It provides a guideline for stakeholders to adopt relevant strategies to reduce solid waste generation during and after pandemic COVID-19.



## PUBLICATION HIGHLIGHTS

Congratulations to all our researchers and their teams for getting their work published in the WoS and SCOPUS reputable journals in the second quarter of 2021. The published articles from our researchers focused on various themes related to plastic pollution, renewable energy sources, CO<sub>2</sub> conversion and the transition towards sustainable energy systems in the following journals:



### Plastic pollution in water ecosystems: A bibliometric analysis from 2000 to 2020

Kasavan, S., Yusoff, S., Fakri, M. F. R., & Siron, R. (2021). *Journal of Cleaner Production*, 127946. <https://doi.org/10.1016/j.jclepro.2021.127946>

This article presents research trends on plastic pollution in the water ecosystem via a bibliometric analysis conducted using Web of Science (WoS) database's research articles from 2000 to 2020.

### Kinetic modeling and reaction pathways for thermo-catalytic conversion of carbon dioxide and

### methane to hydrogen-rich syngas over alpha-alumina supported cobalt catalyst

Alsaffar, M.A., Ayodele, B.V., Ali, J.M., Ghany, M.A.A., Mustapa, S.I. and Cheng, C.K. (2021). *International Journal of Hydrogen Energy*, In Press. <https://doi.org/10.1016/j.ijhydene.2021.04.158>

This study investigates the kinetic modeling and reaction pathways for the thermo-catalytic conversion of methane (CH<sub>4</sub>) and Carbon dioxide (CO<sub>2</sub>) over alpha-alumina supported cobalt catalyst.

### CO<sub>2</sub> Reforming of CH<sub>4</sub> on Mesoporous Alumina-Supported Cobalt Catalyst: Optimization of Lanthana Promoter Loading

Tran, N.T., Kumar, P.S., Van Le, Q., Van Cuong, N., Phuong, P.T., Jalil, A.A., Sharma, G., Kumar, A., Sharma, A., Ayodele, B.V. and Abidin, S.Z. (2021). *Topics in Catalysis*, 64(5), pp.338-347. <https://doi.org/10.1007/s11244-021-01428-x>

This article analyses the impact of La<sub>2</sub>O<sub>3</sub> promoter loading on alumina-supported cobalt catalysts for CO<sub>2</sub> reforming of methane.

### Natural Gas as a Key Alternative Energy Source in Sustainable Renewable Energy Transition: A Mini Review

Mohammad, N., Mohamad Ishak, W.W., Mustapa, S.I. and Ayodele, B.V., 2021. *Frontiers in Energy Research*, 9, p.237. <https://doi.org/10.3389/fenrg.2021.625023>

This paper highlights the technological pathways and policies that support the development of natural gas as a key alternative energy source in sustainable renewable energy transition for ASEAN member states (AMS).

### Green City: The Lifestyle of Melaka Residents

Bakar, A. A., Mustapa, S. I., & Mohammad, N. (2021). *Green City: Planning Malaysia*, 19(1), 1-12. <http://dx.doi.org/10.21837/pm.v19i15.920>

This paper compares the environmentally-aware collective Personality and Lifestyles (PL) of Melaka residents to residents of other states in Malaysia via the one-way MANOVA method.

### Green City Initiatives: Human-Nature Interaction

Bakar, A. A., Mustapa, S. I., & Mohammad, N. (2021). *Planning Malaysia*, 19(15). <http://dx.doi.org/10.21837/pm.v19i15.921>

This paper evaluates the Interaction with Nature (IN) of Melaka residents to residents of other states in Malaysia via the one-way MANOVA method.

### **Highly active Fe-Co-Zn/K-Al<sub>2</sub>O<sub>3</sub> catalysts for CO<sub>2</sub> hydrogenation to light olefins**

Witoon, T., Chaipraditgul, N., Numpilai, T., Lapkeatseree, V., Ayodele, B.V., Cheng, C.K., Siri-Nguan, N., Sornchamni, T. and Limtrakul, J. (2021). *Chemical Engineering Science*, 233, p.116428.  
<https://doi.org/10.1016/j.ces.2020.116428>

This article focuses on CO<sub>2</sub> hydrogenation to light olefins over Fe-Co-Zn/K-Al<sub>2</sub>O<sub>3</sub> catalysts with different Zn loading contents.

### **Linking Circular Economy and Sustainable Energy Technology through Quintuple Helix Perspective**

Ishak, W. W. M., Mustapa, S. I., Mohammad, N., & Jais, A. M. (2021). *Journal of Governance Risk Management Compliance and Sustainability*, 1(1), 7-25.  
<https://doi.org/10.31098/Jgrcs.V1i1.450>

This paper examines the five main elements of the quintuple helix (academia, companies, environment, government, and society) that contribute to the circular economy ecosystem and discusses the innovative technologies for sludge management in urban wastewater sectors.

### **Examining Smart Meter Users' Experience on Continuance Intention in Adopting Smart Meter in Malaysia – Result from a Pilot Study**

Yusoff, N. S., Zeitley Karmilla Kaman, Abdul Rahman Zahari, Wan Hafizhah Wan Mohamad Norafi, & Azlina Bte Abdullah. (2021). *Asia Proceedings of Social Sciences*, 7(2), 110-113. <https://doi.org/10.31580/apss.v7i2.1785>

This article identifies the key factors that influenced the continuance use of a smart meter among Malaysian residential users.

### **Nexus between carbon emissions, energy consumption, urbanization and economic growth in Asia: Evidence from Common Correlated Effect Mean Group (CCEMG) Estimator**

Adeneye, Y. B., Jaaffar, A. H., Ooi, C. A., & Ooi, S. K. (2020). *Frontiers in Energy Research*, 8, 415.  
<https://doi.org/10.3389/fenrg.2020.610577>

This study investigates the dynamic relationships between carbon emission, urbanization, energy consumption, and economic growth in a panel of 42 Asian countries for the period 2000–2014 using dynamic common correlated effects panel data modeling.

### **Interaction Effect of Process Variables on Solar-Assisted Photocatalytic Phenol Degradation in Oilfield Produced Water Over ZnO/Fe<sub>2</sub>O<sub>3</sub> Nanocomposites**

Al Haiqi, O., Nour, A. H., Ayodele, B. V., & Bargaa, R. (2020). *Journal of Advanced Research in Fluid Mechanics and Thermal Sciences*, 78(1), 100–121.  
<https://doi.org/10.37934/arfmts.78.1.100121>

This study investigates the interaction effects of process variables on photocatalytic phenol degradation in oilfield produce water.

### **Artificial neural network modeling of thermo-catalytic methane decomposition for hydrogen production**

Alsaffar, M. A., Ghany, M. A. R. A., Ali, J. M., Ayodele, B. V., & Mustapa, S. I. (2021). *Topics in Catalysis*, 64(5), 456-464.  
<https://doi.org/10.1007/s11244-020-01409-6>

In this study, Bayesian regularization and Levenberg-Marquardt trained multilayer perceptron neural networks were employed in predictive modeling of hydrogen production by thermo-catalytic methane decomposition.

### **Modeling the effect of process parameters on the photocatalytic degradation of organic pollutants using artificial neural networks**

Ayodele, B. V., Alsaffar, M. A., Mustapa, S. I., Cheng, C. K., & Witoon, T. (2021). *Process Safety and Environmental Protection*, 145, 120-132.  
<https://doi.org/10.1016/j.psep.2020.07.053>

In this study, the Levenberg-Marquardt-trained artificial neural network is used for modelling the photocatalytic degradation of organic pollutants.

### **CO<sub>2</sub> Capture for Dry Reforming of Natural Gas: Performance and Process Modeling of Calcium Carbonate Looping Using Acid Based CaCO<sub>3</sub> Sorbent**

Zubir, M. A., Afandi, N., Manap, A., Hamid, A. A., Ayodele, B. V., Liu, W., & Abd Hamid, M. K. (2021). *Frontiers in Energy Research*, 8, 610521.  
<https://doi.org/10.3389/fenrg.2020.610521>

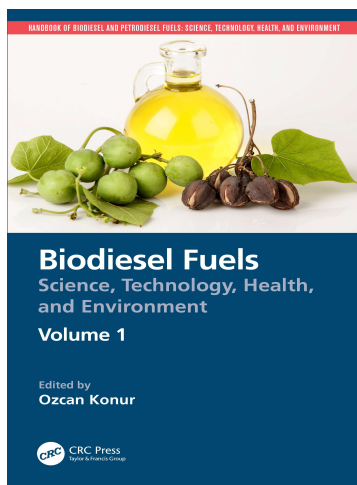
This study investigates the performance and process modeling of CO<sub>2</sub> capture through calcium carbonate looping (CCL) utilizing Malaysian limestone as the sorbent to be integrated with a 700 MWe coal-fired power plant.

### **Experimental studies and artificial neural network modeling of hydrogen sulfide removal from wastewater by calcium-modified coconut shell based activated carbon**

Habeeb, O. A., Ayodele, B. V., Alsaffar, M. A., Bin, T. A. R., Abdullah, T., Kanthasamy, R., & Yunus, R. B. M. *Songklanakarin Journal of Science and Technology*, 43(1), 96-104.  
<https://rdo.psu.ac.th/sjstweb/journal/43-1/13.pdf>

This study utilizes the artificial neural network (ANN) model to investigate the effects of parameters in hydrogen sulphide removal from wastewater using calcium impregnated coconut shell activated carbon.





**Book Chapter:**

Hydrogen-Rich Syngas Production from Biodiesel-derived Glycerol: An Overview of the Modeling and Optimization Strategies

**Authors:** Bamidele Victor Ayodele, Siti Indati Mustapa, May Ali Alsaffa

**First Published:** 6 May 2021

**Pub. Location:** Boca Raton, Florida USA

**Imprint:** CRC Press

**eBook ISBN:** 9780367456238

**DOI:** <https://doi.org/10.1201/9780367456238>

**Abstract**

The book chapter highlights the challenges and opportunities of the various strategies that have been employed for modeling and optimization of hydrogen-rich syngas production from thermo-catalytic conversion of biodiesel-derived glycerol with a view of charting a new research direction

**Congratulations to our high achievers!**



On 23<sup>rd</sup> April 2021, the Innovation & Research Management Centre (IRMC) organized a publication award ceremony for all high-achiever UNITEN staff. We would like to congratulate two of our researchers, Dr. Amar Hisham bin Jaafar for obtaining the highest number of citations in College of Business Management and Accounting (COBA) for 2020, and our honorable director, Dr. Siti Indati bt Mustapa for achieving the highest number of publications and citations in College of Economics & Social Sciences (CES) for 2020. Looking forward to see more achievements in the upcoming years!

**Wishing all the best for future ahead!**



Puan Siti Halimah has served IEPRe as research engineer for OIES-UNITEN Fellowship Program since 2018. Ended her contract in April 2021, we would like to express our huge gratitude for her dedication, motivation and contribution throughout the years together. We wish you all the best for your future ahead!

**Welcome aboard to our new internship students**

We are delighted to welcome our new internship students to our IEPRe team. We believe in your skills, talents and knowledge will be of great benefit to our Institute. Coming together from College of Energy Economics & Social Sciences (CES), we are sending our warmest welcome to:

1. Raymond Raj A/L Rajer
2. Ahmad Marwan bin Marzuki
3. Iskandar Zaim bin Nazarail
4. Muhammad Saifullah Bin Zolkefily

We look forward to even greater success and, together, developing our skills. Wishing you all the best!







10<sup>th</sup> INTERNATIONAL ECONOMICS & BUSINESS MANAGEMENT CONFERENCE (IEBMC 2021)

*Virtual*

Sustainability through Digital Transformation

13 & 14 OCTOBER 2021 | UNITEN, SULTAN HAJI AHMAD SHAH CAMPUS

Join us and submit your manuscript in the following areas of interest:

#### DIGITAL TRANSFORMATION & INNOVATION

- Democratisation of Innovation
- Transformations in Business
- Advancements in Information and Communications Technology
- E-business and Mobile Commerce
- Accounting and Finance Digital Transformation
- Information Systems and Performance Measurement Systems

#### EDUCATION & INFORMATION TECHNOLOGY

- Technological Issues in E-education
- E-content Management and Development
- Quality Assurance in E-education
- E-educational Research Experiences
- Educational Policy and Leadership

IEBMC 2021



#### SUSTAINABLE DEVELOPMENT

- Sustainability Accounting
- Sustainable Business
- Sustainable Economy
- Sustainable Environment and Environmental Management
- Sustainable Energy Policy, Planning and Management
- Sustainable Tourism Management

#### CORPORATE RESPONSIBILITY & ETHICS

- Corporate Governance
- Governance Implications of Corruption and Bribery
- Regulatory Framework, Market Development and Investor Protection
- Integrity, Leadership and Business Ethics
- Law, Regulation and Enforcement
- Risk Management and Internal Control
- Socially Responsible Investments
- Governance Mechanisms and Implications

Send your full paper before 15<sup>th</sup> July 2021 by emailing to:  
[iebmc2021@uniten.edu.my](mailto:iebmc2021@uniten.edu.my)

Take  
Care



We are all hoping to the speedest recovery for COVID-19 pandemic. Please take care, stay positive and find a way to protect your physical and mental health. It is a challenging phase for all people, however, we believe we can go through all this together.

Join us!

IEPre has been organizing a series of webinars on contemporary topics by prominent experts in the field of energy economics and policies. All webinars are offered at no cost. Sign-up to join our mailing list for upcoming events.

SIGN-UP



#### CONTACT INFORMATION

Institute of Energy Policy and Research (IEPre)  
 Universiti Tenaga Nasional

Putrajaya Campus  
 Jalan IKRAM-UNITEN  
 41000 Kajang Selangor.

✉ [iepre@uniten.edu.my](mailto:iepre@uniten.edu.my)

☎ +603 8921 2020

OUR WEBSITE



#### PUBLICATION COMMITTEE

##### Advisor

Dr. Siti Indati Mustapa

##### Head of Committee

Dr. Amar Hisham Jaaffar

##### Committee Members

Dr. Ayodele Bamidele Victor

Dr. Norsyahida Mohammad

Ms. Syarifah Mardhiah Syed Salim

Ms. Waznatol Widad Mohamad Ishak