TABLE OF CONTENTS

AGENDA

AEMI FORUM: ENERGY POVERTY AND SMALL SCALE RENEWABLE ENERGY

JAKARTA, 3 – 4 JUNE 2015

ASEAN ENERGY MARKET INTEGRATION (AEMI) FORUM:
ENERGY POVERTY AND SMALL SCALE RENEWABLE ENERGY

Forum held under Chatham House Rule

AGENDA

Wednesday, 3 June 2015

17:30 – 18:00 Registration

18:00 – 18:30 Drinks and appetizers

18.30 – 19.00 **Welcome**
Mrs. Hilde Solbakken, Minister Counsellor, Royal Norwegian Embassy in Jakarta
Dr. Charit Tingsabadh, Chulalongkorn University, Bangkok, Thailand

18:30 – 21:00 Dinner (Hotel Aryaduta)

Thursday, 4 June 2015

8:15 – 8:30 **Registration**

8:30 – 8:45 **Opening remarks**
Professor. Dr. Iskandar Zulkarnaen, Chairman of Indonesian Institute of Sciences

8:45 – 9:00 Group photo

9:00 – 9:30 **Introductions**
Roundtable: All participants

9:30 – 10:00 **AEMI project overview**
Dr. Nawal Kamel, Chulalongkorn University, Faculty of Economics
Dr. Indra Øverland, Norwegian Institute of International Affairs (NUPI)
Dr. Maxensius Tri Sambodo, Indonesian Institute of Sciences (LIPI)

10:00 – 10:15 **Addressing the Electrification Challenge in Indonesia - Lessons from the Sumba Iconic Island Program**

1. Ms. Sandra Winarsa, Project Manager of Green Energy (Sumba) at HIVOS Southeast Asia Office, Jakarta

2. Ms. Maura Lillis, Energy Analyst and Consultant, the Asian Development Bank

10:15 - 11:00 **ASEAN Power Grid and energy poverty: Country Experience**
Roundtable discussion: All participants

(Note: Mr. Syaiful Bakri Ibrahim**,** Secretary in Charge of Head of ASEAN Power Utilities/Authorities provided short presentation on the progress of ASEAN Power Grid following the 31st HAPUA Council Meeting*)*

11:00 – 11:15 Coffee break

11:15 – 12:30 **Small-scale renewable energy and energy access: Prospects and Challenges**
Roundtable discussion: All participants

(Note: Dr. Xiying Liu, Research Fellow from Energy Studies Institute at National University of Singapore delivered short presentation on the Policy Instruments in Facilitating Renewable Energy Off-grid (REOG) investment in ASEA: Lesson Learn from International Experiences*)*

12:30 – 14:00 Lunch (Hotel Aryaduta)

14:00 – 15:15 **Methodology for assessing the impact of electricity access**
Roundtable discussion: All participants

15:15 – 15:30 Coffee break

15:30 – 16:15 **Field survey: Approach and Delivery**
Roundtable discussion: All participants

16:15 – 17:00 **Research outline: National and ASEAN analyses**
Roundtable discussion: All participants

17:00 – 17:30 **Division of labour, timeline and next steps**
Dr. Indra Øverland, Norwegian Institute of International Affairs (NUPI)
Dr. Maxensius Tri Sambodo, Indonesian Institute of Sciences (LIPI)

17:30 – 17:40 **Conclusions**
Dr. Nawal Kamel, Chulalongkorn University, Faculty of Economics

17:40 – 17:45 **Closing Remarks**
Mr. Darwin Syamsulbahri, Director of Economic Research Center, Indonesian Institute of Sciences (P2E LIPI)

17:45-18:30 Drinks and appetizers

18:30-21:00 Dinner (Hotel Aryaduta)

AEMI PROJECT OVERVIEW

AEMI FORUM: ENERGY POVERTY AND SMALL SCALE RENEWABLE ENERGY
Jakarta, 3 - 4 June 2015

AEMI PROJECT OVERVIEW

A. MOTIVATION

Context[1]

1. ASEAN is facing an energy challenge. Primary demand for energy is set to grow steadily at 4.4% per year up to 2030, in the face of increased economic activity, population growth, rising electrification rates, and expansion of the transport sector. The implication is that energy demand will double by 2030, after having already expanded 2.5 times since 1990. Demand for all hydrocarbons is set to expand: oil by 50%; natural gas by 80%; and coal by 300%, as it replaces gas and oil, notably for electricity generation. According to the Asian Development Bank, even in a best-case scenario for energy efficiency and renewable energy, ASEAN energy production cannot meet such rapidly increasing demand.

2. This soaring energy demand is combined with declining energy production within ASEAN. ASEAN oil production is expected to fall by almost one third by 2030, after having declined by 10% per year in the last decade. Also ASEAN's surplus of natural gas and coal available for export will continue to decline, as ASEAN production is outpaced by its domestic demand. Currently, renewables represent only 3% of primary energy mix in ASEAN-5 (Indonesia, Malaysia, the Philippines, Singapore and Thailand) and this ratio is set to fall, as gains from the use of renewable energy will only displace current use of biomass.

3. Moreover, ASEAN's environmental sustainability is set to decline. ASEAN energy-related greenhouse gas emissions are expected to double by 2030, after having increased by 57% during the last decade. This is due in part to the expected 8% annual increase in coal consumption for electricity generation. Moreover, ASEAN energy intensity is lagging world averages. It improved only by 12%, compared to 26% worldwide. Moreover, ASEAN industrial energy intensity[2] has been worsening steadily in the last three decades (decreasing on average by 0.2% per year in 1980-2011). As a result, ASEAN currently consumes more than twice the amount of energy per unit of GDP than the average industrial countries (OECD). End-users appliances (e.g.,

[1]Sources: AEMI Group (2013), *ASEAN Energy Market Integration (AEMI): From Coordination to Integration*; Asia Development Bank (ADB) (2013), *Asian Development Outlook 2013: ASEAN's Energy Challenge*; International Energy Agency (IEA) (2012), *World Energy Outlook*; International Monetary Fund (IMF) (2013),*Energy Subsidy Reform: Lessons and Implications*; International Institute for Sustainable Development (IISD) (2013),*A Guidebook to Fossil-Fuel Subsidy Reform for Policy-Makers in Southeast Asia*; The World Bank (2010),*Subsidies in the Energy Sector: An Overview*.

[2] It means output per unit energy use at constant price. Thus, when the intensity decreasing means that to produce same unit of output, industries need more energy.

incandescent light, bulbs, air conditioners; industrial motors) are highly inefficient compared to best available technologies.

4. Finally, ASEAN energy poverty is higher than the world average. More than one fifth of ASEAN population (some 130 million people) is without access to electricity, and nearly half (45%) relies on traditional use of biomass for cooking (about 230 million people). Lack of access to modern energy services is a serious hindrance to economic and social development, and must be overcome if sustainable and equitable growth is to prevail within the ASEAN Economic Community.

Challenges

5. International organizations (ADB, IEA) propose ASEAN energy market integration as the most efficient way for ASEAN to address its energy challenges. They also recognize that the creation of an efficient ASEAN-level regional energy market is a major challenge, as it requires harmonization of energy pricing and subsidies for energy product and services; rationalization of tariffs and non-tariff barriers; expansion of market connectivity through gas pipelines and power grid; and formulation of a common strategy for energy security. Moreover, for the integrated ASEAN energy market to be socially equitable and environmentally sustainable, member states need to agree common policies to deploy renewable energy; enhance energy efficiency; and secure access to clean energy sources. ASEAN energy market integration therefore involves all of these elements.

6. A group of concerned ASEAN academics held a session at Chulalongkorn University (May 2013, Bangkok) and constituted themselves into the AEMI Group, agreeing to work together to make the case for ASEAN Energy Market Integration (AEMI) within the forthcoming ASEAN Economic Community (AEC). The vision is to allow for the free flow of energy products, services, investment and skilled labor in the framework of the AEC. The approach is consistent with the purpose of the AEC, to transform ASEAN into a single production market with a free flow of goods, services, investment and skilled labor. AEMI is a logical extension of such provisions to the energy sector.

7. The AEMI Group committed to working together to develop the AEMI concept, analyze its rationale, assess its potential benefits, and propose an approach for its deployment within the AEC through 2030. Through their studies, the AEMI Group demonstrated that the development of AEMI is an imperative requirement for the success of the AEC, given the vital role that energy plays in sustaining economic growth and in securing the wellbeing of people. Moreover, if designed properly and implemented efficiently, AEMI has the potential to deliver economic, social and environmental benefits to all ASEAN member states. It could improve

energy efficiency, help creation and deployment of renewable energy and address energy poverty across ASEAN.

8. The AEMI Group published a Book: *"AEMI: From Cooperation to Integration"* (2013) distributed to ASEAN Senior Officials, policymakers and academics (in Bangkok, Jakarta, Manila, Kuala Lumpur, Singapore, and Tokyo). The work of the AEMI Group was supported since its inception by Chulalongkorn University (Bangkok, Thailand).

Policy-making

9. The AEMI Group was successful in opening a dialogue with ASEAN policymakers on energy market integration. It made the case for the successor of the current ASEAN Plan of Action for Energy Cooperation (APAEC, 2010-2015), to move from regional energy "cooperation" into energy "integration", to take the energy dialogue beyond the current piecemeal bilateral trading arrangements, into fully integrated energy policies within the framework of the AEC.

10. The AEMI Group worked closely with the ASEAN Secretariat and relied on the data and publications from the ASEAN Center for Energy (ACE). It was invited to address the 31st Senior Officials Meeting on Energy (SOME) in Bali (June 2013). The SOME endorsed the AEMI initiative and encouraged the AEMI Group to report back their results on the subsequent SOME.

11. More recently, the SOME adopted "ASEAN connectivity and energy market integration" as the main theme for the upcoming APAEC 2016-2020 and instructed the drafting committee to prepare the document accordingly. This agreement is to be concluded by the ASEAN Energy Ministers by December 2015.As a result of this development, the AEMI Group currently focuses its analytical work on defining an AEMI Blue Print. It has already identified the set of issues that needs to be addressed in the design of the next APAEC, with a view to formulating policy recommendations directly relevant to its drafting in 2015 and to its deployment to 2020.

B. STRUCTURE

Focus

12. The adoption of "connectivity and energy market integration" as the main theme of the new APAEC represents a major shift in ASEAN perspective, and a challenge to its policymakers. The proper formulation of AEMI Blue Print would provide ASEAN greater energy security, enhanced economic efficiency, and improved opportunities to fight energy poverty and to address environmental problems.

13. The purpose of the AEMI Project is to bring together energy experts from ASEAN member states and beyond, to further develop the concept of AEMI and design its Blue Print components. Building on the work accomplished by the AEMI Group, it would undertake policy analysis and formulate recommendations for the next APAEC (2016-2020) from the drafting stage in 2015 through the period of implementation to 2020.

14. The AEMI Project is geared towards enhancing ASEAN energy policy dialogue, and engaging policymakers (including the ASEAN Center for Energy, the ASEAN Secretariat and all ASEAN energy bodies), non-government organizations, as well as energy and environment experts from the region and beyond.

Approach

15. The AEMI project will convene a series of thematic Forums to assess ASEAN energy challenges, identify opportunities and challenges in implementing AEMI, and formulate policy recommendations for the new APAEC. These Forums will be designed to engage an interaction policy dialogue between academics, energy practitioners, civil society organizations, ASEAN policymakers as well as international organizations.
16. Each thematic Forum corresponds to one of the components identified for the AEMI Blueprint. These themes include: expanding renewable energy; improving energy efficiency; securing clean energy access to isolated remote areas; tackling energy subsidies while enhancing affordability of energy to the poor; improving market connectivity; fostering clean energy technology; and advancing energy security. Table 1 provides a preliminary list of such thematic Forums.

17. Special attention will be given to convening a Forum to assess the impact of small-and-medium-scale renewable energy projects in remote and isolated areas across ASEAN, and to investigate ways to help forge a role for ASEAN in global renewable energy development. In particular, the Forum would assist in developing a survey to be conducted in at least 20 local communities that have recently installed renewable energy sources across a minimum of four ASEAN member states.

Outputs

18. A *Forum Report* will summarize the conclusions from each Forum, highlight the emerging policy recommendations, and outline next steps to further develop them (including surveys at the national levels, interactions with ASEAN policy makers, and investigations with national energy entities). Moreover, a survey of renewable energy will be produced.

19. An *AEMI Policy Paper* will be drafted on each of the Forum themes, focused on analyzing policy options and making policy recommendations for the APAEC (2016-2020).
20. The *AEMI Website* will be created to e-Publish *AEMI Policy Papers*, post information related to the ASEAN energy, distribute Forum outputs, and receive comments and suggestions.

Support

21. The project is funded by the Norwegian Ministry of Foreign Affairs, building on the AEMI work initiated and supported by Chulalongkorn University, Thailand. It is housed at the ASEAN Studies Center (ASC), Chulalongkorn University, where the AEMI Secretariat will also be located.

22. The project is jointly coordinated by Dr. Nawal Kamel (ASC) and Dr. Indra Øverland, the Norwegian Institute of International Affairs. An AEMI Advisory Committee will review progress, provide advice and supervise the budget. Furthermore, an AEMI Review Committee will provide guidance on the technical aspects of the AEMI project, and include prominent energy experts and practitioners from ASEAN and beyond.

Partnerships

23. The AEMI project will seek to expand the current AEMI Group, which currently includes academics from most ASEAN countries. The project will seek to include active participation of ASEAN academic institutions and research institutes currently present within the AEMI Group, and to expand this network further. Table 2 provides the list of AEMI Group members as of January 2015.

24. The AEMI project will also strive to broaden the AEMI network to gradually include relevant civil society organizations, multilateral organizations, foundations, as well as (neutral) bilateral and multilateral donors. It will also build linkages with ongoing related international initiatives on green energy and technology, and on access to renewable energy.

Table 1: Potential Forums Themes

(1) ADDRESSING ENERGY POVERTY

(a) How would AEMI help access to energy and eradicate energy poverty across ASEAN?

(b) What is the investment need to improve access to electricity and clean energy fuel across ASEAN?

(c) Which policy incentives would encourage private sector investments in energy infrastructure projects?

(d) How to quantify the implications of eradicating energy poverty on narrowing the development gap across ASEAN (an objective of the AEC), and on improving GDP prospects across ASEAN?

(e) What policy recommendations for APAEC (2016-2020)?

(2) TACKLING ENERGY PRICING AND SUBSIDIES

(a) What are the options to "decouple" energy pricing from welfare objectives to assist the poor in most vulnerable ASEAN communities (e.g., tax breaks, social security mechanisms, and rebates on energy bills).

(b) Can AEMI help implement ASEAN-wide subsidy instruments to protect the poor while allowing the energy market function efficiently?

(c) What are the policy recommendations for the APAEC (2016-2020)?

(3) EXPANDING RENEWABLE ENERGY

(a) What are the options for establishing ASEAN-level targets?

(b) How to quantify the impact of such targets on key environmental and economic indicators?

(c) What are the policy incentives to encourage the use of Renewable Energy in the context of AEMI?

(d) What are the policy recommendations for the APAEC (2016-2020)?

(4) SMALL-SCALE RENEWABLE ENERGY AND ENERGY POVERTY

(a) The Forum will discuss a project implemented by surveying at least 20 local communities in at least four ASEAN countries that have recently installed renewable energy sources. The design of this survey will be presented for review and input at a workshop before the survey is carried out.

(b) The survey would address the following questions:

(i) Are previously energy-poor communities within ASEAN in fact "leapfrogging" directly from biomass energy to clean energy?

(ii) What developmental benefits has the deployment of renewable energy actually delivered in these local communities?

(iii) How could ASEAN use its remote, energy-poor communities to play a constructive and pro-active role in global climate policy by creating a market niche and setting precedents?

(5) IMPROVING ENERGY EFFICIENCY

(a) What are the options for establishing ASEAN-level targets?

(b) How to quantify the impact of such targets on key environmental and economic indicators?

(c) What are the policy incentives to encourage Energy Efficiency in the context of AEMI?

(d) What are the policy recommendations for the APAEC (2016-2020)?

(6) ENERGY TARIFFS AND NON-TARIFFS BARRIERS

(a) What are the tariffs and non-tariffs barriers to the free flow of energy goods, services and investments across national borders in the framework of AEMI?

(b) What are the policy recommendations for the APAEC (2016-2020)?

(7) INFRASTRUCTURE NEEDS FOR CONNECTIVITY

(a) What are the investments needed to build the physical, financial and legal/regulatory connectivity through the ASEAN Power Grid and the Trans-ASEAN Gas Pipeline?

(b) What are the investments needed for the ASEAN Power Grid to be able to absorb the full potential from Renewable Energy sources, so that renewables can compete on an equal footing with traditional sources?

(c) What are the policy recommendations for APAEC (2016-2020) for investments in energy infrastructure and smart grids?

(8) FORMULATING ENERGY TECHNOLOGY STRATEGY

(a) What are the ASEAN-level policy incentives to develop and deploy clean energy technology?

(b) What incentives for the private sector in creation and deployment of clean energy technology in ASEAN?

(c) Could AEMI facilitate the creation of an *ASEAN Clean Energy Technology Fund*?

(d) What policy recommendations for the APAEC (2016-2020)?

(9) ADVANCING ASEAN ENERGY SECURITY

(a) What are the core components of an ASEAN energy security strategy?

(b) Would the ASEAN energy strategy address oil and gas physical reserves and deployment conditions?

(c) Would the ASEAN energy strategy include reserve margins for power generation, to maintain electricity provision through national and local grids?

(d) What are the strategic policy recommendations for the APAEC (2016-2020)?

(10) DEVELOPING ANALYTICAL TOOLS FOR ASEAN ENERGY POLICY

(a) Which econometric tools and methodologies could best quantify AEMI economic, welfare and environmental benefits across ASEAN (e.g., impact on energy prices, economic growth, energy savings, reduction in greenhouse gas emissions and energy security)?

(b) Which tools could best assess the impact of adopting ASEAN targets on Renewable Energy and Energy Efficiency?

(c) What are the policy recommendations for the APAEC (2016-2020)?

Table 2: AEMI Group Members

(As of January 2015)

BRUNEI	Dr. Lim Chee Ming	Associate Professor, Institution of Engineering and Technology, Universiti Brunei Darussalam (UBD), Bandar Seri Begawan.
CAMBODIA	Dr. Srinivasa Madhur	Director of Research, Cambodia Development Resource Institute (CDRI), Phnom Penh.
INDONESIA	Dr. Maxensius Tri Sambodo	Researcher, Indonesian Institute of Sciences (LIPI)-Economic Research Center, Jakarta. Visiting Fellow, Institute of Southeast Asian Studies (ISEAS), Singapore.
	Dr. Tri Widodo	Professor and Head of Economics Department, Faculty of Economics and Business, Universitas Gadjah Mada (UGM), Yogyakarta.
LAO PDR	Dr. Phouphet Kyophilavon	Associate Professor and Vice Dean, Faculty of Economics and Business Management, National University of Laos (NUOL), Vientiane.
MALAYSIA	Dr. Aishah Bte. Mohd Isa	Research Fellow, Energy Policy and Research (IEPRe), Universiti Tenaga Nasional (UNITEN), Kuala Lumpur.
	Ir. G. Lalchand	Associate, Akademi Sains Malaysia (ASM), Kuala Lumpur.
	Dr. Leong Yow Peng	General Manager (Corporate Planning & Innovation), National Power Utility, Kuala Lumpur.
	Ir. Tuan Ab. Rashid Bin Tuan Abdullah	Director, Institute of Energy Policy and Research (IEPRe), Universiti Tenaga Nasional (UNITEN), Kuala Lumpur.
MYANMAR	To be determined	To be determined
PHILIPPINES	Dr. Adoracion M. Navarro	Senior Research Fellow, The Philippine Institute for Development Studies (PIDS), Manila.
	Dr. Ma. Joy V. Abrenica	Associate Professor, School of Economics, University of the Philippines (UP)-Diliman, Manila.
	Mr. Jessie L. Todoc	Consultant, Sustainable Energy, Manila.

SINGAPORE	Dr. Philip Andrews-Speed	Principal Fellow, Energy Studies Institute (ESI), National University of Singapore (NUS), Singapore.
	Dr. Xunpeng Shi	Senior Research Fellow, Energy Studies Institute (ESI), National University of Singapore (NUS), Singapore.
	Dr. Youngho Chang	Assistant Professor, Division of Economics, Nanyang Technological University (NTU), Singapore.
THAILAND	Dr. Bundit Fungtammasan	Associate Professor and Vice President for Research, Joint Graduate School of Energy and Environment (JGSEE), King Mongkut's University of Technology Thonburi (KMUTT), Bangkok.
	Dr. Chaiwat Muncharoen	Director, Asian Greenhouse Gas Management Center (AGMC), Asian Institute of Technology (AIT), Bangkok.
	Dr. Kitti Limskul	Associate Professor, Faculty of Economics, Chulalongkorn University (CU), Bangkok.
	Dr. San Sampattavanija	Lecturer, Faculty of Economics, Chulalongkorn University (CU), Bangkok.
	Dr. Watcharapong Ratisukpimol	Lecturer, Faculty of Economics, Chulalongkorn University (CU), Bangkok.
VIETNAM	Mr. Nguyen Duc Song	Researcher, Demand Forecast and DSM Department, Institute of Energy, Hanoi.
	Dr. Nguyen Thi Mai Anh	Lecturer, Department of Industrial Economics, School of Economics and Management, Hanoi University of Science and Technology (HUST), Hanoi.
	Dr. Tran Van Binh	Lecturer, Department of Industrial Economics, School of Economics and Management, Hanoi University of Science and Technology (HUST), Hanoi.

DISCUSSION PAPER

AEMI FORUM: ENERGY POVERTY AND SMALL SCALE RENEWABLE ENERGY

Jakarta, 3 – 4 June 2015

AEMI FORUM

ENERGY POVERTY AND SMALL SCALE RENEWABLE ENERGY
3 -4 JUNE 2015, ARYADUTA HOTEL, JAKARTA

DISCUSSION PAPER

A. FORUM OBJECTIVE

1. The task of AEMI in the energy poverty area is to develop relevant policy recommendations for the ASEAN Plan of Action for Energy Cooperation (APAEC) (2016-2020). This would focus on improving access to electricity on grid (notably through the ASEAN Power Grid), as well as off grid. This forum is convened to plan AEMI's work in this topic area for the coming two years, in particular to agree on an analytical approach and division of labor among its participants from ASEAN research institutions. A follow-up forum in this topic area will be convened in 2016 or 2017 to finalize the results of the work.

2. More specifically, the research to be undertaken will be designed to address the following objectives:

   (a) To provide policy recommendations for the new APAEC (2016-2020)
   (b) To evaluate how AEMI can enhance electricity access ASEAN with special reference to off grid connection.
   (c) To assess how off-grid and mini-grid can be promoted to complement the APG mechanism with special reference Indonesia and Philippines.
   (d) To highlight the potential role of ASEAN's energy poor island communities as a launch market for renewable energy and an opportunity for ASEAN to take a lead role in a global context.
   (e) To assess the climate aspect of rural electrification, in particular whether remote energy poor communities can leapfrog directly from no electricity to local supplies of renewable energy.
   (f) To assess the status of households and community welfare before and after gaining access on electricity by conducting a fieldwork study in selected villages (covering on grid, off grid, and mini grid).
   (g) To assess the sustainability of electricity access, including technology selection, maintenance and operation, standardization and coordination, utilization of capacity, ecology, investment and pricing.

B. ASEAN Energy Poverty and Rationale for Small-scale Renewables

3. In 2012, 140 million people in ASEAN (equivalent to 22.6% of the region's total population) do not have access to electricity. Surprisingly, this number has risen from about 127.4 million in 2010. This indicates that ASEAN as a whole has not progressed towards meeting the Sustainable Energy for All (SEA4ll) objectives. This initiative was launched by the UN General Assembly in September 2011. As seen from Table 1, the ratios of access to electricity in rural areas lags far behind the urban areas in Cambodia, Indonesia, Laos, Myanmar, Philippines and Vietnam.
4. According to the International Energy Agency (IEA), energy poverty is defined as lack of access to modern energy services, i.e. access to electricity and clean cooking facilities. Similarly, Reddy and Reddy (1994) as cited in Masud et al. (2007:47), define energy poverty as "the absence of sufficient choice in assessing adequate, affordable, reliable, high-quality, safe and environmentally benign energy services to support economic and human development". Thus without serious effort by the ASEAN member countries to combat energy poverty, it will be difficult for ASEAN to achieve "RICH" status by 2030.[3]

Table 1. Electricity Access 2012

Country	Population without electricity, millions	National Electrification rate (%)	Urban electrification rate (%)	Rural electrification rate (%)
Brunei Darussalam	0	100	100	99
Cambodia	10	34	97	18
Indonesia	60	76	92	59
Laos	1	78	93	70
Malaysia	0	100	100	100
Myanmar	36	32	60	18
Philippines	29	70	89	52
Singapore	0	100	100	100
Thailand	1	99	100	99
Vietnam	4	96	100	94

Source: IEA, World Energy Outlook 2014

5. On the other hand, a UNDP (2005) study shows that providing access to modern energy can enhance countries' attainment of the Millennium Development Goals (MDGs). Kanagawa and Nakata (2008) show that energy has close relationship with poverty indicators such as health, education, income and environment. By using the rural level data in Bangladesh, Barnes et al. (2010) found that the use of electricity significantly improves household incomes. Similar,

3 RICH = Resilient, inclusive, competitive and harmonious. ADB (2014:xxiv) states that "*resilience* refers to the capacity to handle volatilities and shocks from within or outside the region, reducing the likelihood of economic crises; *inclusiveness* refer to the need for ASEAN to achieve equitable economic development, providing opportunities through cooperation strategies that reduce income gaps within and across countries, and promoting citizen welfare; *competitiveness* requires a business environment where successful firms operate in efficient markets under effective national and regional regulation; and *harmony* stems from environmentally sustainable development and growth, with proper consideration of the need to mitigate and adopt to climate change".

positive association was found by Kooijman – van Dijk and Clancy (2010) using rural level data in three countries, Bolivia, Tanzania and Viet Nam. They found that electricity access in rural areas directly provided both non-financial benefits and financial benefits to rural household such as improving quality of goods and services. Electricity access also reduces travel time and waiting time. Then, electricity access enables household to use mobile phone and electric machines for sewing and working wood (Kooijman – van Dijk and Clancy, 2010).

6. Studies have also shown that there is a connection between electricity access and welfare (Munasinghe 1988; Reiche, Covarrubias & Martinot 2000; Peng & Pan 2006; Al Mohtad 2006; Kanagawa & Nakata 2008). Reiche, Covarrubias & Martinot (2000) investigated the social impact of a rural electrification program on increasing standard of living, reducing traditional energy consumption such as fire wood, leading to better health and environmental conditions, increasing job opportunities, and enhancing business productivity. Kanagawa and Nakata (2008) studied electricity access in poor India region and showed that electricity access had a direct and indirect impact on poverty indicators such as health, education, income and the environment.

7. There are three ways to improve the electrification ratio (IEA, 2011): (i) grid extension, (ii) mini grid,[4] and (iii) off-grid. In cities or in regions with high population density, grid extension can draw on existing infrastructure to provide the lowest cost option. Mini grid can be low voltage and it can be fed by small power generator. Cooperative and local business entities can manage it (IEA, 2011). Finally, the off-grid electricity can be promoted in remote areas where settlements are scattered and it is impossible to develop a grid extension or mini grid (IEA, 2011). At the ASEAN level, ASEAN Power Grid is one of the mechanisms for alleviating energy poverty, but it may have many limitations. Table 1 shows, energy poverty is concentrated in rural areas where grid extension has less of an advantage. Because most energy-poor households are located in rural and remote areas, promoting small-scale renewables can be an effective way to increase the electrification ratio. As seen from Table 2, different types of small-scale renewable energy have different comparative advantages in supporting daily life and economic activities. It is therefore also important to consider carefully exactly which type of renewable energy source to install when trying to use renewable energy to alleviate rural energy poverty.

[4] With range of capacity between 10 – 1,000 kilo watt (IRENA, 2012)

Table 2: Application of Renewable Energy for Supporting Economic Activities

Type of technology	Lighting/ Refrigerator	Communication	Cooking	Heater/ Cooler	Micro industry	Water pump
Solar Home System (SHS)	√	√			√	
Pico Solar Photovoltaic (SPV)	√	√				
Solar thermal				√		
Solar cookers			√			
Solar crop dryers				√		
SPV Pumps						√
Small hydro	√	√				
Small wind		√			√	√
Mechanical wind pumps						√
Household-scale biogas digester	√	√	√	√		
Biomass gasifier	√	√			√	√
Improved cookstove (ICS)			√			

Source: IRENA (2012)

C. Methodology

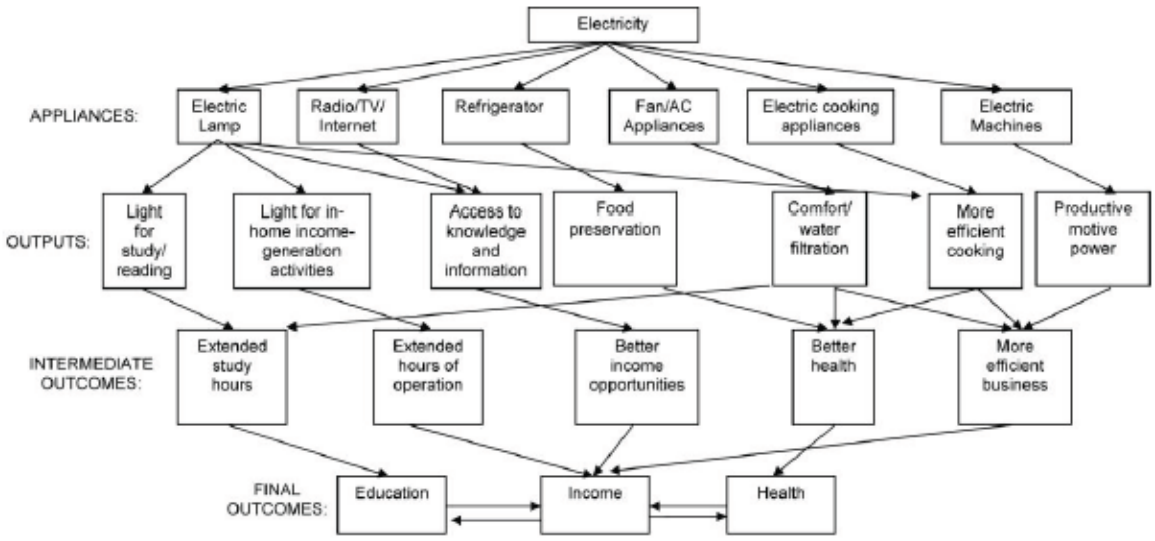
C.1 Country Focus

8. Five of the ASEAN countries have large numbers of people without electricity access: Indonesia, Myanmar, Philippines, Laos, and Cambodia. In addition, we also include Vietnam in the study for two major reasons. First, there will be the APG new interconnection project in 2017 between Vietnam and Cambodia. Thus, Indonesia and Malaysia will be the beneficiaries of APG from the eastern part of APG while Vietnam and Cambodia represent the northern part of APG. Second, Vietnam represents a success story, because in spite of a lower GDP per capita than Indonesia and the Philippines, the ratio of electrification in rural areas is approaching 100%. Thus, it is necessary to understand this achievement.

C.2 Framework

9. There are three elements of assessment that we are going to conduct: (i) understanding the characteristics of energy poor households; (ii) understanding and evaluating the selection criteria that government sets in providing electricity access (on grid, mini grid and off grid); and (iii) assessing the impact of electricity access both quantitatively and qualitatively. However, Khandker et al (2013) argued that it is difficult to measure the direction and magnitude of outcomes in relation to the specific electrification programs introduced, due to the complex relationship between electricity equipment, output and intermediate outcomes. As seen from Figure 1, gaining access to electricity has lead households to buy electric equipment such as lamps, radios, television sets, refrigerators, rice cookers and small scale electric machines. They produce different outputs such as for lighting, information, more efficient cooking, and food preservation. Intermediate outcomes from those outputs such as extended study hours, extended hours of operation, better income opportunity, better hygiene, better health, better information and communication and more efficient business. Thus the final outcomes will be improvement in education, income and health.

Figure 1: Transmission of Electricity Benefits to Welfare



Source: Khandker, Barnes & Samad 2013, pp. 668

C.3 Sample selection

10. The main objective of the survey is to collect data at the household level, then we plan to assess the impact of electricity access (focus on small-scale grids) on social welfare.[5] The unit of analysis is households in remote areas that gain access to electricity from renewable energy during the project period and households who will be beneficiaries or potential beneficiaries of the off grid connection. We prepared three strategies for data collection. In strategy A, the control group is households that do not have electricity access, while the treatment group is

[5] Please refer to appendix 3 for detail information regarding information and questionary that we are going to collect.

consists of nearby households that will have access to electricity the following year. We collect a random sample of about 50 households from each village for each period.

Strategy A

Group	**Time t**	**Time t + 1**
Control	Do not have electricity	Do not have electricity
Treatment	Do not have electricity	Have electricity

Note: we survey the same households in time t + 1

11. In strategy B, we are not sure whether the treatment group will obtain electricity in time t + 1 or not, thus, we obtain households that have electricity and do not have electricity in time t. From a technical point of view, strategy A is more reliable than strategy B, because we compare the same household at time t and t + 1. However, if at time t + 1, the treatment group fails to obtain electricity, as in strategy B, there will be little point in the study. We can combine strategy A and B into strategy C. It seems that strategy C will provide low risk in terms of the success of the impact assessment, but it is necessary to expand the sample size.

Strategy B

	Time t	Time t + 1
Group M	Have electricity	Have electricity
Group N	Do not have electricity	Do not have electricity

Strategy C

	Time t	Time t + 1
Group X	Have electricity	Have electricity
Group Y	Do not have electricity	Have electricity
Group Z	Do not have electricity	Do not have electricity

12. Before conducting fieldwork, it is necessary to obtain information from the national electricity authority about villages that have access to electricity and do not have access on electricity. It would be good if we can select locations where the two groups (have and do not have electricity) are neighbor and they are far away from the APG network. Then, we also need to obtain information regarding the main source of electricity supply. It is good if we can cover a variety of renewable energy sources such as hydro power, solar panel and biomass.

C.4 Method of Analysis

C.4.1 Qualitative analysis

13. We will divide the qualitative analysis into two elements. First, we will assess the impact of electricity access on education, health, social activity, environment, economic activity and gender dimension. Then, we also assess the sustainability of existing small-scale renewables in terms of: (i) technology selection; (ii) maintenance and operation; (iii) standardization and coordination; (iv) use of capacity; (v) environment/ecology; (vi) investment; (and) (vii) pricing. The information will be obtained from household, community, and local government level. (Please refer to Appendix 2 for detailed information).

C.4.2 Quantitative analysis

A. Statistical analysis

14. We can apply descriptive statistics and parametric (or non-parametric) test to investigate the differences in selected indicators (expenditure, health, and education) between the two groups (with and without) or among groups with difference type of electricity access.

B. Econometric approach

15. We propose two economic approaches that can be applied to our data: (i) Seemingly unrelated regression (SUR); and (ii) the fixed effect model. Please refer to Appendix 3 for a detailed discussion. However, in the forum, we will discuss other methods that can be also applied.

D. Research outline[6]

16. The proposed research outline is divided into two phase based on the fieldwork activity. After conducting the first fieldwork the report outline is agreed as follows:

1. Understanding the national interest in promoting renewable energy
    a. Why small scale renewable energy important
    b. How small scale renewable energy can reduce poverty
2. Brief overview on small scale renewable energy
    a. Current situation
    b. Prospect and trend
    c. Target
    d. Financial and investment
3. Methodology
    a. Location description
    b. Sampling technique (*we agree on the convenience sampling technique; we agree the minimum sampling is about 100 households; we agree to choose strategy A for sample selection*)
4. Empirical analysis – First Fieldwork
    a. Descriptive Statistics (*base on questioner*)

[6] The research outline may slightly change, especially on the sustainability assessment.

b. Qualitative assessment (*the analysis need to elaborate the interview question that is provided on appendix 2*)
   i. Local-Provincial-Central Government
   ii. State Own Electricity Company (SOEC)
   iii. Village
   iv. Private Sector

After conducting the second fieldwork, all collaborators agreed to outline the report as follows:

5. Empirical analysis – Second Fieldwork
   a. Descriptive Statistics (*comparing changes between first and second fieldwork*)
   b. Qualitative assessment (*comparing changes between first and second fieldwork*)
      i. Local-Provincial-Central Government
      ii. State Own Electricity Company (SOEC)
      iii. Village
      iv. Private Sector
   c. Sustainability assessment (*country level analysis*)
      i. technology selection
      ii. maintenance and operation
      iii. standardization and coordination
      iv. ecology/environmental assessment
      v. investment and pricing policy
6. Econometric assessment – Impact assessment[7]
   a. Building model (difference in difference)
   b. Model Diagnostic
   c. Empirical results
   d. Conclusion
7. Sustainability assessment for 6 countries studies[8]
8. Policy Implications and Recommendation for the ASEAN (*addressing key issues including*)[9]
   a. Implication for the new APAEC (2016-2020)
   b. The role of AEMI in developing off grid connection.
   c. Promoting complementarities between APG and off grid
   d. ASEAN as a role model of off-grid in a global context.
   e. Promoting the welfare impact from electricity access
   f. Ensuring sustainability of electricity access

[7] Impact assessment will be conducted by Maxensius Tri Sambodo
[8] This analysis will be prepared by Indra Øverland
[9] This section will prepared by Indra Øverland

E. Tentative time frame 2015 – 2017

Date	Keyword	Activity	Person in charge
June 2015	AEMI Forum I	Discussing research design and expert meeting. Agreement on content and methodology of study	Maxensius Tri Sambodo
9 June 2015	Questionnaire	Distribute revised version to collaborators for final round of discussion over email.	Maxensius Tri Sambodo
30 June 2015	Questionnaire	Finish email discussion	Indra Overland
30 June 2015	Data collection	Identify locations for data gathering	Collaborators
31 July 2015	Guidelines for national level reviews	Distribute to collaborators	Indra Overland
25 August 2015	MoUs / contracts	Signing of MoUs / contracts between Chulalongkorn and collaborators	Indra Overland and Nawal Kamel
31 August 2015	Payment I	Payment of first tranche to collaborators	Nawal Kamel
31 August 2015	Country reviews	National level reviews of renewable energy situation	Collaborators
September - October 2015	Data collection I	Each country team conducts fieldwork to gather baseline data.	Collaborators
15 December 2015	Country report I	Submit baseline data with descriptive analysis and explanation of choice of location etc.	Collaborators
31 January 2016	Aggregate baseline report I	Synthesizing all country reports	Indra Overland
31 July 2016	Payment II	Second tranche to collaborators	Nawal Kamel
March 2016	Questionnaire	Formulate new questions on sustainability of renewable energy (management, financing, repairs)	Indra Overland
31 August 2016	Data collection II	Each country team conducts fieldwork to gather post-treatment data.	Collaborators
September 2016	Country report II	Post-treatment data and analysis	Collaborators
November 2016	Draft aggregate report II	Synthesizing all country reports and adding analysis	Maxensius Tri Sambodo and Indra Overland
November 2016	AEMI Forum II	Study results and policy recommendations	Indra Overland

15 December 2016	Final Report	Report preparation	Indra Overland and Maxensius Tri Sambodo
25 December 2016	Payment III	Last tranche to collaborators	Nawal Kamel
January 2017	Op-eds	Publish op-eds in newspapers in ASEAN countries	Indra Overland
June 2017	Academic articles	Submit 2 articles to peer reviewed journals	Indra Overland and Maxensius Tri Sambodo

Note: Please refer to Participants – Collaborators; * intellectual property right belong to author/authors

APPENDIX 1

ASEAN PERSPECTIVES

During the forum discussion, the collaborator from each country needs to provide basic information regarding the rural electrification program as in the example in Box 1.

Box 1
Rural electrification in Vietnam

(1) National target: Achieve over 99% electrification by 2020 (given in Prime Minister Decision No 2081 QD/TTg on Rural, Mountainous and Island Electrification Program for the Period 2013-2020 (8 November 2013). Specific objectives are:

   a. Supply electricity to 57 communes that are currently without electricity

   b. Supply electricity to 12 thousand hamlets of these 57 communes

   c. Number of households that will be supplied electricity is about 1,290 thousand in these 57 communes.

(2) Objectives of the first period (2013-2015).

   a. Supply electricity to about 140 thousand households in 2,500 hamlets of 40 communes

(3) Objectives in the second period (2016-2020)

   a. Supply electricity to about 1,126 thousand households in 9,640 hamlets of 17 communes

   b. About 21,300 households will be supplied electricity off-grid

(4) Investment: Total required investment: 28,809 billion dong (1.5 billion USD). Of which 27,328 billion dong for national grid extensions and updrade and 1,481 billion dong for off-grid (renewable energy)

(5) Key players are Ministry of Industry and Trade, Vietnam Electricity, provincial people's committee, donors such as WB, ADB, KfW, JICA

(6) Key barriers: financing, technology, etc and possible solutions for rural electrification: financial, technical, institutional, etc

(7) Roles of RE in rural electrification: small hydropower, solar PV, small wind, etc. There is a project supplying renewable electricity for communes located in remote areas in the following provinces: Tra Vinh, Soc Trang, Lai Chau and Dien Bien. ADB will provide loan of 1,775 billion dong to this project.

(8) According to the EVN's report (30 Sept 2014), There are only 42 communes having no electricity among 54 communes in early 2013. Of which EVN is responsible for 27 communes and Provincial People's Committees are responsible for 15 communes. More specifically EVN is responsible for 16 communes in Nghe An province and 11 communes in Lai Chau while Provincial People's Committees are responsible for 6 communes in Cao Bang; 4 in Dien Bien and 5 in Quang Nam.

APPENDIX 2

SURVEY[10]

In-depth interview

Local-Provincial-Central Government
Agenda for promoting electricity access
The role of renewable energy
Managing sustainability of electricity supply at small scale level
Budget in promoting electricity access
Organization and institutional setting in promoting off grid connection
State Own Electricity Company (SOEC)
Programs on electrification ratio (APG, on grid, mini grid, and off grid)
Involvement of SOEC in promoting off grid connection
Village
Potential source of renewable energy
Challenging in promoting renewable energy
Managing sustainability of electricity access
Understanding economic and social impact on off grid to the community
Understanding the potential environmental and benefit
Understanding the potential impact on gender issue
Private Sector
Investment prospect renewable energy especially on off grid
Obstacles and expectation

[10] The in-depth questions may be changed after obtaining feedback from collaborators by the end of June 2015

Questionnaire - *At Household Level*[11]

Location		
1	Country	
2	Province	
3	District/City	
4	Sub-district	
5	Village	

Household			
1	Name	3	Age head of household
2	Number of family member (*including head of household*)	4	Gender

Employment Status for Head of Household
1. Number of working day in a week: ……day
2. Number of working hours in a week: …… hour
3. Number of working house in a week: (day time) ..... hours; and (night time) ..... hours
4. Main employment status...
5. Salary per month from main job....
6. Any side job..... and what is it?
7. Any family member working in foreign country? How many?

Housing
Type of roof
Type of wall
Type of floor
Total area of floor …… m^2
Source of lighting i. Kerosene ii. Diesel iii. Battery torch iv. Candle
Type of cooking energy i. Firewood ii. Kerosene iii. Gas (LPG) iv. Other….
Total expenditure for per month for:

[11] The questioner questions may be changed after obtaining feedback from collaborators by the end of June 2015

1. Electricity
2. Kerosene
3. Fire wood

Food and Non-Food Expenditure (in the last week)

Food expenditure

i. Rice
ii. Other carbohydrate
iii. Fish, prawn, etc.
iv. Meat
v. Milk
vi. Egg
vii. Peanut
viii. Vegetable
ix. Fruit
x. Cooking oil
xi. Beverages

Non-Food

1. Housing
2. Health
3. Education
4. Transportation
5. Cloths
6. Electronic

Social Protection Program

1. Cash transfer
2. Free access on health
3. Free access on education
4. Access on micro credit
5. Access to free food
6. Social works
7. Foreign worker (any family member)

Electricity Access

1. Has access on electricity? When?
2. Source of energy for off grid connection
3. Installation cost
4. Amount of monthly payment

If the answer on question no 1 is no, then

1. What are the reasons do not access on electricity?
2. What efforts have been done to obtain electricity?

Information on electronic equipment

What kind of electronic equipment do you have and how many? (Radios, Television, Mobile

phone, rice cooker, water heater, electric stove, water pump, etc.)

Gender Questions
1. How many female in the family? 2. What is the highest education level? 3. What is the lowest educational level? 4. Does she responsible to collect firewood? 5. How electricity access can make their life much easier?

Health information
1. Any health problems (focus on eyes and respiration), how long? 2. Does it affect economic activities, how **3.** Any effort to see doctor, how

Education (above 5 years old)
1. The highest education level in the family 2. Having access on information (newspaper, etc.) **3.** The average number of hours for studying (studying at night)

Questionnaire - *At Village Level*

Information At Community Level
1. Any school nearby, what level 2. Public health center, how far 3. Grid connection, how far 4. Traditional market, how far 5. Telecommunication network 6. Public transport **7.** The average price of crops

Note:

APPENDIX 3

ECONOMETRIC MODEL

A. Seemingly unrelated regression (SUR)

We developed an econometric model to assess quantitative impact of electricity access to people welfare. We can apply this strategy in the first both for Strategy B and Strategy C. We assume that increasing in welfare can be captured by increasing in household's expenditure both on food and non-food. We developed the model as follows:

$$Y_1 = x_1^{'}\beta_1 + U_1 \qquad 1)$$

$$Y_2 = x_2^{'}\beta_2 + U_2 \qquad 2)$$

Where Y_1 represents food expenditure and Y_2 represents non-food expenditure (we exclude energy spending from non-food expenditure). We have similar independent variables for the two equations namely: number of family member, number of working hours, total floor area, electricity access (1 for has access; 0 for no access), access to anti-poverty program such as rice, free health service, cash transfer, and other program. We defined electricity access both access through on-grid, off-grid, and mini grid. Because both food and non-food expenditure are connected, the error terms from the two equations are correlated. We can gain more efficient estimators by estimating the two equations jointly. Then we conducted seemingly unrelated regression (SUR).

B. The Fixed Effect Model

In the second year, we conducted the similar survey to the same households that we surveyed in the first year. We can apply this method for Strategy A, B and C. We can apply the Khandker et al (2013) model. We formulated the output on electricity access as follows:

$$Y_{ijt} = \beta^y X_{ijt} + \gamma^y V_{jt} + \delta_h^y E_{Hijt} + \delta_k^y E_{Kijt} + \delta_v^y E_{Vjt} + \chi^y T_t + \varepsilon_{ijt}^y \qquad 3)$$

where *t* indicates time index (0 for baseline-year 2015, and 1 for 2016/17); Y_{ijt} represent output (total real expenditure, we deflated the nominal value by consumer price index) for household *i* in village *j*; E_{Hijt} is electricity access – *on grid* (1 if household *i* in village *j* has electricity connection and 0 otherwise); E_{Kijt} is electricity access – off grid (1 if household *i* village *j* has electricity connection and 0 otherwise); E_{Vjt} is a status of electricity access in the village level *on grid* (1 if village *j* has connection on grid connection and 0 otherwise); X_{ijt} is the characteristic of household such as number of family member, access on rice for the poor, and floor area; V_{jt} is the village characteristics such as grid network, and T represents time period (2015 and 2016/17); $\beta^y, \gamma^y, \delta_h^y, \delta_k^y$ and δ_v^y are the parameter estimate from equation (1); and ε_{ijt}^y is a *non-systematic error*.

However, there is a problem when we directly estimate the equation (3). The variables E_{Hijt}, H_{Kijt}, E_{Vjt} and Y_{ijt} are simultaneously determined by a group of characteristics both observed and unobserved. For example, decision to have connection on electricity is not only affected by infrastructure condition especially the on grid (V_{jt}), but also by household characteristics (X_{ijt}). For example, poor households do not have capacity to pay connection fee. This is not only because of low of income level but also due to the number of family member. Thus, equation for on grid and off grid connection can be written as follows:

$$E_{Hijt} = \beta^e X_{ijt} + \gamma^e V_{jt} + \chi^e T_t + \varepsilon^e_{ijt} \quad (4)$$

$$E_{Kijt} = \vartheta^f X_{ijt} + \vartheta^f V_{jt} + \chi^f T_t + \varepsilon^f_{ijt} \quad (5)$$

Similarly, the equation at the village level can be presented as follows:

$$E_{vjt} = \gamma^v V_{jt} + \chi^v T_t + \varepsilon^v_{ijt} \quad (6)$$

Thus for the outcome equation, ε^y_{ijt} is represent the combination of three error terms components:

$$\varepsilon^y_{ijt} = \mu^y_j + \eta^y_{ij} + e^y_{ijt} \quad (7)$$

where μ^y_j and η^y_{ij} are represent the unobserved village condition and unobserved household characteristic, in addition e^y_{ijt} is a *non-systematic error* that are not correlated with the two error terms. Further, the error components on equation (4), (5) and (6) can be represented as follows:

$$\varepsilon^e_{ijt} = \mu^e_j + \eta^e_{ij} + e^e_{ijt} \quad (8)$$

$$\varepsilon^f_{ijt} = \mu^f_j + \eta^f_{ij} + e^f_{ijt} \quad (9)$$

$$\varepsilon^v_{jt} = \mu^v_j + e^v_{jt} \quad (10)$$

There is possibility of correlation among $\varepsilon^y_{ijt}, \varepsilon^e_{ijt}, \varepsilon^f_{ijt}$, and e^v_{jt} then the variables $E_{Hijt}, E_{Kijt}, E_{vjt}$ and Y_{ijt} can be correlated due to unobserved factors at village and household level. This can cause an endogeneity problem. This can be happened because *on grid* access can be found in villages that have good access on road and those village will obtain high priority to have electricity access compare to remote and undeveloped villages. Similarly, when a village obtains electricity access, more households have economic opportunity compare to villages without electricity or network connection. Families with better economic opportunity will have more capacity to pay connection and installation fee. The two problems can cause an endogeneity problem and it needs to be solved because it can cause bias on the parameter estimate.

Through the panel data analysis, the endogeneity problem can be solved with the assumption the trend from unobserved (*unobserved heterogeneity*) is fixed during the period of analysis both at household and village level. For one year period of estimation, this assumption may be hold. Thus,

the Fixed-Effect Model can eliminate the unobserved heterogeneity. Then the equation 3 can be rewrite as follows :

$$Y_{ij1} - Y_{ij1} = \beta^y (X_{ij1} - X_{ij0}) + \gamma^y (V_{j1} - V_{j0}) + \delta_h^y (E_{Hij1} - E_{Hij0})$$
$$+ \delta_k^y (E_{Kij1} - E_{Kij0}) + \delta_v^y (E_{Vj1} - E_{Vj0}) + \chi^y (T_1 - T_0) + (\varepsilon_{ij1}^y - \varepsilon_{ij0}^y)$$

or

$$\Delta Y_{ij} = \beta^y \Delta X_{ij} + \gamma^y \Delta V_j + \delta_h^y \Delta E_{Hij} + \delta_k^y \Delta E_{Kij} + \delta_v^y \Delta E_{Vj} + \chi^y \Delta T + \Delta \varepsilon_{ij}^y \qquad (11)$$

Equation (11) will bring unbiased estimates if the *time-invariant heterogeneity* assumption is fulfil. However, the *time-invariant heterogeneity*, assumption may fail for several reasons. For example, the unobserved factors that affect the outcome variable of household and villages may change. For example, the timing on grid connection or installation connection may differs across villages and household. Village in remote area may have some delay on connection due to longer preparation time in transporting the equipment. Further, some households will obtain first priority for electricity connection because they have more financial capacity or they may think that after they obtain electricity their business will grow. Thus, differences in time connection and characteristics of respondents and villages may affect the dynamic of electricity connection and projection of growth. Under the time-variant heterogeneity, condition, the error structure on equation (7) can be written as follows:

$$\varepsilon_{ijt}^y = \mu_{jt}^y + \eta_{ijt}^y + e_{ijt}^y \qquad (12)$$

Thus equation (11) can be rewritten as follows:

$$\Delta Y_{ij} = \beta^y \Delta X_{ij} + \gamma^y \Delta V_j + \delta_h^y \Delta E_{Hij} + \delta_k^y \Delta E_{Kij} + \delta_v^y \Delta E_{Vj} + \chi^y \Delta T + \Delta \mu_{ij}^y + \Delta \eta_{ij} + \Delta e_{ij}^y \quad (13)$$

where $\Delta \varepsilon_{ij}^y = \Delta \mu_{ij}^y + \Delta \eta_{ij}^y + \Delta e_{ij}^y$ will have correlation with electricity access. Under that situation, the OLS's estimate will be inconsistent. In order to measure the problem, researcher can think the correlation between unobserved heterogeneity and the initial conditions of household, village and its characteristics. The initial characteristic of village will affect the village in obtaining electricity access and those characteristics will give different responses for each household. Thus, equation 13 can be rewrite as follows:

$$\Delta Y_{ij} = \beta^y \Delta X_{ij} + \gamma^y \Delta V_j + \delta_h^y \Delta E_{Hij} + \delta_k^y \Delta E_{Kij} + \delta_v^y \Delta E_{Vj} + \alpha_h^y X_{ij0} + \alpha_v^y V_{j0} + \chi^y \Delta T + \Delta \varepsilon_{ij}^y \quad (14)$$

In conclusion equation (14) will give an unbiased estimate.

References

ADBI (2014). *ASEAN 2030 Towards a Borderless Economic Community*, ADBI, Tokyo

Al Mohtad, I. (2006). Remote Area Power Supply Systems (RAPSS). *Himalayan Small Hydropower Summit, October 12-13, 2006*.

Barnes, D.F., Khandher, S.R., dan Samad, H.A (2010). Energy Access, Efficiency, and Poverty: How Many Households Are Energy Poor in Bangladesh?, *Policy Research Working Paper*, The World Bank, Development Research Group, Agriculture and Rural Development Team, June 2010. [Accessed: http://elibrary.worldbank.org/doi/pdf/10.1596/1813-9450-5332, 3 December 2013]

IEA (International Energy Agency) (2011), "Energy for All: Financing Access for the Poor", *A Special early excerpt of the World Energy Outlook 2011*, IEA, Paris, pp. 52.

IRENA (International Renewable Energy Agency). (2012). Renewable Energy Jobs & Access. Abu Dhabi.

Kanagawa, M. & Nakata, T (2008). Assessment of access to electricity and the socio-economic impacts in rural areas of developing countries. Energy Policy, 36: 2016-2029.

Khandker, S.R., Barnes, D. F., & Samad, H. A. (2013). Welfare Impacts of Rural Electrification: A Panel Data Analysis from Vietnam. *Economic Development and Cultural Change*, Vol. 61, No. 3 (April), pp. 659-692

Kooijman-van Dijk, A. & J.S. Clancy (2010). Enabling Access to Sustainable Energy: A Synthesis of Research Findings in Bolivia, Tanzania and Vietnam*, Energy for Sustainable Development*, 14, pp.14-21.

Masud, J., D. Sharan and B. Lohani (2007). *Energy for all: Addressing the energy, environment, and poverty nexus in Asia*, Asian Development Bank, Manila.

Munasinghe, M., 1988, 'Rural Electrifiction: International Experience and Policy in Indonesia', Bulletin of Indonesia Economic Studies, vol. 24, no 2, pp. 87-105.

Peng, W. dan J. Pan. (2006). Rural Electrification in China: History and Institution. *China & World Economy*, *14* (1), 71-84.

Reiche, K., Covarrubias, A. dan E. Martinot. (2000). *Expanding Electricity Access to Remote Areas: Off-Grid Rural Electrification in Developing Countries*. World Power.

UNDP (2005). *Energizing the Millennium Development Goals: A Guide to Energy's Role in Reducing Poverty*. United Nations Development Programme, New York.

ASEAN ENERGY MARKET INTEGRATION (AEMI) FORUM:
ENERGY POVERTY AND SMALL SCALE RENEWABLE ENERGY
Jakarta, 3-4 June 2015

Forum held under Chatham House Rule

CONCLUSIONS

At the conclusion of the Forum, participants unanimously adopted these main conclusions as a result of their deliberations. Statement agreed unanimously at the conclusion of the AEMI Forum in Jakarta, June 4 2015

The Sumba Iconic Island Program

1. Participants agreed that the **lessons from the Sumba Iconic islands** are most relevant to developing renewable energy projects across ASEAN. They resolved to follow further developments of this project, conducted by the ADB and Hivos with Norwegian funding, and look forward to hearing more about it in the next AEMI Forum.

ASEAN Power Grid and Energy Poverty: Country Experience

2. Participants discussed the **challenges faced by the ASEAN power grid (APG)**. While there are several interconnections working on a bilateral basis, multinational connections remain a major challenge. The main obstacles in moving from a bilateral to a multilateral basis for the APG lies in establishing a multilateral governance mechanism that would allow ASEAN to harmonize taxes, regulations, and tariffs as well as provide an efficient dispute resolution mechanism across border.

Small-Scale Renewable Energy and Energy Access

3. In terms of **small-scale renewable energy** projects as a means to combatting energy poverty, participants emphasized:

   (a) the importance of securing **project sustainability**, through special attention to support at the community level, project ownership, appropriate training and full technology transfer;

   (b) the challenge of designing proper approaches to **economic viability** of small scale renewable energy sources, which could require connecting to the grid (where feasible), and involving the

private sector, without compromising the primary objectives of securing access to electricity on an affordable basis to poor households and micro enterprises;

(c) the necessity to further **develop the business case** for renewable energy sources, and their importance in meeting the increasing ASEAN energy demand on a sustainable basis;

(d) the damaging effects from the **multiplicity of financing sources** on the ground, with no cohesive standards and often competing in a predatory manner, thereby undermining their stated objectives of providing access to sustainable and affordable energy in remote areas.

Methodology for Assessing the Impact of Electricity Access

4. In terms of **survey methodology** to evaluate of the welfare impact from the introduction of renewable energy, participants recommended to:

(a) include **short-term indicators** likely to affect the welfare impact (education, income and health) in the longer term, as the study timeframe is far too short to capture these (e.g., children's study hours, the number of kids registered at school, health respiratory problems, hours spent on productive activities per household);

(b) develop indicators for **project sustainability,** in order to assess the lasting impact from the introduction of renewable energy (e.g., number of people trained to maintain generator, management at the local community level, economic viability perspectives, women participation rate, and technical training);

(c) develop the **environmental component,** as part of the impact analysis, either as a stand-alone, or as part of the sustainability analysis;

(d) introduce the **gender perspective** through specific questions geared towards activities typically conducted by women (e.g. use of cooking energy sources, women training and participation in governance);

(e) include questions related to **affordability** of renewable energy in the rural context (e.g., willingness to pay for clean renewable energy) as an important indicator of beneficiaries' preferences;

(f) assess the impact of access to renewable energy on **connectivity** of poor remote communities, and their inclusion into economic activities through access to timely information (e.g., internet use, mobile phone), a prime requirement for inclusive and sustainable growth.

Field Survey: Approach and Delivery

5. Participants highlighted the difficulty of formulating ASEAN policy recommendations based on the **field survey** in the six countries, and advised researchers to recognize this serious limitation upfront in the preface of their final report. The report can develop the next steps needed to further develop these surveys at the national level, to yield a more significant and sustained case study.

Research Outline: National and ASEAN Analyses

6. Participants suggested to include in the study **more work on energy poverty**, with a view to formulating policy recommendations based on best practice around the world to combat energy poverty and promote inclusive growth. Researchers would seek UNESCAP assistance to deliver this part. In this context, survey results would be used as illustration to support the recommendations in the context of ASEAN.

7. Participants concluded that the study should focus primarily on off-grid small scale renewable energy in remote areas. As such, **the research outline** should **exclude** analysis of the role of the ASEAN Power Grid (APG) in alleviating energy poverty (as previously proposed).

8. Participants proposed that the r**esearch outline** should:

   (a) develop an **AEC perspective** in addressing energy poverty, including across border connectivity; technology transfers and success in delivering sustainable development goals within the AEC;

   (b) include a **quantitative analysis** of the impact of each recommendation on electrification rates at the national levels and across ASEAN, as an element in the dialogue with ASEAN policy makers;

   (c) introduce a first part on energy poverty, and recognize that survey results will only be used on an **illustrative basis**, as a way to provide concrete examples in formulating an ASEAN strategy to address energy poverty in the context of AEMI;

   (d) focus the study and survey on **remote communities** not accessible through the APG;

   (e) identify **enabling factors** to address energy poverty, for national levels across ASEAN, as well as for the AEC level in the context of AEMI.

Division of labour, timeline and next steps

9. The next AEMI Forum on "Energy poverty and small-scale renewable energy" will take place in March-April 2016 in Jakarta, to examine survey results and policy recommendations for the ASEAN Plan of Action for Energy Cooperation (APAEC). Participants would include researchers, experts as well as policymakers.

LIST OF PARTICIPANTS

AEMI FORUM: ENERGY POVERTY AND SMALL SCALE RENEWABLE ENERGY

Jakarta, 3 – 4 June 2015

ASEAN ENERGY MARKET INTEGRATION (AEMI) FORUM
ENERGY POVERTY AND SMALL SCALE RENEWABLE ENERGY
AEMI FORUM, HOTEL ARYADUTA, JAKARTA, 3 - 4 JUNE 2015

LIST OF PARTICIPANTS

A. AEMI Advisory Committee

	Name	Affiliation
1	Dr. Nawal Kamel	Visiting Professor, Faculty of Economics, Chulalongkorn University (CU), Bangkok, Thailand; Coordinator of the AEMI Project
2	Dr. Indra Øverland	Senior Researcher, Head Energy Program, Norwegian Institute of International Affairs (NUPI) and Professor, University of Nordland, Bodø, Norway
3	Dr. Charit Tingsabadh	Assistant Professor and Director, Center for European Studies (CES), Executive Committee Member, Chula Global Network (CGN), Chulalongkorn University (CU), Thailand

B. Collaborators

	Name	Affiliation
4	Dr. Maxensius Tri Sambodo	Researcher, Indonesian Institute of Sciences, – Economic Research Center, Jakarta, Indonesia and Visiting Fellow, Institute of Southeast Asian Studies (ISEAS), Singapore
5	Dr. Nguyen Thi Mai Anh	Lecturer, School of Economics and Management, Hanoi University of Science and Technology, Vietnam
6	Mr. Kongchheng Poch	Visiting researcher, Economic Institute of Cambodia
7	Dr. Adoracion M. Navarro	Senior Research Fellow, the Philippine Institute for Development Studies (PIDS), Philippines
8	Dr. Phanhpakit Onphanhdala	Director of Graduate Division, National University of Laos, Laos

9	Daw Thi Thi Han	Research and Outreach Officer, Center for Economic and Social Development (CESD), Myanmar Development Resource Institute (MDRI), Myanmar

C. Experts

	Name	Affiliation
10	Ms. Maura Lillis	Energy Analyst/Consultant at Asian Development Bank
11	Dr. Xiying Liu (Sophie)	Research Fellow from Energy Studies Institute (ESI), National University of Singapore (NUS), Singapore.
12	Ms. Sandra Winarsa	Project Manager Green Energy (Sumba) at Hivos Asia Hub, Jakarta
13	Mr. G. Lalchand	Fellow, Akademi Sains Malaysia (Academy of Sciences Malaysia), Malaysia
14	Dr. Hanna Yolanda	Senior Advisor for Renewable Energy Support Programme for ASEAN (ASEAN RESP), The *Deutsche Gesellschaft für Internationale Zusammenarbeit* (GIZ) - Indonesia
15	Dr. Hongpeng Liu	Chief, Energy Security and Water Resources Section United Nations Economic and Social Commission for Asia and the Pacific (ESCAP)
16	Prof. B.V.R. Chowdari	Executive Director, India Research Initiatives and Professor of Physics, the National University of Singapore (NUS)

D. Officials

	Name	Affiliation
17	Prof. Dr. Iskandar Zulkaernaen	Chairman of Indonesian Institute of Sciences
18	Prof. Dr. Aswatini	Deputy for Social Sciences and Humanities, Indonesian Institute of Sciences
19	Mr. Albert Munthe	Directorate General for Electricity, Ministry of Energy and Mineral Resources, Indonesia
20	Ms. Susy M. Simarangkir	Senior Advisor ASEAN-RESP, ASEAN Centre for Energy (ACE), Jakarta
21	Mr. Syaiful Bakhri Ibrahim	Head of ASEAN Power Utilities/Authorities (HAPUA)

		Secretary in Charge, Indonesia
22	Mr. Christian Groseth	First Secretary (ASEAN), Royal Norwegian Embassy in Jakarta
23	Mrs. Hilde Solbakken	Minister Counsellor and Deputy Head of Mission, Royal Norwegian Embassy in Jakarta
24	Mr. Eka Nurhidayat	Directorate General of Electricity, Ministry of Energy and Mineral Resources, Indonesia
25	Dr. Nizhar Marizi	Directorate of Energy Resources, Minerals, and Mining, Ministry of National Development Planning, Indonesia
26	Mr. Darwin Syamsulbahri	Director of Economic Research Center, Indonesian Institute of Sciences
27	Ms. Cecile Leroy	ASEAN-EU Programme Manager, the EU Delegation to ASEAN, The European External Action Office in Jakarta
28	Mr. Khamsing Bounyong	Deputy Director of Administration Division Institute of Renewable Energy Promotion, Ministry of Energy and Mines, Laos
29	Mr. Babang Sugandhi	Directorate of Energy Resources, Minerals, and Mining, Ministry of National Development Planning, Indonesia

E. Academics

	Name	**Affiliation**
30	Dr. Helmy A. Fuady	Researcher at Research Center for Regional Resources, Indonesian Institute of Sciences
31	Dr. Yoyon Ahmudiarto	Head of Center for Appropriate Technology, Indonesian Institute of Sciences
32	Mr. Faiz Husnayain	Researcher, Electric Power and Energy Studies University of Indonesia (EPES UI).
33	Professor Aris Ananta	Associate Fellow, Institute of Southeast Asian Studies (ISEAS), Singapore and Lecturer at University of Indonesia
34	Dr. Evi Nurvidya Arifin	Associate Fellow, Institute of Southeast Asian Studies (ISEAS), Singapore and Lecturer at University of Indonesia

F. LIPI's energy research team

	Name	Affiliation
35	Mrs. Putri Irma Yuniarti	Researcher at Economic Research Center, Indonesian Institute of Sciences
36	Mrs. Chitra Indah Yuliana	Researcher at Economic Research Center, Indonesian Institute of Sciences
37	Mrs. Erla Mychelisda	Researcher at Economic Research Center, Indonesian Institute of Sciences
38	Mr. Felix Wisnu Handoyo	Researcher at Economic Research Center, Indonesian Institute of Sciences
39	Mr. Rio Novandra	Researcher at Economic Research Center, Indonesian Institute of Sciences

G. Event Organizer

	Name	Affiliation
40	Mrs. Inne Dwi Astuti	Researcher at Economic Research Center, Indonesian Institute of Sciences
41	Mr. Bahtiar Rifai	Researcher at Economic Research Center, Indonesian Institute of Sciences
42	Ms. Atika Zahra	Researcher at Economic Research Center, Indonesian Institute of Sciences
43	Mr. Nur Firdaus	Researcher at Economic Research Center, Indonesian Institute of Sciences

BIOGRAPHICAL NOTES

AEMI FORUM: ENERGY POVERTY AND SMALL SCALE RENEWABLE ENERGY

Jakarta, 3 – 4 June 2015

ASEAN ENERGY MARKET INTEGRATION (AEMI) FORUM
ENERGY POVERTY AND SMALL SCALE RENEWABLE ENERGY
3 - 4 JUNE 2015, HOTEL ARYADUTA, JAKARTA

AEMI ADVISORY COMMITTEE

Dr. Charit Tingsabadh

Assistant Professor and Director, Centre for European Studies (CES),
Executive Committee Member, Chula Global Network (CGN),
Chulalongkorn University (CU), Thailand

B.A. Economics Cambridge University, M. Social Sciences in Birmingham University-UK and PhD Development Planning, UCL London University-UK Former Director of the Centre for Ecological Economics, he is interested in economics of the environment and in Social and Environmental Research including climate change, forestry development, and urban environmental management. As Director of CES, besides European studies and theoretical aspects of regional integration and how they may apply in other contexts e.g. the ASEAN region, he is now developing co-operations with Centres for EU Studies in Thailand and abroad through joint activities such as exchanges of information, research and scholarly exchanges.

Dr. Nawal Kamel

Visiting Professor, Faculty of Economics,
Chulalongkorn University (CU), Bangkok, Thailand

Nawal is a Visiting Professor at the Faculty of Economics, Chulalongkorn University, Bangkok. Until 2012, she was a Director at the World Bank, in Washington, D.C., a position she had held since 1994. During her career, Nawal has also served at the Deputy Ministerial level in the Department of Natural Resources, Canada, working closely with the Minister to advise on decisions regarding his portfolio of energy, mining, and forestry. She was the Canadian lead for a joint

Canada-US Task Force on electricity distribution in North America, co-chaired by the Ministers of Energy from both the US and Canada. The success of this Task Force earned her the 2005 Key Women in Energy-Global award from the Energy Marketers Association in the US. Nawal has also spent two years at the Oxford Institute for Energy Studies (UK), an academic organization dedicated to research in energy and to fostering a dialogue between energy producing and consuming countries, and private sector entities. Finally, as part of her contribution to her country of origin, Nawal was also the founding Executive Director of the Sawiris Foundation for Social Development, the first family Foundation dedicated to social development in Egypt. Nawal holds a Doctorate in Mathematics from the Sorbonne (Paris) and a Doctorate in Economics from Oxford (UK).

Dr. Indra Øverland

Senior Researcher, Head Energy Program, Norwegian Institute of International Affairs (NUPI) and Professor, University of Nordland, Bodø, Norway

Indra Overland is head of the Energy Program at the Norwegian Institute of International Affairs and Professor II at the University of Nordland. He did his PhD at the University of Cambridge and has since published extensively on energy issues. He was awarded the Toby Jackman Prize for best PhD dissertation, the Marcel Cadieux Prize for an article on Russia's Arctic energy policy in *The International Journal*, the Stuland Prize and co-authored the most cited article published by the Journal of Eurasian Studies. During his studies he specialized on South-East Asia, and he later worked as a long-term political observer in Cambodia and did research in Myanmar.

COLLABORATORS

Dr. Maxensius Tri Sambodo

Researcher, Economic Research Center – Indonesian Institute of Sciences (P2E LIPI) and Visiting Fellow Institute of Southeast Asian Studies (ISEAS), Singapore

Maxensius Tri Sambodo is a researcher at the Indonesian Institute of Sciences (LIPI) -Economic Research Center. Currently, he is a visiting fellow at the Institute of Southeast Asian Studies (ISEAS), Singapore. His research interests are on energy, environment, natural resources and economic development. He obtained a Ph.D. from the National Graduate Institute for Policy Studies (GRIPS). His latest publications appeared in: (1) *ASEAN Energy Market Integration (AEMI): from coordination to integration*, ASEAN Studies Center, Chulalongkorn University (2013); and (2) *Government and Communities: Sharing Indonesia's Common Goals*, IRSA Book Series on Regional Development, No. 12 (2014). His analysis also appeared in ISEAS Perspective such as '*LPG Price Adjustments in Indonesia: An Unfinished Reform*' (14 May 2014); and '*Analysing the Economic Platforms in the Indonesian Presidential Election*' (with Alexander R. Arifianto) (4 July 2014). Currently he is still finalising his book project under the title "From Darkness to Light: the State of the Electricity Sector in Indonesia" with ISEAS and an edited volume on Indonesian Regional Development, on the title "Electricity access and poverty incidence: Evidence from provincial and household data" will be published by the Springer.

Dr. Nguyen Thi Mai Anh

Lecturer, Hanoi university of Science and Technology, Vietnam

Dr. Nguyen Thi Mai Anh. Over 15 years of experiences in teaching and conducting research in energy and environment fields. Experts and analyst for many energy projects like Energy & International Development: Understanding Sustainable Energy Solutions in Developing Countries, promoting energy conservation in small and medium enterprises; promoting high efficiency of

public lighting; Rural Electrification & Renewable Energy, assessment of energy policy in Vietnam in terms of sustainable development. Expertise includes organizing large scale of surveys to identify needs of target groups (training, technology transfer needs etc.) and conducting market research in the energy fields. She currently is lecturer of Hanoi university of Science and Technology. She obtained PhD degree from Fribourg University in Switzerland.

Mr. Kongchheng POCH

Researcher, Economic Institute of Cambodia

Mr. Kongchheng POCH has far-reaching experience in research and analysis on Cambodia's socio-economic development and public policy issues. He has contributed significantly to the Cambodia Economic Watch (CEW), which is a core publication of the Economic Institute of Cambodia. He is specialized in economic and private sector development, international trade, and development monitoring and evaluation. As a professional researcher, he has extensively 1) conducted research and analysis on critical socio-economic and public policy issues (e.g. macroeconomic performance, energy development planning, water and sanitation access, etc.) facing the Cambodian economy, 2) provided expertise to development programme formulation on economic and development issues, and 3) managed knowledge building on economic and development issues in order to provide high-quality and evidence-based policy advices and technical inputs to the Cambodian government, non-governmental organizations, and development partners to make informed decisions and policies in order to achieve resilient, sustainable, equitable and inclusive growth. He holds a Master of Public Policy in Economic Development from the KDI School of Public Policy and Management, Seoul, South Korea.

Dr. Adoracion M. Navarro

Acting Vice President, Philippine Institute for Development Studies (PIDS)

Dr. Navarro is currently the Acting Vice President of the Philippine Institute for Development Studies (PIDS), a policy research institute. She is also rendering additional service to the government through the following posts: Chairperson of the Review, Evaluation and Dissemination Committee of the Philippine APEC Study Center Network; and Chairperson of the Task Force to Study Ways to Reduce the Price of Electricity. She holds a Ph.D. in Economics from the University of the Philippines-Diliman. She also obtained an MPA (Economic Policy Management) from Columbia University-New York. In 2013, DevEx (www.devex.com), an organization that helps make international development aid efficient, recognized her as among the *40 Under 40 Leaders in International Development* in Manila.

Dr. Phanhpakit Onphandala

Director of Graduate Division, Faculty of Economics and Business Management, National University of Laos (NUOL)

Dr. Phanhpakit Onphanhdala is a leading economist in Lao PDR. He currently works at Faculty of Economics and Business Management, National University of Laos as the director of Graduate Division. He obtained PhD in Economics from Kobe University, Japan in 2008. He was visiting scholar to many institutions such as Australia National University, Doshisha University and Institute of Developing Economies. He has joined many academic conferences worldwide, and published more than 30 articles. His expertise covers a wide range such as education and labor market analysis, agriculture and rural development, public finance and so on.

Draw Thi Thi Han

Research and Outreach Officer, Center for Economic and Social Development (CEDS), Myanmar Development Resource Institute (MDRI)

Daw Thi Thi Han has two degrees in computer sciences, and recently completed a public policy internship at Victoria University in New Zealand, and plans to complete a Master's degree at the same university. Daw Thi Thi Han is currently a researcher at the CESD, an independent think tank and research organization dedicated to economic and social transformation in Myanmar, with work focusing on the Extractive Industries Transparency Initiative (EITI), a global coalition of governments, companies, and civil society working to improve openness and accountable management of revenues from natural resources.

EXPERTS

Ir. Lalchand is an electrical engineering graduate from the Brighton College of Technology United Kingdom (1963). He served the main electricity supply utility in Malaysia, TNB, for a total of about 37 years in Distribution Management, Corporate Planning and Corporate Audit and was engaged after retirement to establish a "Loss Management Unit". He has been involved in activities related to policy development and promotion of Energy Efficiency, Renewable Energy, Green Technology, and Sustainable Development for buildings and materials, transport infrastructure and power supply. He was involved in the development of Malaysia's first successful RE (Biomass – EFB) power plant in Sabah. He is currently engaged as a Director at G&P Professional Sdn.Bhd and G&P M&E Sdn Bhd, a Fellow of the ASM, which he represents in various government fora on energy related issues and policy formulation activities, as well as in AEMI activities, and the Smart Villages initiative. He also appointed as an Adjunct Professor by UCSI at "Faculty of Engineering, Technology and Built Environment" (from 1 July 2013 to 30 June 2015). Ir. Lalchand has contributed articles on energy in the Institution of Engineers Malaysia's Bulletins and contributed comments on energy in Linkedin threads.

Maura Lillis is an energy consultant based in Jakarta, Indonesia. Since 2013 she has been supporting the Asian Development Bank (ADB)'s clean energy portfolio in Indonesia, including projects to develop renewable energy policy, pilot carbon capture and storage, and increase rural access to clean energy through the Sumba Iconic Island partnership. Prior to ADB, Ms. Lillis worked for the community development foundation Yayasan Dian Desa based in Yogyakarta, Indonesia as assistant staff to the Indonesian Alliance for Clean Cookstoves and Indonesia Gender and Energy Network.

Dr. Xiying Liu is a Research Fellow from Energy Studies Institute at National University of Singapore. She received her Doctor's degree in Energy Economics and Master's degree in International Finance from Xiamen University, P.R. China. Her work mainly focuses on energy economics and policy, electricity market reform, low carbon urbanization, renewable energy development. Currently, she is working on the solar PV development in Singapore, renewable energy based off-grid energy system, and ASEAN electricity market.

Sandra Winarsa is a Project Manager of Green Energy (Sumba) at HIVOS Southeast Asia Office based in Jakarta. Since 2012 she has been responsible in managing the multi-actors Sumba Iconic Island initiative which aims to provide the population of the medium sized of Sumba island with 100% renewable energy access, thereby demonstrating a replicable model for the country's islands and the broader Pacific region. Having very close partnership with Ministry of Energy and Mineral Resources, the initiative combines two agendas; renewable energy as a solution to address climate change as well as a means for poverty reduction. Prior to HIVOS, Ms Winarsa worked in several development sectors such as environment education, youth green entrepreneurship and climate change campaign with the British Council Indonesia.

Prof. B.V.R. Chowdari is the Executive Director of "India Research Initiatives" and Professor of Physics at the National University of Singapore (NUS). His research interests lies in energy storage applications including Lithium Ion Batteries. He has published 275 papers and trained 22 students for PhD degree. He is also the Chinese Academy of Sciences Visiting Professor. Prof. Chowdari was awarded "Officer in the Order of Academic Palms" title by French Government, "Business Event Ambassador" title by Government of Singapore, and "Outstanding Science Entrepreneur" award by NUS. He is the member of the "ICSU Regional Committee for Asia and the Pacific", Honorary Advisor to the Government of Andhra Pradesh, India, Vice-President of the Asia Pacific Academy of Materials, President of the Materials Research Society of Singapore, and former President of the International Union of Materials Research Societies.

Dr. Hongpeng Liu, Chief, Energy Security and Water Resources Section, United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). Mr. Liu's work covers from conducting analytical studies, organizing regional legislative meetings and policy dialogues to the implementation of initiatives and programmes in the Asia-Pacific region on energy for sustainable development. He is currently leading the energy team in ESCAP to promote regional cooperation on sustainable use of energy in particular the Plan of Action on regional cooperation for enhanced energy security and the sustainable use of energy, including the Asian Energy Highway initiative for regional economic integration through energy connectivity.

Dr. Hanna Yolanda got her Bachelor of Engineering from University of Indonesia in 1990. After gaining four years working experience in a professional association and two UNDP/ UN Habitat projects she was granted a British Chevening scholarship for a master degree on development study in University College London in 1994-1995. Afterwards, she joined a state owned bank in Indonesia and contributed to several divisions such as risk management; SMEs; Institutional Funding; and CSR. Her roles were an advisor for sustainability practices and climate change issues for the Board of Directors; a liaison person of the bank to the UNEP Finance Initiatives; as well as to the various multilateral/ bilateral development agencies and CSOs.

After approximately fourteen years in the banking sector, she was granted an Australian Leadership Awards for pursuing a PhD study on sustainable development in University New South Wales, Sydney – Australia in 2010-2014. After completed the PhD thesis on "Corporate Sustainability and

Responsibility of Banks in the transition to a low carbon economy: Cases in Australia and Indonesia", she joined the GIZ (German state-owned enterprise for international development cooperation) as a Senior Advisor of the ASEAN Renewable Energy Support Programme and based in ASEAN Center for Energy, Jakarta since January 2015 up until now.

OFFICIALS

Susy Marisi Simarangkir

Senior Advisor on Renewable Energy Support Programme (RESP), ASEAN Centre for Energy (ACE), Jakarta

Susy M. Simarangkir is the Senior Advisor of ASEAN Centre for Energy on Renewable Energy Support Programme. Her background education is in electrical engineering and sustainable energy system and management. Starting 2005 until 2013 she involved deeply in emission reduction projects in Indonesia, Malaysia and Thailand in the area of cement plant, fertilizer plant, chemical plant, geothermal, hydropower, methane capture from waste and provided advisory services in policy and plan on the emission reduction programme from energy efficiency and renewable energy activities. Now, she is working in planning, coordination and implementation of the Renewable Energy projects under cooperation with GIZ in region.

Mrs. Hilde Solbakken

Minister Counsellor and Deputy Head of Mission, Royal Norwegian Embassy in Jakarta

Prior to her posting in Jakarta, she has been posted to the Norwegian Embassies in Amman, Washington DC and Nairobi, as well as the Norwegian Permanent Delegation to the UN in New York. She has also worked in the Section for Peace and Reconciliation in the Ministry of Foreign Affairs in Oslo, and in the International Department at the Office of the Prime Minister of Norway.

Mrs Cecile Leroy

EU Attache for EU-ASEAN Development Cooperation, EU Delegation, Jakarta

Cecile Leroy earned her Master of Sciences degree from the University Of Economic Sciences Of Rennes II, France, focusing on development. As of September 2015, she will move to Hanoi, Viet Nam to work as EU Programme Officer for Energy, green growth, natural resources and climate change.

Mr. Syaiful Bakri Ibrahim

Head of ASEAN Power Utilities/Authorities (HAPUA)
Secretary in Charge, Indonesia

Syaiful B Ibrahim was graduated in Bachelor of Engineering Physics in 1977 from Institute Technology of Bandung and have post grade education on Energy Economics at UW Madison USA 1984. He has joint for 32 years carrier with PT PLN since 1977, with various task and responsibility, from Junior System Planning Engineer at Head Office, General Manager for Regional Services and Senior Staff at Head Office prior his retired in 2009. He was appointed as HAPUA Secretary in Charge since 2007, actively involve and support on various Study of ASEAN Power Grid Projects. After his second carrier, he was actively as Senior Energy Expert of study conduct by JICA, ADB and USAID in Indonesia. He is also Board of Director two private companies in developing two projects of Mini hydro Power Plant at West Sumatra.

Mr. Darwin Syamsulbahri

Director of Economic Research Center, Indonesian Institute of Sciences (P2E LIPI)

Mr. Darwin, M.Sc is the Director of Economic Research Center - Indonesian Institute of Sciences (P2E LIPI). He joined in 1983 as a junior researcher. He is a Board Advisor of Local Sciences and Technology (IPTEKDA) LIPI which support Small and Medium Enterprises (SMEs) in Indonesia. His researches really concern in SMEs in Indonesia. He finished his undergraduate degree in Economics Science from Andalas University, West Sumatra. His earned his master's degree in Economics from University of Illinois at Champaign Urbana, USA.

Mr. Christian Groseth

First Secretary (ASEAN), Royal Norwegian Embassy in Jakarta

Christian Groseth is First Secretary at the Embassy of Norway, Jakarta. He is a Senior Adviser at the Legal Department, Norwegian Ministry of Foreign Affairs prior to the posting to Jakarta. He was graduated Master of Law from the universities of Oslo, Norway and Auckland, New Zealand.

ACADEMICS

Dr. Helmy A. Fuady

Researcher, Research Center for Regional Resources - Indonesian Institute of Sciences (PSDR LIPI)

Ahmad Helmy Fuady is a researcher at the Research Center for Regional Resources, Indonesian Institute of Sciences (P2SDR-LIPI). He was trained in economics and development at the Gadjah Mada University, Yogyakarta and the Australian National University, Canberra, from where he got his bachelor and master degree respectively. In 2012, he obtained his doctorate degree from the Universiteit van Amsterdam, with a dissertation entitled *Elites and Economic Policies in Indonesia and Nigeria, 1966-1998*. He has worked on wide range of development issues, such as on poverty alleviation, regionalism, international trade and foreign investment. In the last three years his works are mainly on renewable energy and rural electricity provision. He can be contacted at elhelmy@yahoo.com.

Professor Aris Ananta

Associate Fellow, Institute of Southeast Asian Studies (ISEAS), Singapore and Lecturer at University of Indonesia

He is an economist-demographer, with an inter-disciplinary approach. His research interests include sustainable and just development and interaction among energy, food, water, and air; health care financing; ethnicity, religion, and language; and migration and ageing. Currently, he is Professor of Economics at the University of Indonesia, Indonesia. He obtained his Ph.D in economics from Duke University, the US and Master in Social Statistics from George Washington University, the US. His publications include Aris Ananta and Myo Thant "A New Triple-Win Option for the Environment of the Poor". In *The Environment of the Poor in East Asia, Southeast Asia, and the Pacific.* Edited by Aris Ananta, Armin Bauer, and Myo Thant. Singapore: Institute of Southeast Asian Studies and Asian Development Bank, 2013.

Dr. Evi Nurvidya Arifin

Associate Fellow, Institute of Southeast Asian Studies (ISEAS), Singapore and Lecturer at University of Indonesia

Evi Nurvidya Arifin is a researcher at the Centre for Ageing Studies, University of Indonesia, previously is a visiting research fellow at the Institute of Southeast Asian Studies (ISEAS) and also a post-doctoral fellow at the Asian MetaCentre for Population and Sustainable Development Analysis, c/o Asia Research Institute, National University of Singapore. She is a social statistician. In 2014, she was a consultant for the UNFPA on the Population Dynamics and Sustainable Development to prepare a readiness of Indonesia in facing the post-2015 Development Agenda.

Mr. Faiz Husnayain

Researcher, Electric Power and Energy Studies University of Indonesia (EPES UI)

Faiz Husnayain received the bachelor of sccience from University of Indonesia in 2010 and Master of Science in electrical engineering from the National Taiwan University of Science and Technology in 2013. Currently, he is a lecturer and researcher at the Electric Power and Energy Studies (EPES) in Electrical Engineering Department, University of Indonesia. His research interests include power quality and harmonics phenomenon, national energy evaluation, energy storage hardware for future vehicle, management energy and charging station for electric vehicle, and biomass for power generation.

Nizhar Marizi, Ph.D

Planner, Ministry of National Development Planning
(BAPPENAS), Jakarta

Nizhar Marizi is a planner at the Ministry of National Development Planning/Bappenas. He joined the institution as staff at the Directorate for Environmental Affairs in 2003 and currently serves as Deputy Director for Energy Resources and Institutional Affairs at Directorate for Energy Resources, Mineral and Mining. Marizi received his B.E. in Urban and Regional Planning from Bandung Institute of Technology, his M.Sc. in Environmental Planning from the University of Indonesia, and his Ph.D. in Development Policy from the University of Kitakyushu, Japan.

Marizi's works and interests are much more related to the environment and energy issues including green growth, renewable energy, and climate change. When he is not trying to meet his work's deadlines, he spends time enjoying his philatelic collection, running, and relaxing with his family. Marizi, who was born in 1979 in Tanjungkarang, currently resides in Bekasi with his wife and two sons. He can be contacted at ijimarizi@bappenas.go.id.