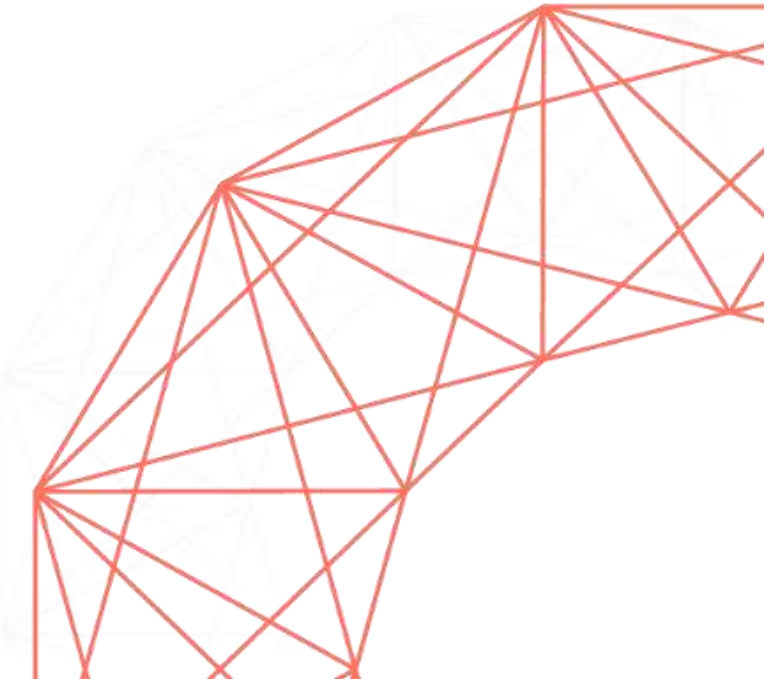
SECOE
SUSTAINABLE ENERGY CENTER OF EXCELLENCE

"CONNECTING POLICY, TECHNOLOGY & FINANCE THROUGH KNOWLEDGE"

Making off-grid rural electrification work

5-9 December 2016

Singapore



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SUMMARY OF THE PRESENTATIONS & DISCUSSIONS

DAY 1: MARKET & INDUSTRY OVERVIEW, POLICIES, REGULATIONS

The first day began with an introduction to the training organizers and briefings on the current state of the energy access industry and that challenges and opportunities it has. Speakers from high-level energy access advocates, country-specific information, and case studies provided a foundation from which to build the discussions throughout the training.

Welcome Remarks

Edwin Khew, Chairman SEAS:

Each country is at different level, so sharing with each other can learn from each other. Only when appropriate policies are implemented and regulatory frameworks in place, can you expect foreign and local investments.

Bouadokpheng Chansavat, ADB Country Office, Tajikistan:

Generally, limited capacity to pay and low electricity consumption leads to high operating costs but small returns. This is a widely faced challenge that must be addressed to attract the investment needed to achieve universal electrification.

Marcus Wiemann, ARE

Currently celebrating its 10 year anniversary, ARE has a long history of work in Africa but are moving into working more in Asia. ARE serves to close the gap between the private and public sector in order to facilitate the pairing of appropriate technology and business models with the necessary funding. We need to create level playing field between different energy sectors and utilities to promote regional cooperation.

Antoine Vander Elst, EU Delegation to Vietnam

The EU Commision has limited experience in energy access work but are looking to become more involved in the sector. It has historically worked more in Africa, but now are expanding to Asia-Pacific. Generally people have believed that grid extension is the best way to reach rural populations, but we should explore other options (off-grid).



Introduction to SEAS (Kavita Gandhi, SEAS):

SEAS, a clean tech accelerator, mission is to be voice of sustainability industry and brings together over 200 corporate members across sectors. The two most represented sectors are Solar PV & Energy Efficiency. They aim to serve as a thought leader by using their technical and market expertise to support the industry and test-bed new technologies. SECOE, founded one year ago, trains policy makers in energy efficiency, renewable energy, and energy access.

Introduction to Workshop Objectives (Katarina UH, EU SE4All TAF):

There are currently 420 million people in Asia pacific without electricity, 85% of which live in rural areas. This makes it hard to reach with on-grid work , so the energy access sector has turned to decentralized technology as a potential solution. For this training, we brought in-field and project developer leaders to come share their acquired knowledge.

Introduction to Rural Electrification (Marcus Weimann, ARE)

In the sector, we need to form a more concrete understanding of what "access" to energy means and how that relates to the beneficiaries. To do this, deeper communication and involvement at the community-level is critical in designing practical business models. Some trends in the industry, such as PURE, are utilizing this need but further partnerships and holistic program design needs to take place with all stakeholders.


Participants Presentations:

Bangladesh:	With an impressive history in rural electrification, Bangladesh has made great strides with their solar home system program, installing 4.5 million to date. While the industry grows

	and renewable energy jobs are being created, Bangladesh is still challenged by high O&M costs and dependency upon grants that is unreliable. With their well-developed industry and constructive national policy, they have the potential to create a more sustainable local market for renewables that will aid in the long term management and proliferation of energy infrastructure.
Cambodia:	Cambodia's large rural population presents challenges for the creation of reliable distribution networks that can provide proper O&M and quality-assured product. The REF of the EDC has done programs with SHSs but find that the lack of local technically capacity and inability to provide the necessary servicing to the highly-distributed populations, to degrade the sustainability of their work. The opaque regulatory environment also prevents private investment in off-grid projects, only furthering the challenge of providing sustainable products and services without sufficient funding. A better policy and regulatory framework is needed to attract investors and support the local private sector.
Indonesia:	Despite a dispersed population, Indonesia has a high electrification rate; however, it access is greater in the western part of the country than in the eastern. With high demand in rural areas and government financial support, Indonesia has the potential to provide energy to the remaining 10% of the population. Intention is set but they still need to assess what is the appropriate technology and business model.
Nepal:	Large majority of energy consumption in Nepal goes to the residential sector, showing the high demand across the country. However, the size of the local market and challenging terrain makes getting projects of the ground a challenge, despite significant funding from the EU and SNV. Funds and efforts are dedicated to capacity building work, but high turnover rate in the work force makes the skills impermanent
Philippines:	The dispersed population and turbulent weather present big challenges for electrifying the remaining 13% of the population of the Philippines; however, with the completing of a successful village electrification pilot, they are optimistic for the second phase. The current political climate, however, is creating significant uncertainty in the country.
Sri Lanka:	Sri Lanka's main island is almost completely electrified, but isolate island off the coast account for much of the 2% un-electrified population. Reaching the indigenous communities in these areas is challenging, but the potential for a trifecta of RE technology (solar, wind, hydro) and potential in biomass and tidal, opens opportunities. After completing a hybrid mini-grid pilot, they will scale if proof of concept is achieved.
Vietnam:	Close to full electrification, Vietnam is facing the challenge of rehabilitating old energy infrastructure and reaching the remaining 1%. Diverse funding sources and supportive regulations are promising as they pursue mini-grid technology, but they are still assessing their plans.

When we aim for "electrification" we need to think about what that means and how it relates to the sustainability of the project. O&M work is critical, but the high cost of RE projects makes it a lower priority. Many countries are facing the challenge of last-mile electrification and the sector needs to collaborate on planning how to reach them.

Project Development in Rural Electrification (Andy Shroeter, Sunlabob)

We need to focus on project sustainability by creating robust quality standards that are supported by the funding and political institutions connected to rural electrification work. Also, prioritizing O&M work and project that allow for productive energy use will increase impact and interest in off-grid projects, that have a high perceived risk. Governments need to make more transparent and clear policies that allow the private sector to mobilize and create a more reliable flow of investment (avoid corruption) so subsidies can reach the poorest of the poor.

Rural Electrification Policy & Regulatory framework (Katarina Uherova Hasbani, ARE)

For successful projects, we need to address the needs of the communities involved and ensure that the regulations and policies protect the customer and assure quality. PURE projects allow for greater certainty that the customers can pay, even low-income communities, and make projects more commercially viable if done with adequate political and public support.

National Solar Home System Programme Bangladesh (Abu Khan, Rahimafrooz)

Rahimafrooz, with the support of IDCOL, harnessed mobile technology as a method to manage payments for last mile service delivery. Through their SMART SHS, they can monitor the use and payments remotely and use a distribution network of agents to facilitate servicing and in-person requests. The systems are 50 Wp, cost USD$210, and are warrantied for 5 years, after which maintenance can be done for a fee. Aspirational product design and promotion encourages sales.

Role of Utilities I (Vincent Bouet, Micronesia)

Success mini-grid systems on remote islands in Micronesia that were outage free for 5 years. Because transportation cost to reach island and bring supplies is so high, prioritized quality over cost to lower risk of needing to return often. Yap community members, and island chiefs, were included in the planning process for project design and tariff policy.

Role of Utilities II (Chen Shiun, Malaysia)

As an effort to replace diesel generators, Sarawak used private sector as a contractor and supplier but designed the solution beforehand after assessment of the villages. Because the population is so dispersed and there is little existing infrastructure connecting them, Sarawak does smaller projects for the most remote, and try to provide utility grade power to easier to access areas. Sarawak owns all the systems.

Wrap Up

Currently, donor financing dominates off-grid industry which is not a long-term solution. Additionally, O&M planning and continuity is a challenge for many. New business models and technology will lower costs and make projects easier.

DAY 2: BUILDING BETTER OFF-GRID PROJECTS

The second day of the training focused on how we can improve upon the way we approach off-grid projects and provide examples and recommendations for future consideration. A strong focus was taken on better project design practices and ensuring sustainability.

Building Bankable Projects I (Upendra Bhatt, cKinetics)

In the design process, we must understand the needs of the communities and meet their aspirational desires. This means hands-on interaction with the sites and people in order to understand their needs and concerns. Pairing this with the needs and concerns of all stakeholders, site selection must be accompanied by ensuring access to local permits. Across projects, technical standards should be set to ensure quality and allow for potential integration in the future. This actions can bring your project closer to achieving the roughly 16 to 20 percent ROI that investors are looking for.

Building Bankable Projects II (Sagar Gubbi, Ecoforge)

The IEA has predicted that we need USD$49 billion annually to achieve universal energy access by 2030, a figure that cannot be met by just grant-based financing and the public sector. In order to attract private sector investment to acquire the necessary funding, sufficient load sizes and risk mitigation actions need to be taken. It takes roughly two years to reach the size of loads that invested are interested in, but two years is often beyond the time frame that investors are willing to wait. We need to investigate different business models to balance both those needs.

Productive Farm Loads as Anchor Loads (Vijay Bhaskar, Mlinda)

Productive loads can be used to increase load size and village purchasing power by providing the means to make additional revenue. With the consultation and of the user groups, properly identify and design productive loads can help to meet the minimum load size desired by investors while better insuring the customers ability to pay back. It usually takes 2-3 years to reach 70% load capacity, so investors with patience for longer-term projects are needed. With the inclusion of productive loads, user groups can serve as advocates, information sources, and peer-pressure influence to care for and contribute to the success of the mini-grid.

Biomass Based Power Generation (Ashok Chaudhuri, Ankur Scientific)

There are two main types of biomass based power generation, including gasification which is used for smaller systems (10kW – 2MW). It has many benefits such as being a highly automated technology with a quick start up time, and makes charcoal as co-product while meeting emission regulations. Currently, the policy around gasification technology is dynamic as no precedent is set.

Women in RE (Sudeshna Mukherjee & Tania Ghosh, MLinda)

MLinda is conducting a pilot project that aims to mobilize women to use productive loads. The motivation behind this gender-based work is the belief that women give earnings back to community, not just using growth for personal gain. In order for this to work, the value chain needs to be women-friendly so the women can drive entrepreneurship and higher socio-economic returns. MLinda finances by the systems with down payment from users and providing a loan with 10% IR. The inclusion of women is currently limited to design and use, and MLinda hopes to build the technical capacity to add O&M.

Solar-Diesel Hybrids (Timothy Walsh, Canopy Power)

Solar and diesel hybrid systems are a potential technology to provide 24/7 electricity more reliable, but require good charge controller to facilitate load and battery management. However, O&M costs can be higher because load needs to be carefully managed to optimize system which is a technically difficult process. Looking forward, DC mini grids may allow for easier integration between system, though further R&D is needed to asses its feasibility. Additionally, further investment in battery/energy storage research should help decrease price over time, similar to what we saw with the solar-panel industry.

SPORE (Antoine Ballereau, Engie)

Though off-grid energy projects provide temporary access, they aren't full solutions. Because grid-connectivity is viewed as "real" power, off-grid is seen as sub-par as does not meet the aspirational needs of the communities in need. Looking at grid-similar technology, smart meters can improve load management and system optimization. The continued development of new technology and business models is promising, but the industry must pursue O&M training more aggressively.

Importance of Reform & Investment (Chansavat, Tajikistan ADB)

In Tajikistan, there is a large installed capacity, but lots of aged infrastructure. The high cost of rehabilitating the defunct infrastructure has largely been ADB funded. They are currently working on new tariff policy and legal framework in order to attract IPPs and plan to eliminate subsidies over time. When performing the rehabilitation work, they must consider the possible have high technical losses in the system and how to fix them, while ensuring that any new building design must be cohesive with energy infrastructure – a challenge caused by the clash of old infrastructure and new development.

Wrap-Up

In order to attract the private sector, regulatory certainty and other risk mitigation work needs to occur at a government level. Additionally, tariff policy must be cost-reflective. This, amongst other challenges, makes commercial financing roughly 2-3 years away. However, current work in new business models, such as the use of productive loads help to ensure that customers will pay back, and technology like hybrid mini-grids for secure 24/7 electricity demonstrate the continued growth of the industry.

DAY 3: FINANCE

The third day focused on how to facilitate the financing necessary for rural electrification work, which can have prohibitively high upfront costs. Challenges in attracting private investment and structure public-private partnerships were discussed and potential options were presented by relevant experts.


Financing Rural Electrification and De-risking (Balaji M K, PFAN)

PFAN works to bridge the public and private sectors by providing assistance and assessment. They believe that some current factors that contribute to the perceived risk of electrification work are: Lack of technical experience, inconsistent policies, andpoor government organization. Private investors are looking for 20% IRR which can only be achieved through further maturing of the industry and increased commitment to evolving policies around PPAs and IPPs. Additionally, local education and awareness will increase adoption of RE and build local supply chain, for better stability.

Institutional Investor's Perspective (Fely V. Arriola, ADB)

For the poorest of the poor at the bottom of the pyramid, subsidies are necessary to provide access to energy. Alongside subsidies, PURE techniques can increase load demand and revenue streams, which will ease the requirement for subsidies over time. Innovation in the industry, such as payment technology that increases collection efficiency, are helping to fuel electrification efforts. When reviewing projects, ADB looks for scale (to help absorb high administrative costs), strong partnerships, abd replicable projects with reliable technology. For success in any project, you need to have local buy-in and training for sustainability and impact.

Institutional Investor's Perspective (Antoine VanDer Else, EU Commission)

Because the private sector is more sustainable than grant-funded, EU Commission blends financial instruments and bundles projects to achieve scale demanded by private investors. They follow a dynamic financing structure that depends on the current state of project, and re-evaluate it at certain milestones. In their work, they aim to encourage stronger technical and regulatory framework and regional cooperation. Their services depend on the need of proposal. They are currently planning second call for proposals, so countries should look for opportunities that the EU Commission can support.

Institutional Investor's Perspective (Thierry Lefevre, EU SE4ALL TAF)

The EU SE4All TAF provides experts that support development and deployment for energy access projects. They provide a wide range of services and length of appointments that depend upong the nature of the proposal. When considering proposals, priority to countries with energy focus. TAF follows a demand driven process, meaning that they wait for proposals to come to them and are not active in searching for opportunities. Therefore, countries should go through their EU Delegations if they are interested in the service.

Innovating Financing for EA (Alan Dale Gonzales, PFAN)

As the industry has matured, new financing technology, like PAYG technology, had helped to make payment collection more efficient. PFAN has worked with two organizations in the region that serve as good case studies: Kamworks (Cambodia) and SunSawang (Thailand). Using PAYG technology, Kamworks monitors use and activates SHS upon payment. They work with separate distributor and provide the technology and back-end support. SunSawang follows fee-for-service mode and has used interesting techniques such as selling refurbished panels to provide a lower-cost option. In their partnership with Kamworks, PFAN is helping them expand to less competitive market. PFAN is helping SunSawang target impact investors to support due diligence costs and also look at larger markets for their products and services.

Alternative Sourcing of Funding (Pariphan Uawithya, Rockefeller Foundation)

There is an ever-growing array of tools available to energy access actors. One such tool is the use of anchor loads to provide assured revenue. In any project, collaboration with CBOs improves the design process and allows you to better understand what tools are appropriate to use. As the industry continue to grow, opportunities such as R&D in batteries build optimism for future work, but adjustment need to be made in the present until those milestones are achieved. For example, governments need to evaluate true cost of generation to make better tariff policy. By listening to the private sector, they can better support rural electrifixation efforts.

Linking Climate Change Financing with EA (Conrado Heruela, UNEP)

Energy access is co-benefit to climate change mitigation and adaptation work. This link opens up potential funding opportunities that are focused on climate change work. For example, there is funding available through the Green Climate Fund for low emission projects. For those interested in applying, there is a template available for GCF proposals and they can provide project formulation funds for proposal design. It is advised that governments pursue other funding sources for projects larger than USD$50 million.

Structuring Business Models for Microgrids (Sujay Malve, Canopy Power)

When considering the many business models available for use, you much consider the pain points of each stakeholder . Business models must be simple and in language that exists already and should avoid reinventing the wheel. Additionally, they should use appropriate technology, making it worthwhile to invest in assessing this upfront. A major challenge is setting the period of a PPA to find a balance between being short enough for investors, but long enough to reduce user costs. Governments much also provide clear and consistent regulations are critical, with fair judicial process for potential revision.

DAY 4: SITE VISIT TO PULAU SEMAKAU

Pulau Semakau island is hosting Renewable Energy Integration Demonstrator-Singapore (REIDS), an initiative led by Nanyang Technological University (NTU) and supported by Economic Development Board and National Environment Agency. The REIDS is the first micro-grid in the region and the largest hybrid micro-grid in the tropics. It will test and demonstrate the integration of solar, wind, tidal, diesel, storage and power-to-gas technologies, and ensure these energy sources operate well together.

Micro-grids can meet the need for electrification of hundreds or thousands of islands in the Southeast Asian region that are not connected to the main power grid because they serve as independent energy sources for

offgrid and island communities. For example, Indonesia is aiming to install micro-grids that will bring electricity to 90 per cent of its off-grid population by 2025.

In addition to rural electrification, these micro-grids can also help to stabilise the main power grids and provide energy when there is a power outage in the main system. Because micro-grids can be isolated and have independent energy sources, they are less vulnerable to problems in the larger system.

Therefore, this S$8 million renewable energies integrated micro-grid platform is expected to attract S$20 million worth of projects from companies interested in test-bedding integrated micro-grid technologies over the next five years.



DAY 5: CLOSING SESSION

The last day entailed presentations by each of the participating countries providing overview of their learnings. The following are highlights from the situation in individual situations from the countries, as presented during the closing session and completed by recommendations for improvement.





Bangladesh:	Bangladesh currently faces the challenge of continuing to build the necessary foundation that can ensure sustainability in the development sector. Having proved the concept of off-grid solar as a solution to rural energy access, a more stable and developed work force and supply chain will be critical to electrify the remaining 20%. Without building the technical know-how in remote areas, O&M costs will remain high. Greater integration of solar-technician training programs will help build a work force equipped to service the growing industry. One challenge with this is the high turn-over rate that is common amongst skilled workers. In the case of Bangladesh, the proliferation of training programs, continued investment in the RE sector, and outspoken support by the Bangladeshi government may aid in creating allegiance to the industry – if it looks like a public success, people will be more interested to stay involved. Training needs to transition from being a sub-category in the business plan to a key factor for success. Previous work has generally focused on the project development and add training at the end, more for closure's sake. Business and organizations need to be devoted to capacity building and the government and financial institutions need to publicly acknowledge and support this demand. Because the Bangladeshi government has been supportive of the renewables sector and active in promoting rural electrification, training and technical capabilities need to be prioritized in their current construct of the rural electrification plan. A strong and influential champion of this may help create the push needed to shift from focusing on number of systems installed to the sustainability energy access programs can have at a community level.
Cambodia:	While the private sector in Cambodia is working to nurture the solar market, the policy and regulatory framework in place greatly hinders significant investment and progress. Despite Cambodia's high solar potential and potential for hybrid system, the lack of established and clear policies around power generation and distribution deters private investment. The EAC and EDC need to work together to create a better investment environment and to clarify policies such that investors and developers can pursue mini-grid projects, that is a promising technology. EDC could transfer attention and funding from it's solar home system program to hiring advisors and pursuing assistance in designing better and clear policies that can help the mini-grid market grow. SHSs have been slow to take off in Cambodia, largely due to incompatibility with the people and cultural perceptions. Focusing on the regulatory environment would be a more efficient use of EDC's funding and allow the local private sector, that is well developed, to focus on project deployment and management.
Indonesia:	Indonesia, home to over 600 separate grids, is challenged by the isolated islands that remain un-electrified, mostly in the Western region of the country. The highly scattered population is a challenge that can be met by distributed off-grid renewables. Low irradiation in Papua (a key region in need of access) requires that other technologies are investigated and hybrid mini-grids should be considered. Recently, the Indonesian Ministry of Energy and Mineral Resources has pushed through a new rural electrification regulation, creating new opportunities for private sector involvement. This regulation is a good first step, but does not clearly outline quality standards which are necessary to ensure adequate quality installations across the diverse landscape. PLN should take this opportunity to pursue new partnerships with private actors, but be cautious of developing a clear and consistent PPA system. This should have a consistent process to be licensed as an electricity provider, expectations of technical standards, determined roles for all involved stakeholders, and requirement for managing ownership of the PPA (to limit sales to others). However, this needs to be in balance with flexibility to meet the needs of each unique community – a necessity for a successful project. With reliable PPAs

	and clear policies in place, the government and PLN can nurture a local renewables market, that has been slow to develop. This market is needed for project sustainability.
Nepal:	Nepal has access to funding, from the EU and SNV, that is dedicated to rural electrification projects, but has a fairly limited local renewables sector. Because the market size is relatively small, private energy access work has been small and a lack of competition to drive growth. With their available funding, the government and the NEA can look to subsidize smaller projects, in partnership with REEs, to help kick start market growth and private sector involvement through proof of concept pilots. This money could be used to directly subsidize the cost of generation systems (high solar, wind, and hydro potential, depending upon the terrain), or to feed a fund that takes on the upfront debt burden, allowing customers to pay back over a longer period of time. This should be accompanied with PURE projects, and could use a similar model to MLinda's project in women groups as major energy consumers.
Philippines:	The Philippines has set an ambitious electrification goal for full access by 2020. With 13% of the population currently un-electrified, many of which are in last-mile and remote island communities, the country faces many many geographical and environmental challenges (weather) that must be overcome. Because each community is unique and isolated, careful attention to hands-on site assessment is critical, albeit costly. PPPs that are better suited to customize on a case-by-case basis can help to provide the technical experience needed for a reliable solution, paired with the pursuit of local knowledge and cultural understanding. The NEA must work with the National Economic and Development Association (NEDA) to improve policies around PPPs with respect to power producers and distributors for this synergy of private knowledge and public interest to occur. Additionally, hybridized mini-grids may be pursued to accommodate the volatile weather conditions that can affect output of renewable technologies.
Sri Lanka:	Similar to Indonesia, Sri Lanka has a high electrification rate at 98 percent, but faces new challenges when electrifying the remote and isolated 2 percent remaining. Much of the un-electrified population is largely indigenous and live off the coast of the main island. To address this, once proof of concept is complete in Eluvaithivu Island, hybrid mini-grids can be scaled to other in-need areas. To better understand the conditions and needs of the remote populations, an in the ground feasibility study should be done as they scale the technology (and re-evaluate it, as appropriate). Sri Lanka has good wind and tidal potential, so technology outside of solar should be considered. Funding sources like the ADB or EU Commission can provide the upfront capital necessary for these studies.
Vietnam:	Vietnam is close to fully electrified but estimates a need of USD$3 billion to reach full electrification. These funds would be directed at providing access to roughly 300,000 households and rehabilitating the infrastructure for roughly 3,000 communities. Depending upon the geographic distribution of the un-electrified communities, pursuing mini-grids project to provide access may overlap with some of the rehabilitation work needed, potentially lowering costs. Vietnam has strong government support for rural electrification and proven success in payment collection (99 percent collection rate for paying customers), making it an attractive option for private investors looking to work on mini-grid projects. Funding should be pursued to conduct feasibility studies prior to project design.

The workshop concluded by remarks from representatives of the SECOE, ARE and SE4A TAF.

ANNEX 1: AGENDA OF THE WORKSHOP

Organised By:

MAKING OFF-GRID RURAL ELECTRIFICATION WORK

Date: **5 – 9 December 2016**
Venue: **Level 1, Pan Pacific Ballroom 1**
Pan Pacific Hotel, Singapore
7 Raffles Boulevard, Marina Square, Singapore 039595

5 Dec 2016	**Day 1: Market & Industry Overview, Policies, Regulations**
Time	**Programme**
8.30 am	Registration
9.00 – 9.20 am	Welcome Remarks 1. Edwin Kew, Chairman, SEAS 2. Bouadokpheng Chansavat, Portfolio Management Specialist, Tajikistan Resident Mission 3. Marcus Wieman, Alliance for Rural Electrification 4. Antoine Vander Elst, EU Delegation to Vietnam
9.20 – 9.30 am	Introduction of Sustainable Energy Centre of Excellence (SECOE) ***Kavita Gandhi, Executive Director, SEAS***
9.30 – 9.40 am	Introduction of the workshop & objectives ***Katarina Uherova Hasbani, Non-key expert, EU SE4All TAF***
9.40 – 10.00 am	**Introduction of rural electrification: Present & future trends** *A global view of rural electrification – both on-grid and off-grid. For this workshop, the focus is on off-grid electrification[1].* ***Marcus Wiemann, Alliance for Rural Electrification***
10.00 – 10.30 am	Coffee Break
10.30 – 12.00 pm	**Presentation by participants** *The participants will be requested to introduce themselves and discuss specific rural electrification challenges in their country. On this basis, they can discuss/address these specific challenges in the course of the workshop.*

[1] From here onwards rural electrification refers to "off-grid rural electrification".

	• Self-introduction to the group by each participant • Breakout discussion by each country on the current situation regarding rural electrification, the main barriers and opportunities • A representative of each country will provide a short presentation on their country's situation to stimulate discussion and exchange ideas Facilitator: ***Katarina Hasbani, Non-key expert, EU SE4All TAF***
12.00 – 1.30 pm	Lunch
1.30 – 2.00 pm	**Project development in rural electrification: Introduction** *An introductory presentation on how off-grid rural electrification works in practice – success factors & limitations. This presentation will be an introduction to case studies that will be presented in Day 2.* ***Andy Schroeter, Sunlabob***
2.00 – 2.30 pm	**Rural Electrification: Policy & regulatory frameworks** *Overview of policies and regulations in rural electrification. The session answers questions such as: how policies and regulatory frameworks can support rural electrification? Which policies and regulations are required?* ***Marcus Wiemann/Katarina Hasbani, Alliance for Rural Electrification***
2.30 – 3.00 pm	**Case study: National Solar Home System Programme** *A case study describing Bangladesh national solar home system programme and how it became a success story, including experience from execution at company level.* ***Abu Khan, Manager, Renewable Energy, Rahimafrooz***
3.00 – 3.30 pm	Coffee Break
3.30 – 4.00 pm	**Role of utilities in off-grid electrification (1)** *Presentation will address the importance of utilities for the sustainability of off-grid renewable energy systems in the context of Island countries.* **Vincent Bouet, YSPSC, Yap, Micronesia**
4.00 – 4.30 pm	**Role of utilities in off-grid electrification (2)** *Presentation will address the importance of utilities for the sustainability of off-grid renewable energy systems in the context of large countries.* **Chen Shiun, Sarawak Energie, Indonesia**
4.30 – 4.45 pm	Closing Day 1 - Wrap up by Facilitator
	End of Programme

6 Dec 2016	Day 2 – Building Better Off-Grid Projects
Time	**Programme**
8.30 am	Registration
	The following 2 sessions will provide an overview of what is required from building bankable projects. It is crucial for policy makers to know so that they can design policies and regulations which contribute to making rural electrification projects more bankable.
9.00 – 9.30am	**Building bankable projects (1): Project development & regulatory aspects** ***Upendra Bhatt, cKinetics***
9:30 – 10.10 am	**Building bankable projects (2): Commercial structuring & financing** **Sagar Gubbi, Ecoforge**
10.10 – 10.50 am	**Case study: 'Productive Farm Loads as anchor loads in Rural Mini Grids'** *This will be a practical example of productive use of renewable energy in the context of rural electrification.* ***Vijay Bhashkar, Mlinda***
10.50 – 11.30 am	Coffee Break
11.30 – 12.00 am	**Case study: Biomass and waste based distributed power generation for Sustainable Economic Development of Developing Countries** *A presentation of biomass/waste to energy technologies in rural electrification and industry best practice.* ***Ashok Chaudhuri, Ankur Scientific***
12:00 – 1:30pm	Lunch
1.30 – 2.00 pm	**Case study: How women can contribute to improving rural electrification projects** *Women can be clients or entrepreneurs supporting rural electrification projects. In both situations, research shows they can make the projects more successful. This will be a case study to show how.* ***Sudeshna Mukherjee and Tania Ghosh, MLinda***
2.00 – 2.30 pm	**Case study: Solar-Diesel Hybrid Microgrids for Rural Electrification** *An overview of solar-diesel hybrid microgrids, and discuss their role and position within the evolution of rural electrification. The focus will be on technological aspects.* ***Timothy Walsh, Canopy Power***
2.30 – 3.00 pm	**Coffee break**
3.00 – 3.30 pm	**Sustainable Power for Off-Grid Regions (SPORE)** *Introduction of the Engie / Schneider Electric SPORE Project, within the REIDS (Renewable Energy Integration Demonstrator in Singapore) project, the largest hybrid microgrid test site in the tropics.*

	Antoine Ballereau, Engie Lab Singapore
3.30 – 4.00 am	**Importance of reform and investment in the energy sector** *This will be a presentation of on-going energy sector reforms being implemented in Tajikistan* ***Bouadokpheng Chansavat, Portfolio Management Specialist, ADB***
4.00 – 4.15 pm	Closing Day 2 - Wrap up by Facilitator
	End of Programme
7 Dec 2016	**Day 3 – Finance**
Time	**Programme**
8.30 am	Registration
9.00 – 10.00 am	**Financing rural electrification and derisking** *An overview of what are the main elements and challenges of finance for energy access/rural electrification projects.* ***Balaji M K, PFAN***
10.00 – 10.30 am	**Presenting institutional investors' perspective: ADB** *An overview of work by ADB on energy access.* ***Fely V. Arriola, Access to Energy Expert, ADB***
10.30 – 11.00 am	Coffee Break
11.00 – 11.30 am	**Presenting institutional investors' perspective: European Commission** *An overview of the European Commission/DG DEVCO work on energy access, including ElectriFI and the Asian Investment Fund, as well as other EU Energy interventions in the Asia-Pacific Region.* ***Antoine VanDer Elst, European Commission***
11.30 – 12.00 am	**Presenting institutional investors' perspective: EU TAF for SE4All** *An overview of the European Commission/DG DEVCO TAF for SE4All Initiative. On-going activities in the Asia-Pacific Region and rest of the Word will be presented.* ***Thierry Lefevre, EU SE4All TAF***
12.00 – 1.30 pm	Lunch
1.30 – 2.30 pm	**Innovating financing for energy access** *This will be presentation of 2 innovative projects/initiatives which improve access to finance for rural electrification projects.* ***Alan Dale Gonzales, PFAN***

2.30 – 3.00 pm	**Alternative sourcing of funding for energy access** *This presentation will provide insights into new, alternative source of finance for rural electrification projects.* ***Pariphan Uawithya, Associate Director, Rockefeller Foundation***
3:00 – 3:30pm	Coffee break
3.30 – 4.00pm	**Linking climate change financing with rural electrification and energy access** *On overview of how climate change financing can offer an additional opportunity to boost rural electrification and energy access.* ***Conrado Heruela, , UNEP Environment, Asia & Pacific Office, Bangkok***
4:00 – 4:30pm	**Structuring business models for microgrids for rural electrification** *Presentation about the typical business models applied to grid-connected renewable energy projects, and how these may be modified to serve rural electrification.* **Sujay Malve, Canopy Power**
4:30 – 4.45pm	Closing Day 3 – Wrap up by Facilitator
	End of Programme
8 Dec 2016	**Day 4 – Site Visit to Pulau Semakau** *Off-grid microgrids will increasingly become the key energy infrastructure to address the need for better and more affordable energy access in the region. Renewable Energy Integration Demonstrator - Singapore (REIDS) project, which will be the largest hybrid microgrid test and research platform in the tropics. REIDS and its partners will test and demonstrate the integration of solar, wind, tidal, diesel, storage as well as waste-to-energy and power-to-gas technologies as well as other production, storage, end-use technologies and solutions suitable for deployment in Southeast Asia. We will take you on a tour that includes a boat ride to Semakau Island 4km south of Singapore to visit the location and the demonstrator set-up*
Time	**Programme**
8.30 am	Registration
9.30 am	Meeting at Pasir Panjang Ferry Terminal
9.45 am	Boat Departs to Semakau Island
10.15 – 11.45 am	REIDS visit on Semakau Island
11.45 am	Boat back to mainland
12.15 pm	Bus back to Pan Pacific Hotel, Singapore
12.15 am	End of Programme

9 Dec 2016	Day 5 – Closing Session
Time	**Programme**
8.30 am	Registration
9.00 – 10.00 am	**Group Work** Break out session by country to discuss what the participants have learned and experience shared. Each country team should focus on: • How can they apply some of the learnings from the workshop in their country? • Identify priority list for improving policy and regulatory framework and increasing investment into rural, off-grid electrification projects
10.00 – 10.30 am	Coffee Break
10.30 – 12.00 pm	**Presentation by country representatives**
12.00 – 12.30 pm	**Closing Ceremony & Presentation of Certificates** • Edwin Kew, Chairman, SEAS • Katarina Uherova Hasbani, ARE • Thierry Lefevre, EU TAF for SE4All Initiative
12.30 pm	End of Programme

ANNEX 2: LIST OF THE SPEAKERS AND PARTICIPANTS

List of speakers

1. Edwin Kew, Chairman, SEAS
2. Bouadokpheng Chansavat, Portfolio Management Specialist, Tajikistan Resident Mission
3. Marcus Wiemann, Alliance for Rural Electrification
4. Antoine Vander Elst, EU Delegation to Vietnam
5. Kavita Gandhi, Executive Director, SEAS
6. Katarina Uherova Hasbani, Non-key expert, EU SE4All TAF
7. Andy Schroeter, Sunlabob
8. Abu Khan, Manager, Renewable Energy, Rahimafrooz
9. Vincent Bouet, YSPSC, Yap, Micronesia
10. Chen Shiun, Sarawak Energie, Indonesia
11. Upendra Bhatt, cKinetics
12. Sagar Gubbi, Ecoforge
13. Vijay Bhashkar, Mlinda
14. Ashok Chaudhuri, Ankur Scientific
15. Sudeshna Mukherjee and Tania Ghosh, MLinda
16. Timothy Walsh, Canopy Power
17. Balaji M K, PFAN
18. Fely V. Arriola, Access to Energy Expert, ADB
19. Thierry Lefevre, EU SE4All TAF
20. Alan Dale Gonzales, PFAN
21. Pariphan Uawithya, Associate Director, Rockefeller Foundation
22. Conrado Heruela, , UNEP Environment, Asia & Pacific Office, Bangkok
23. Sujay Malve, Canopy Power

List of participants

COUNTRY	NAME	DESIGNATION & ORGANIZATION
Bangladesh	Md Rashed Nizam	Deputy Director Finance, Bangladesh Rural Electrification Board
Bangladesh	Mr. Nazmul Haque	Superitending Engineer, BREB
Bangladesh	Md. Sakil Ibne Sayeed	Deputy Director, Technical, Office of the Project Director, BREB
Cambodia	Mr. Thach Kiengmony	Manager of Technique, Planning, Monitoring and Evaluation, Rural Electrification Fund, Electricity of Cambodia
Cambodia	Mr. Chan Visal	Senior Officer of Finance and Administration, Rural Electrification Fund, Electricity of Cambodia
Indonesia	Ms. Rizki Wahyuni	Engineer of Energy Alternative, PT PLN Persero
Nepal	Mr. Shiva Kumar Adhikari	Joint Director, Nepal Electricity Authority
Nepal	Mr. Nav Raj Ojha	Manager, Nepal Electricity Authority
Nepal	Mr. Raman Raj Sharma	Dy Manager, Nepal Electricity Authority
Nepal	Mr. Khem Bhandari	Energy Officer, AEPC
Philippines	Ms. Lida dela Merced	Division Manager, NEA
Philippines	Mr. Domingo Santiago, Jr.	Section Chief, NEA
Philippines	Ms. Henrietta Maramot	OIC, Department Manager, NEA
Sri Lanka	Mr. M. A. D. N. Gratian	Additional General Manager Distribution Region 2, Ceylon Electricity Board
Sri Lanka	Mr. D. N. Ariyapala	Electrical Engineer Distribution Region 2, Ceylon Electricity Board
Viet Nam	Mr. Nguyen Quang Dinh	Expert, Power Grid & Rural Electrification Department, General Directorate of Energy (GDE), Ministry of Industry and Trade
Viet Nam	Mr. Phan Sy Binh Minh	Expert of Business Department, Vietnam Electricity (EVN)