

# JGSEE

The Joint Graduate School of Energy and Environment



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CENTER OF EXCELLENCE ON ENERGY TECHNOLOGY AND ENVIRONMENT



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## Contribution to International Forum

### LCSAL joins EcoBalance 2018 in Japan



Several members of the LCSAL research group along with the entire team of the NSTDA Research Chair grant mentored by Prof Shabbir H. Gheewala participated in the EcoBalance 2018 in Tokyo during 9-12 October 2018. The theme of the conference was "Nexus of Ideas: Innovation by Linking through Life Cycle Thinking". The group made its presence felt at the conference through 11 oral papers presentations; the efforts were well-appreciated by the organisers as well as other peer-research groups across the world that participated.

### LCA Food 2018: Global Food Challenges towards Sustainable Consumption and Production



The Life Cycle Sustainability Assessment Lab (LCSAL) under the Joint Graduate School of Energy and Environment (JGSEE), King Mongkut's University of Technology Thonburi in collaboration with the Centre of Excellence on enVironmental strategy for GREEN business VGREEN, Kasetsart University (KU) and the National Science and Technology Development Agency (NSTDA) successfully organised the "11th International Conference on Life Cycle Assessment of Food 2018 (LCA FOOD 2018)" on the theme "Global Food Challenges towards Sustainable Consumption and Production". The event was held in conjunction with the 6th LCA AgriFood Asia and the 7th International Conference on Green and Sustainable Innovation (ICGSI) during 16-20 October 2018 at The Sukosol Bangkok Hotel, Thailand.

The LCA Food conference is a reputed international event providing a forum for the exchange of knowledge and practical experiences on LCA applications for agri-food products. This dynamic event gathered food industry professionals, researchers, academics and policy makers. This was the first time the conference was held outside Europe and the United States. It therefore provided a great opportunity for students, researchers and practitioners not only in Thailand but also in Asia to learn and exchange knowledge with top European and US experts. The LCA AgriFood Asia which serves as a regional forum to build up capacity and exchange knowledge on LCA applications for agri-food products, and to enhance collaborative projects at the regional level was organised in parallel with ICGSI, a trans-disciplinary international forum focusing on green process engineering as a path towards sustainable development of societies and regions.

Over the 5 days of the conference and concurrent events, 197 participants from 26 countries shared their views and experiences in the field of food production systems and policy, and green and sustainable production and innovation. Overall the event was a great success. It provided a key global forum for the LCA community from academic, research organisations, government agencies and international institutions, and private sector practitioners to present and share their research works in the areas of science, technology and policy in order to move towards sustainable food consumption and production.



**LCA Food 2018**





## SEE 2018: Technology &amp; Innovation for Global Energy Revolution



The Joint Graduate School of Energy and Environment (JGSEE) and Center of Excellence on Energy Technology and Environment, King Mongkut's University of Technology Thonburi (KMUTT) in collaboration with its consortium partners and Kyoto University, jointly organised the 7th International Conference on Sustainable Energy and Environment or (SEE 2018), during 28-30 November 2018 at the Chatrium Hotel Riverside Bangkok.

The "SEE" Conference is a biennial forum for sharing and exchanging knowledge and experiences on advances in science, technology and innovation to address energy and climate change related challenges. SEE 2018 continued to adhere to this over-arching theme. However in view of rapid advances in emerging technologies leading to changes in the way the world's energy is produced and consumed, the 2018 edition of the conference focused on "Technology & Innovation for Global Energy Revolution". Also, in the light of Thailand's new development strategy which identifies biofuel and biochemical as priority industries, a particular emphasis was given to research advances in those areas.

On energy revolution, the highlight was on three keynotes: "Facing up to Challenges of Energy Disruption" (delivered during the conference dinner) by Dr Piyasvasti Amranand, Chairman of PTT Global Chemical and former Minister of Energy, "The Need for Smart Grid Solutions for a Sustainable Energy Future and to Mitigate Climate Change" by Mr Juergen Bender, a well-known energy consultant in Thailand, and "Renewable Energy Technology: Current Status of Technology Penetration and its Challenge" by Dr Shigeru Niki, National Institute of Advanced Industrial Science and Technology, Japan. All three emphasised that the disruption is imminent, and that its technical, regulatory and policy challenges are immense.

On biofuels and biochemicals, attention was focused on the keynotes: "Transforming Thailand: The Shift to a Sustainable Bioeconomy" by Prof Morakot Tanticharoen, former Director of the National Genetic Engineering and Biotechnology Center and "Biomass Upgrading for High Quality Fuels and Value Added Products" by Prof Kouichi Miura, Kyoto University, Japan, which set the tone for an overwhelming majority of related papers in this conference. One subject that attracted tremendous interest is the "Bio Base Europe Pilot Plant", presented by Dr Frederik de Bruyn of Belgium. It is a EU funded open access facility for R&D collaboration and pre-commercial test run.

Other major areas featured included: environmental and climate change science and technology, sustainability, and the broader issue of addressing United Nations Sustainable Development Goals (SDG). Highlights included the following keynotes: "Thailand's Environment 4.0 to Meet 2030 UN SDGs and EEC Development" by Dr Wijarn Simachaya, Permanent Secretary, Ministry of Natural Resources and Environment, "E-Waste Management Practices towards SDGs in SEA" by Dr Mushtaq Memon, United Nations Environment Programme (UNEP), and "Using Life Cycle Thinking to Promote Sustainability in Emerging Economy" by Prof Shabbir Gheewala, JGSEE-KMUTT.

The 3-day event attracted over 200 participants from 15 countries, with over 100 papers presented. Special sessions showcasing JGSEE's collaborative research programs with its partners were also held: (1) Japan-Thai Science and Technology Resource Partnership for Sustainable Development (SATREPS), (2) Efficient Biomass Conversion Technologies for Biofuel and Bioenergy Production, (3) Climate Change Technology and Innovation, and (4) Energy and Environmental Technology for Sustainable Urban Development Towards Net Zero Energy Building. The event coincided with the 20th Anniversary of the establishment of JGSEE. An exhibition was also staged to commemorate the occasion, retracing the development of JGSEE and its achievements over the past two decades.



## Contribution to Knowledge Platform

### Joint Seminar on Energy and Climate at Bogor Agricultural University

A delegation from JGSEE-CEE comprising 10 students led by Assoc Prof Dr Sirintornthep Towprayoon, Assoc Prof Dr Amnat Chidthaisong and Dr Awassada Phongphiphat participated to a Joint Student Seminar on Energy and Climate during 4-6 September 2018 at Bogor Agricultural University (IPB) in Indonesia. Students from both JGSEE and IPB presented their research works. Several visits were also arranged to a number of research centers and laboratories at IPB, including, the Center for Climate Risk and Opportunity (CCROM), the Center for Coastal and Marine Resources Studies (CCMRS), the Surfactant and Bioenergy Research Centre (SBRC) and the South East Asian Food and Agricultural Science and Technology Centers (SEAFST). Possible opportunities of collaboration in terms of research, and the exchange of students and faculty members were also discussed. A next event will be organised at JGSEE in 2019.



### Professor Gheewala contributes Keynotes in Indonesia and Thailand

Recognising his expertise on life cycle sustainability assessment, Prof Shabbir H. Gheewala of LCSAL was invited to deliver plenary keynotes at three international conferences, two in Indonesia and one in Thailand. Prof Shabbir delivered a plenary talk entitled "Promoting Sustainability in Emerging Economies via Life Cycle Thinking" at the 3rd International Conference Series on Life Cycle Assessment (ICSoLCA) during 24-25 October 2018 at Jakarta, Indonesia. This was followed by a talk on "Are Biofuels Sustainable? A Life Cycle View" at the 7th Sustain International Conference on Sustainable Future for Human Security (Sustain 2018) during 29-30 October 2018 at Padang, Indonesia. Drawing on experiences from several recent projects on the subject, Prof Shabbir delivered a plenary keynote on "Sustainable Food-Feed-Fuel Production via Biorefineries" at the 11th Annual International Conference on Challenges in Environmental Science and Engineering (CESE-2018) held during 4-8 November 2018 in Bangkok.





## Contribution to Research Platform

### NSTDA Research Chair Grant Meeting in Khao Yai



The members of the NSTDA Research Chair grant being mentored by Prof Shabbir H. Gheewala had a meeting in Khao Yai during 19-21 December 2019. Deliberations were made on the research progress along with exchanging views on further actions. The 5-year grant encompasses Research and Innovation for Trade and Production of Sustainable Food and Bioenergy and follows an earlier research network focusing on LCA and Policy on Food, Fuel and Climate Change. Senior researchers from universities all over Thailand – KMUTT, Kasetsart University, Mahidol University, Mahasarakham University, Chiang Mai University and Prince of Songkla University – are part of this network which promotes life cycle thinking in policy making.

### Academic and Research Collaborations with Taiwan, Belgium and Germany



On 29 November 2018, a special seminar was held on “Academic and Research Collaboration Opportunities” between JGSEE-CEE, and the National Cheng Kung University (NCKU), Taiwan, Bio Base Europe - Pilot Plant (BBE-PP), Belgium and the Technical University of Rosenheim (TUR), Germany. The seminar aimed at investigating collaborative opportunities. NCKU was represented by Prof Wei Hsin Chen, BBE-PP by Dr Frederik de Bruyn and TUR by Prof Horst Kreimes. Participants to the meeting from JGSEE included, Assoc Prof Dr Suneerat Fukuda (Director), Prof Navadol Laosirpojana and Dr Patrick Rousset (AFPL),

Prof Shabbir H. Gheewala and Dr Sebastien Bonnet (LCSAL), and Dr Athikom Bangviwat and Dr Boonrod Sajjakulnukit (EEPL). Assoc Prof Dr Bundit Fungtammasan, KMUTT senior Vice President for Research and Innovation also took part in the meeting. Other participants included Prof Jurgen Bender, a well-known energy consultant in Thailand and Prof Christoph Menke, a former advisor to JGSEE and an energy specialist from Trier University of Applied Sciences, Germany.

The meeting started with a presentation of JGSEE by Dr Suneerat. This was followed by a presentation by Prof Chen who introduced the Department of Aeronautics and Astronautics at NCKU, its International Bachelor, Master and PhD Programs in Energy, and the research activities he contributes to under the Green Energy and Fuel Lab (GENFUEL). He detailed 3 main areas GENFUEL focuses on that are (1) Bioenergy; (2) Hydrogen Energy; and (3) Clean Energy. These match perfectly with the research activities performed under AFPL and which involve Prof Navadol and Drs Suneerat, Nakorn and Rousset. A presentation was then delivered by Dr De Bruyn regarding BBE-PP and details of the industrial level research services and collaboration opportunities it can offer. These activities are in line with the research works performed as part of the Integrative Biorefinery Laboratory Dr Navadol contributes to in collaboration with BIOTEC. A last presentation was delivered by Prof Kreimes regarding the activities of TUR. The Rosenheim Technology Center for Energy & Building at TUR was presented with which academic and research collaborations could be developed with BEST and LCSAL.

## Contribution to Society

### CoE and Development in Eastern Area of Thailand



On 18 October 2018, JGSEE-CEE in collaboration with PERDO and 10 Centers of Excellence (CoEs) including, HSM, PETROMAT, EHT, CEM, AG-BIO, PERCH-CIC, BDC, ThEP, PHTIC and CEMB organised a seminar and exhibition on “CoE and Development in Eastern Area of Thailand”. The event was held at The Tide Resort in Chonburi, Thailand.

During the exhibition, aspects related to economics, environment and society were showcased. JGSEE focused on presenting research activities performed under the Advanced Fuel Processing Laboratory (AFPL). Emphasis was on the conversion of biomass to high value-added products, lignin to carbon fiber and microcrystalline cellulose (MCC) to chemicals for the industry.

## Message from Graduate

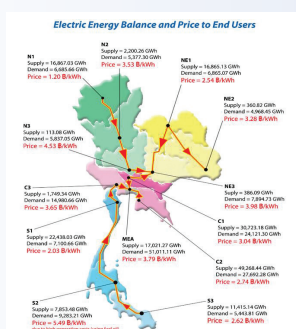
### Mr Peerawat Payakkamas, MEng Energy Technology & Management



My name is Peerawat Payakkamas. I recently graduated from JGSEE-CEE with a Master of Engineering degree in Energy Technology and Management. My Master thesis was performed under the supervision of Dr Athikom Bangviwat (from JGSEE) and Prof Christoph Menke (from Trier University of Applied Sciences, Germany). The thesis is titled "Price Determination of Electricity Supply due to Externalities, Wheeling Charges and Losses".

The research work was performed during 2016-2018 and aimed at determining new electricity prices for end-users in different zones of Thailand by incorporating a number of parameters in the assessment, including: levelized costs of power generation, external costs associated to human health and environmental impacts, as well as wheeling charges and losses incurred from the transfer of electrical energy from one zone to another.

As a preliminary work, this study intends to provide information related to electricity prices that reflect more accurately the adverse effects of power generation onto society. It also intends to highlight the policy implications related to the involvement of localities on power plant planning and decision-making to fulfil the interests of the concerned stakeholders. As a part of this research, I had an opportunity to visit Germany for one month to acquire knowledge on various aspects, including: electricity costs, and effects of externalities and wheeling charges, local participation in electrical utilities planning, Germany's renewable electricity policy, etc. This research work has been published in the journal "Science & Technology Asia".



## Welcome New Comers

### Dr Kazuyuki Yagi



Dr Kazuyuki Yagi joined the Advanced Greenhouse Gas and Aerosol Research Laboratory (AGAR) of JGSEE-CEE as an academic staff in September 2018. His areas of expertise are biogeochemistry and soil science, and the research covers Japan and other Asian countries.

Prior to joining JGSEE, Dr Yagi had worked at the Institute for Agro-Environmental Sciences (NIAES), National Agriculture and Food Research Organisation (NARO) and the Japan International Research Center for Agricultural Sciences (JIRCAS), both located in Tsukuba, Japan, in the research fields of agro-environmental sciences, in particular on emissions of greenhouse gases in association with different land use and agricultural management. He served international research communities as a lead author of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, a member of the International Technical Panel on Soils (ITPS) of the Global Soil Partnership (GSP), and a co-chair of the Paddy Rice Research Group of the Global Research Alliance on Agricultural Greenhouse Gases (GRA). Currently, he works as a chair of Pillar 3 of the Asian Soil Partnership (ASP).

From his research activities, Dr Yagi found that a number of agricultural and environmental issues in tropical countries are more critical than those faced by countries in other regions of the world, and are to be addressed by bringing scientists from different countries together. This is what directed him to join JGSEE to continue his research work.



## Dr Pariyapat Nilsalab



In 2019, Dr Pariyapat Nilsalab earned a PhD degree in Environmental Technology on “Impacts of Freshwater Use from Agrofuels Feedstock Cultivation in Thailand”. The thesis work was supervised by Prof Shabbir H. Gheewala. She is currently a researcher under the Life Cycle Assessment Laboratory. Dr Pariyapat is working on two research subjects which are related to water scarcity assessment. The first project titled “Development of Water Impact Assessment Method for Agriculture for Food and Energy under Climate Change” is a sub-project under a project titled “Network for Research and Innovation for Trade and Production of Sustainable Food and Bioenergy”. The second project titled “Assessment of Water Scarcity Footprint and Economic Impacts towards the Guideline for the Agricultural Sector Adjustment under Climate Change” is a sub-project of a research program on “Water Footprint for Land and Water Resource Management for Food and Fuel Production in the Future Climate Change” under an integrated research plan of “Innovation of Water Management for Sustainable Agriculture and Community under Climate Change”.

## Dr Thao Pham Thi Bich



In 2015, Dr Thao Pham Thi Bich earned a PhD degree in Environmental Technology on “Study of Mercury Deposition Processes in Thailand Integrating Emission Source Characterization and Atmospheric Modeling”. The thesis work was supervised by Assoc Prof Dr Savitri Garivait. Dr Thao is now a post-doctoral researcher under the Advanced Greenhouse Gas and Aerosol Research Laboratory. Dr Thao is doing research on “Development of System Analysis Framework to Identify Risk Area to Air Pollution due to Tropospheric Ozone and Particular Matter (PM2.5 and PM10) for Thailand”. This work is part of a project titled “Climate Change Technology and Innovation (CTI)” which is supervised by Dr Savitri.

## Award

### SEE 2018 Best Paper Award: Mrs Parisa Shokoohiniafor

JGSEE-CEE is pleased to congratulate Mrs Parisa Shokoohiniafor, Master student under the supervision of Assoc Prof Dr Kasemsan Manomaiphiboon, for receiving a Best Paper Award –Runner-Up for her research work titled “An Impact Assessment of Smoke Haze from Indonesia on Air Quality in Songkhla, Thailand”. The presentation was delivered at the occasion of the 7th International Conference on Sustainable Energy and Environment on the theme “Technology & Innovation for Global Energy Revolution” that was held during 28-30 November 2018 at the Chatrium Hotel Riverside Bangkok.



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