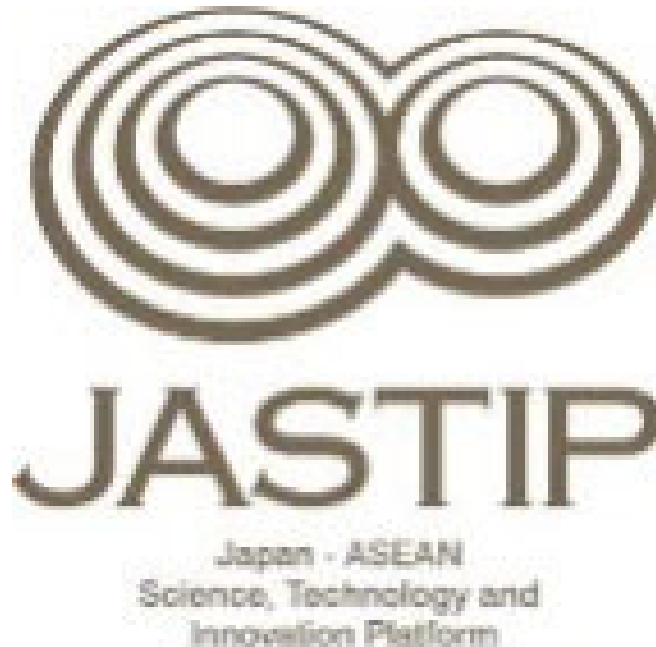


Jan. 17, 2020

JASTIP-WP2 activity report



- Main Satellite Lab.

- **INC1, Thailand Science Park, NSTDA**

- 2017- cooperated with JASTIP Headquarter
 - Collaboration Research: B2EC (MTEC, NANOTEC, BIOTEC)-Kyoto U.
NECTEC(mini-grid optimization)-Waseda U. (e-Asia)
 - NSTDA-KU MOU sign-up (2018 Sep.27)
=> KMUTT-KU Double Degree Program in cooperation with NSTDA



- Collaboration labs

- JGSEE/KMUTT, Bangkhuntien Campus (SATREPS project)
 - 2019- available for near-by countries
 - King Mongkut's Institute of Technology, Ladkrabang, Nano Center (MTEC, Photocatalysis project) => Industries (Thai Lysaght Co.Ltd)
 - NUOL, Faculty of Engineering (supporting for establishment of the Chemical Analysis lab.)

- NSTDA(NANOTEC) : Photocatalytic conversion of biomass to value-added fuels and chemicals
- NSTDA(MTEC) : Development of Carbon Materials from Biomass for Energy Storage Applications
- NSTDA(BIOTEC) : Innovations in Biomass Application for Catalytic Material Synthesis and Energy Devices
- NSTDA(NECTEC):Optimal design platform for smart integration of renewable energy in rural area (Waseda, e-Asia)
- JGSEE/KMUTT : Extension of “Solvent Treatment Method” developed by SATREPS program to ASEAN region(Laos : 2016-, Myanmar : 2018-)
- KMITL:Development of New Functional Materials for Energy and Environment
- RE Implementation: University of Yangon (Kyocera Asia Pacific, Earth Renewable co.), Rural Electrification Study in Myanmar, Cambodia, Malaysia, Indonesia, Philippines, Brunei, Vietnam, Thailand
- JASTIP-net

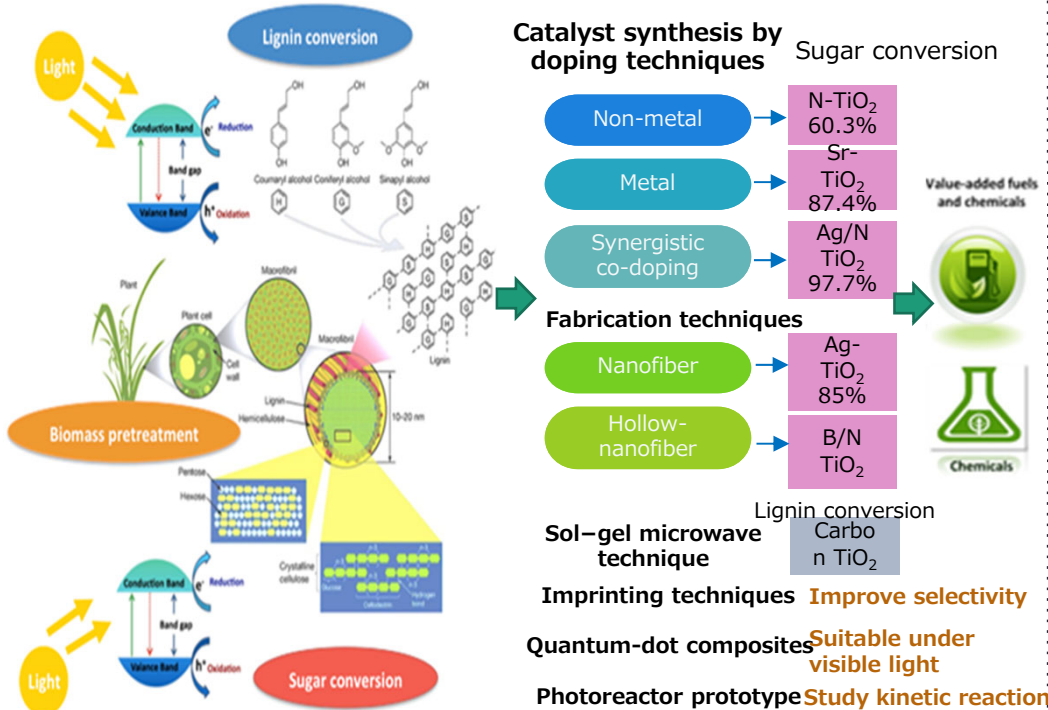


BIOTEC-JGSEE/KMUTT-Kyoto

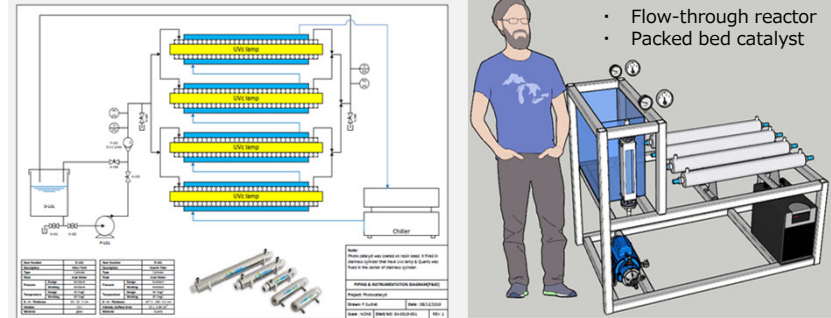
1. Overview (STI for SDGs)

The project aims to develop improved technology for synthesis and fabrication of photocatalysts and development of photo bio-flow reactor for conversion of lignocellulose-derived components i.e. sugars and lignin to value-added chemicals e.g. functional sugar derivatives and phenolics. The work will integrate the technology on photocatalytic conversion to biorefinery which will lead to sustainable development of biomass-based industry targeting on multi-products i.e. fuels and chemicals from agricultural wastes

2. Japan - ASEAN STI Cooperation



3. Photo bio-flow reactor design



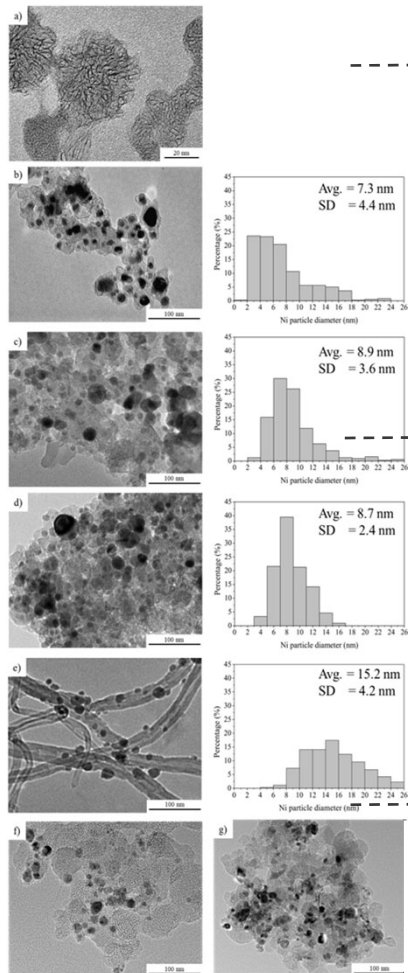
4. Scientific outputs

- International publications = 4 published/1 in-prep(acknowledged to JASTIP)
- Graduate student training at KU 8 M.Sc/ 1 Ph.D and 1 researcher assistant
- 6 presentation in international conferences
- Photocatalytic technology on sugar and lignin conversion
- Photoreactor prototype
- Under proposed phase to TH industry
- ** Photocat team won 1st prize PTTGC Innovation award 2017 for smart eco-products

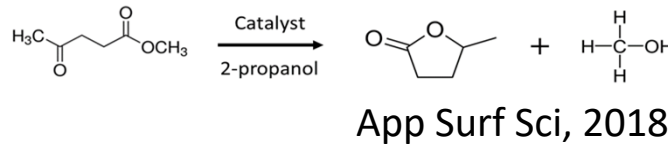


NANOTEC-CU/Kyoto U

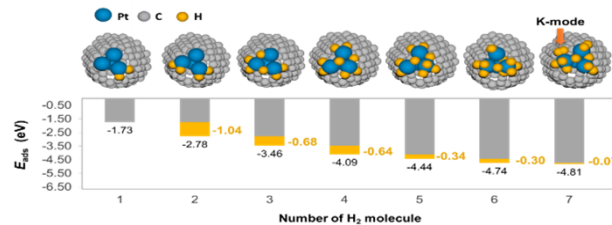
Carbon Nanohorns



Catalytic materials for biomass conversion to γ -valerolactone

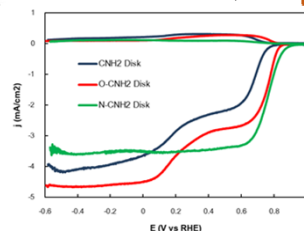


H₂ storage materials



Int Hydrogen Energy, 2018

Electrocatalysts for H₂O₂ production



Manuscripts in preparation

Scientific Output

- Int. Journal : 9 papers
- Int. Conf.: 15 orals
- 8 workshops (>200 people)
- 5 exchange researchers/students
- 7 int./domestic awards, such as, "A CST Citation Award 2018 from the Chemical Society of Thailand (CST) under the Patronage of Her Royal Highness Princess Chulabhorn Mahidol"

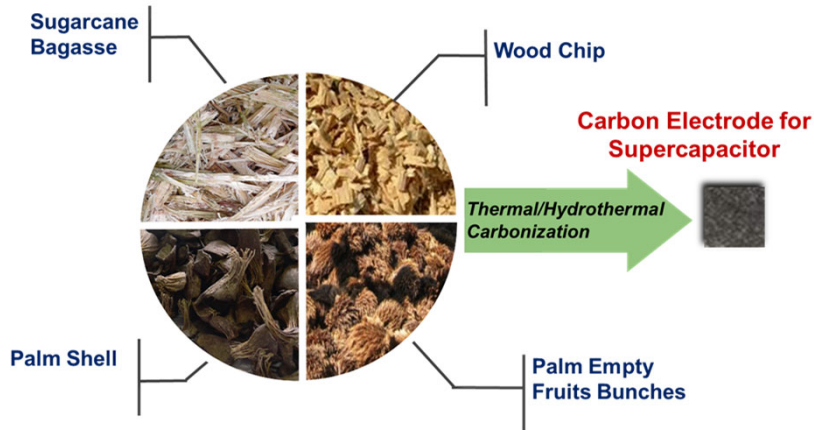


MTEC-Kyoto University

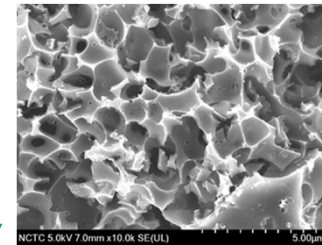
Biomass

Activated Carbon

Scientific Output



High surface area



-2 Int. Conf.; 1 poster, 1 oral-submitted

Exchange

-2 students, from Thammasat University visited Kyoto University in December 2018.
-2 research personnel, from MTEC visited Kyoto University in November 2019.

Energy Storage Applications

Supercapacitor or Electric double-layer capacitor (EDLC)

Advantages of EDLC

- Long life (Theoretically > 100,000 times)
- Fast charge and discharge
- High safety

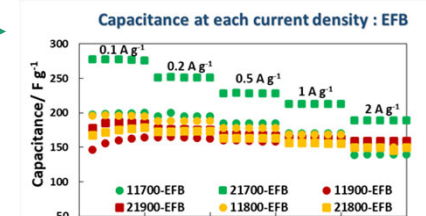
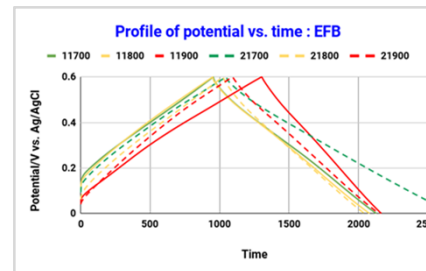
Reaction of EDLC; Adsorption and desorption of ion at the surface of electrode

Requirements for EDLC carbon electrode

- High surface area
- Chemical and electrochemical stability
- High electronic conductivity
- Low cost

Activated carbon: Suitable material for EDLC electrodes

Carbon electrode for Supercapacitor



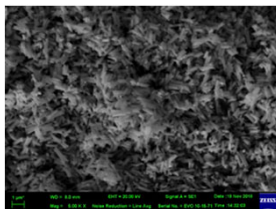
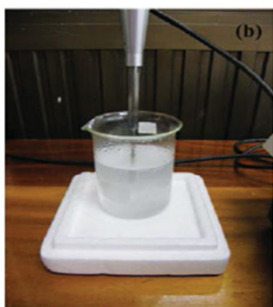
Good Electrochemical performance

Charge-Discharge profile and Capacitance of activated carbon from biomass

KMITL/RMUTT-Kyoto U

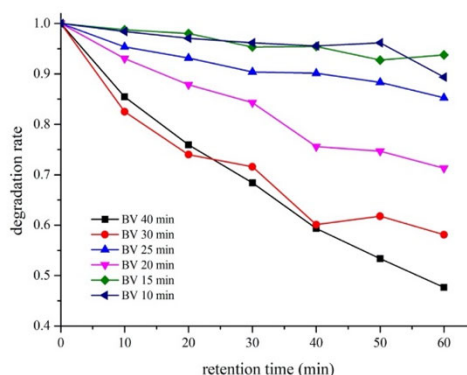
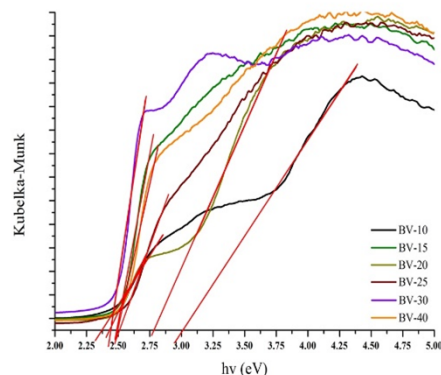
Visible light active
BiVO₄ catalyst

One-step
sonochemical process



Possible Applications

Visible light driven photocatalyst



Scientific Output

- Int. Journal : 3 papers + 1 submitted
- Int. Conf.: 1 orals + 3 posters
- Exchanged Researcher: 1
- Int. Conference : 1
- Exhibition: 1



NST2019

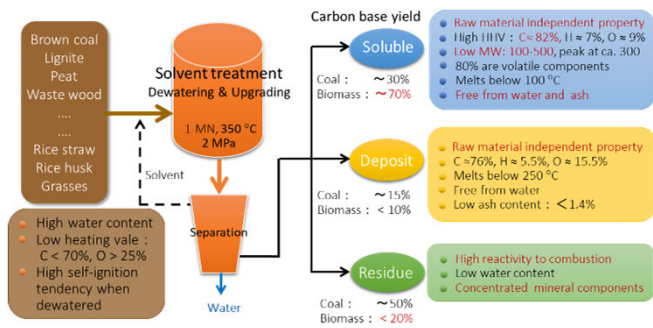


ICREM2019

-Thai side:
"BiVO₄ NANOPARTICLES DERIVED VIA RAPID SYNTHESIS SONOCHEMICAL PROCESS" **best poster award at International Conference on Radiation and Emission in Materials 2019(ICREM2019)**

JGSEE/KMUTT – Kyoto University

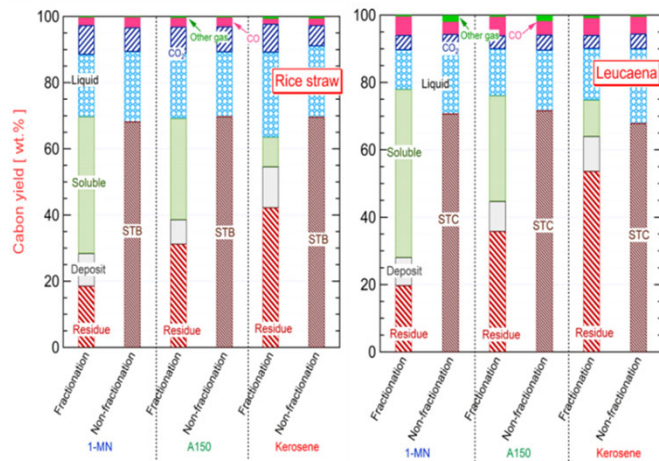
Concept of Solvent Treatment



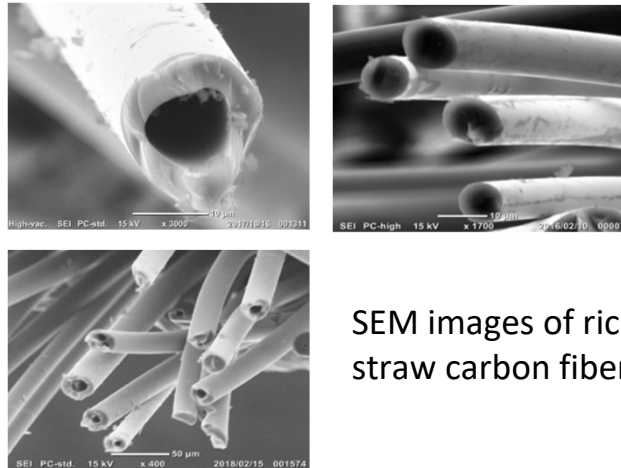
The method dewateres and upgrades various low-grade carbonaceous resources, producing high quality extract in high yield under mild conditions.

- Almost no heating value loss through the treatment
- Soluble and Deposit have raw material independent properties

Product Yield Distribution



Production of Carbon Fiber from Soluble



SEM images of rice straw carbon fiber

Scientific Output

-Int. Journal : 3 papers
-Int. Conf.: 15 papers



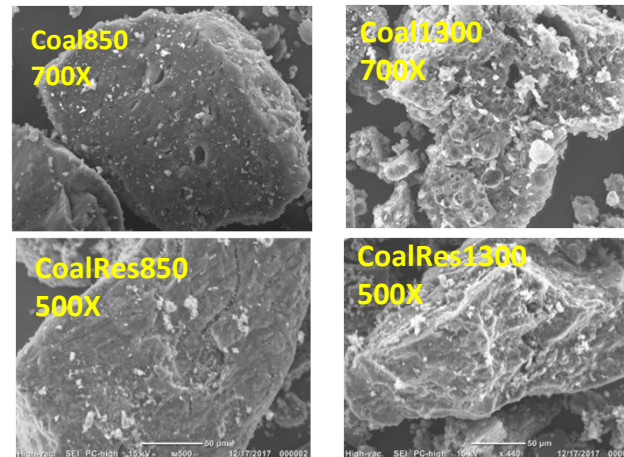
Japan - Thailand SATREPS Workshop 2016

"Development of Clean and Efficient Utilization of Low Rank Coals and Biomass by Solvent Treatment"

1 March 2016
Sattabongkot room,
Pilot Plant Development and Training
Institute building,
KMUTT(Bangkhuntien campus)

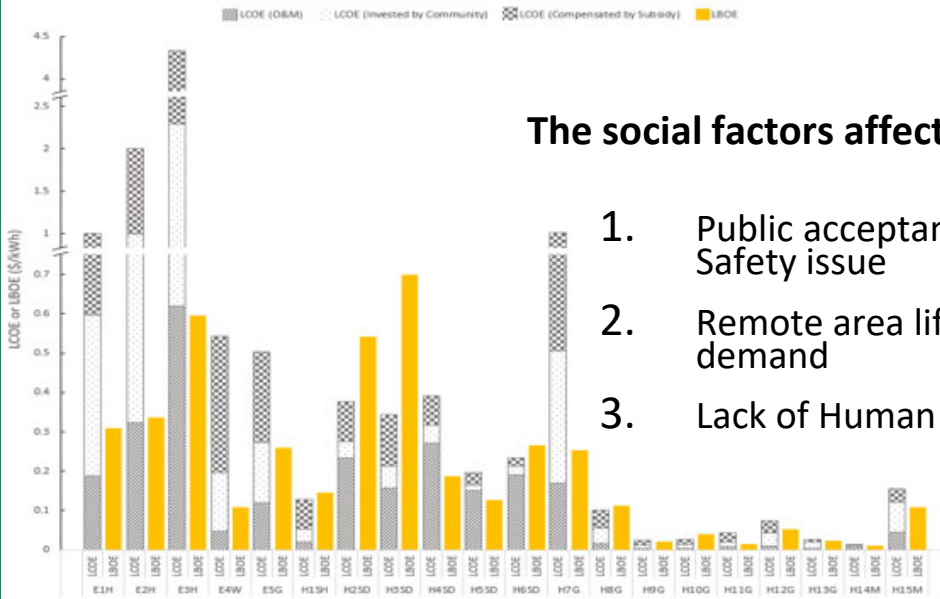


Pyrolysis of Coal Residue using DTF



Morphology of DTF char

Community Renewable Energy Implementation in Thailand (CMU-KU)



The social factors affect economic feasibility

1. Public acceptance of CRE projects: Safety issue
2. Remote area lifestyle, small demand
3. Lack of Human knowledge and skill

Policy Recommendations to MOE, Thailand

Scientific Output

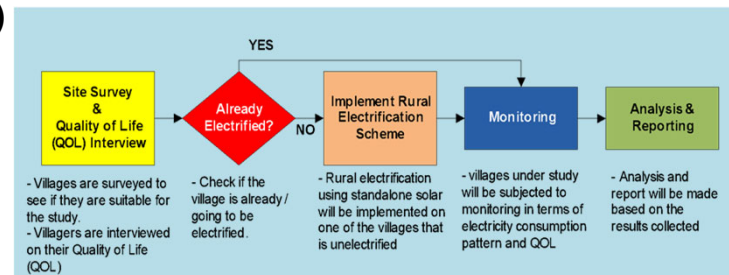
- 5 Int. Journal papers
- 26 Oral presentations

-5 international workshops

Impact Study on Quality of Life for Rural Community Through Rural Electrification using Renewable Energy (UM-KU-ITC-UY-YTU-LIPI)

Field survey and installation of SHS: Impact on QoL

=> Policy Recommendation and Technological improvement



- **Innovations in Biomass Application for Catalytic Material Synthesis and Energy Devices**

- Date: September 3, 2019
- Place: NANOTEC/NSTDA,
- Hosted by Dr. Kajornsak
- Date: November 12-17, 2019
- Place: Kyoto University, Katsura Campus
- Hosted by Prof. Sano



- **Rural Electrification Workshop in KL**

- Date: June 24, 2019
Date: September 3, 2019
- Place: Hilton Bouble Tree, KL
- Prof. Nasrudin(UM)

- **Workshop on Current Status of Renewable Energy in Myanmar and Key Recommendation**
 - Date: July 11, 2019
 - Place: YTU, Myanmar
 - Hosted by Dr. Thein Min Htike
+ MEE, DRD
- **Workshop on Photocatalysis for Energy and Environment**
 - Date: Jan 20, 2020
 - Place: Ibis Style Rachada, Bangkok
 - Prof. Ishihara
- **Supporting AUN/SEED-Net Regional Conference on Energy Engineering**
 - Date: Nov. 12-14, 2019
 - Place: Banyuwangi, Indonesia
 - Hosted by Institut Teknologi Sepuluh Nopember

Research Theme:

Implementation Study of Renewable Energy in South East Asia

14 proposals: IND(1), KHM(2), LAO(1), JP(2), ML(3), MY(3), VN(1), TL(1)

Selected MY(USAID), VN, TL(JICA)
and Rural electrification program(e-Asia, Hitachi foundation)

The mini-workshop on rural electrification research in
JASTIP-net (2019.2.2)

Research Theme:

Implementation Study of Renewable Energy in South East Asia

29 proposals: BD(3), IND(3), KHM(1), LAO(1), JP(1), ML(17), PH(2), VN(1)

Selected 11 proposals (1 carry over, 2 Kyoto U)

1. “Techno-economic Viability of Renewable Distributed Energy System (DES) in Borneo”, Chee Ming Lim (Universiti Brunei Darussalam)
2. “Energy Trading Implementation Study for Rural Community Off-Grid Solar PV System”, Wan Azlan Wan Zainal Abidin (Universiti Malaysia Sarawak)
3. “Strategies for Producing Valuable Carbon from Biomass by Microwave Pyrolysis System”, Mohd Asmadi bin Mohammad Yussuf (Universiti Teknologi Malaysia)
4. “Design, Fabrication, and Testing of a Smart DC-to-DC Converter for the Hybrid Renewable Energy Integrator System for a Village-Scale 150-Liter Capacity Bioethanol Distiller Using Nypa Palm (Nypa Fruticans) Sap”, Willen Mark D. Manzanas (Mariano Marcos State University)
5. “Redesign of Policy Implementation on Solar Cell Energy to Support Sustainable Development in Indonesia”, Anugerah Yuka Asmara (LIPI)
6. “Sustainable Production of High-Quality Bio-Oil from Different Agriculture Wastes in the ASEAN Region through Catalytic Fast Pyrolysis”, Bridgid Chin Lai Fui (Curtin University Malaysia)

7. “Application of a Novel Highly-Efficient Power Generation Method to Biomass Wastes in Southeast Asia for Their Effective Utilization”, Ryuichi Ashida (Kyoto University)

8. “Motivations and Challenges of Solar Photovoltaic System Deployments in the Philippines”, Erees Queen Macabebe (Ateneo de Manila University)

9. “Investigating dimensions and indicators for energy education framework in Malaysia using the analytic hierarchy process (AHP)”, Zul Ilham Bin Zulkiflee Lubes (University of Malaya)

10. “Deployment of a low-cost device for estimating energy production from a PV system in faulty conditions for a remote rural health care center”, Long Bun (Institute of Technology of Cambodia)

11. “Photocatalytic Reforming of Cellulose from Ozone Pretreated Lignocellulosic Biomass Using Modified TiO₂ for Bio-Hydrogen Production”, Nor Aishah Saidina Amin (Universiti Malaysia Teknologi)

JASTIP-net network

Myanmar

- Yangon Technological University
- Mandalay Technological University
- Technological University, Hmawbi
- Pyay University
- University of Yangon
- Earth Renewable Energy

Thailand

- Kyocera Asia Pacific Co. Ltd

Laos

- NUOL

Cambodia

- Institute of Technology of Cambodia

Vietnam

- VNU-HCM
- Can Tho University

Malaysia

- UM
- UM Sarawak
- UTM
- Swinburne University of Technology Sarawak
- Universiti Teknologi PETRONAS

Philippines

- De La Salle University

Brunei

- Universiti Brunei Darussalam

Timor Leste

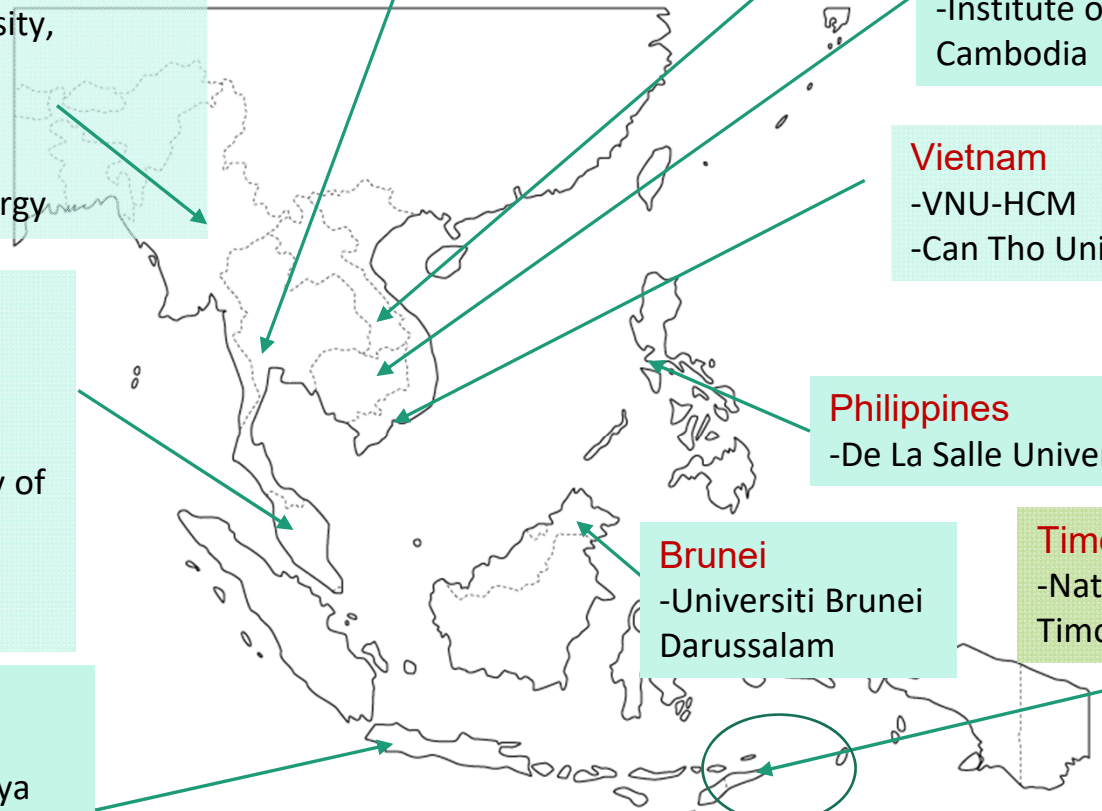
- National University of Timor Leste

Indonesia

- LIPI
- University of Brawijaya
- Surabaya State University
- Sepuluh Nopember Institute of Technology

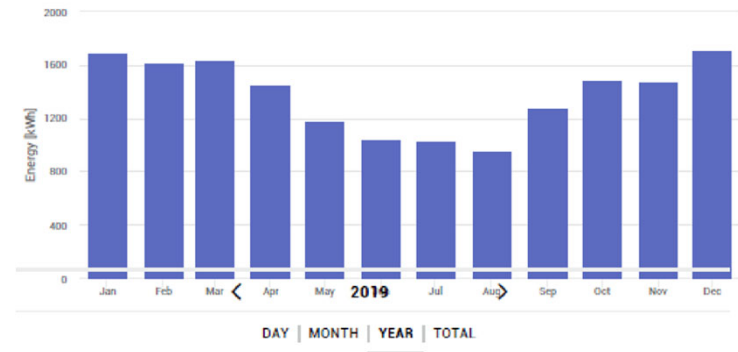
Japan

- Kumamoto U, Ritsumeikan U, Tokai U, Saga U, Waseda U, Myojo U, Fukushima U, Osaka Prefecture U, Kyushu U, AIST



RE implementation -PV installation program in University of Yangon

20 kW PV (13 kW grid tied + 6.5 kW hybrid with battery) has successfully installed in the research building in UY in cooperation with Kyocera Asia-Pacific Co. Ltd. The whole system has been operating since Oct. 2017.



Functional Nano-powders by KMITL

The collaborative project with Thai Lysaght Co.Ltd for reduce micro ZnO powders to nano-powders by milling process.



1st Japan-ASEAN Multi-Stakeholder Strategic Consultancy Forum

“Focus Group Discussion 4: Sugarcane trash/ Algal bioenergy”

4-1 Integrated biorefinery of sugarcane trash: Mitr Phol, PTPN XI

4-2 Development of algal bioenergy systems for green and sustainable ASEAN region: Algal Excellence Centre, TISTR, Euglena

Human Resource Development

- Promotion of Ph.D students in KU (2 Japanese, 2 Thai): Assistant Professor
- PD researchers in KU (1 Japanese, 4 international): Assistant Prof. and Associate Prof.
- Master course DD with CU, UM, KMUTT
 - NSTDA supports and commits KMUTT—KU DD program
 - Collaborative Education Program supported by AUN-SEED-net: UM-KU+YTU, ITC, NUOL, UBD, CanTho Conthortium
- Japan \Rightarrow ASEAN : Faculty member 73, Young Researcher 51
- ASEAN \Rightarrow Japan : Faculty member 53, Young Researcher 55
- AUN-SEED-net Regional Conference on Energy Engineering: 2015 UGM, 2016 ITC, 2017 YTU/UY, 2018 UP, 2019 ITS



Thank you for your kind
contributions!