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APEC Workshop on Achieving Business Sustainability for Clean Energy Start-ups

APEC Energy Working Group

January 2022

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SUMMARY REPORT

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I. Introduction of the Project

The two-day workshop was held on 27 to 28 May 2021 in a hybrid mode due to the COVID-19 pandemic. This workshop covered four main issues, which are: 1) Providing knowledge of clean technology entrepreneurship and energy investment in APEC member economies; 2) Promoting market development of clean energy start-up; 3) Creating suitable environment for the development of clean energy start-ups; (4) Providing recommendations for APEC's program on developing clean energy start-up.

II. Objectives of the Meetings

1. The main objective of this workshop is creating suitable environment for the development of clean energy start-ups. The transition to renewable energy will enhances the socioeconomic resilience of communities, reduces greenhouse gas emissions, increases energy security, and also creates new job opportunities around the world. However, due to the COVID-19 pandemic, the committee was unable to hold physical meetings, and it was converted to a hybrid meeting instead.

   The meeting was held in a hybrid mode for 2 days through the Zoom Virtual Meetings platform. Speakers and participants were gathered in that platform with two sessions of discussion each in a day. The meetings were held successfully. Participants have actively involved in the discussion and questions answers sessions with the speakers.

III. Briefings of the Presentations in the Workshop

The speakers came from different backgrounds of expertise, such as government representatives, academician, and business representatives. This two-days' workshop was opened by a keynote speech from the Minister of Energy and Mineral Resources, Indonesia, Mr Dadan Kusdiana. There were two sessions of presentation from the speakers and two topics of discussion from the facilitators.

- **Opening remarks**

  Seeking to implement the concept of sustainable energy development, the APEC

Leaders in 2014 endorsed a new aspirational goal to double the share of renewable energy in APEC's overall energy mix by 2030. This requires an energy transition to a low carbon, non-polluting energy generation, and energy efficiency enhancement. Energy is essential to the economy and it must be accessible, reliable and affordable.

The transition to more sustainable energy systems has become a trend that presents opportunities as well as challenges. The transition to renewable energy will enhances the socioeconomic resilience of communities, reduces greenhouse gas emissions, increases energy security, and also creates new job opportunities around the world. However, at the same time, skilled workforce is indispensable to realize this opportunities. Without trained and experienced workers, renewable energy deployment may be missed out of the target. Another challenge that needs to be overcome is eliminating dependence on fossil fuels. It would require more ambitious policy action in favor of efficiency and clean energy technologies, supported by clean energy stakeholders. This conditions offer opportunities for the local developing industry to build clean energy start-ups that could potentially revolutionize the world's energy technology.

Along with this workshop, we hope that clean energy start-ups will have an ideal ecosystem to grow in the future and become pioneers in the renewable energy sector in their respective economies.

- **Session 1:**

  Moderator: Adhityani Putri – Founder and Executive Director of Cerah

  Association Perspective: Clean Tech Entrepreneurship is Emerging in APEC Member Economies

  Ms. Lucila Arboleya – Energy Economics and Financial Analyst at the International Energy Agency.

  - There is a need for an increase in renewable energy investment in the future, particularly for relocation of capital within the sector
  - Decarbonizing requires capitalizing at a fast rate. The financing and cost of capital become the key factors in the energy transition. However in the emerging and developing economies, the cost of capital is still very high and pandemic has

worsened conditions in some economies. Finance would appear if the projects were bankable.

- Several economies in Southeast Asia have high capital costs for several different reasons, such as unclear and low ambition strategies, feasibility of procurement methods and pipelines. These three are important if you want to seek international funding. Clarity of regulations is important because investors can assess the risk of financing accordingly. There are other issues, such as the availability of land, cost of land, and the level of transmission infrastructure.
- Policies need to ensure effective pure integration and reduce risk of curtailment. It is important to think about policies to reduce the cost of capital and increase financing. It would lead to lower generation costs and will translate to lower costs for end users.
- The last issue is the need to find local context and binding constraint to reduce the cost of capital. In perfect world, government will try to address all of the constraint. But as we know, we don't live in a perfect world nor do we have perfect information.
- In emerging economies, resources are limited and high capacity is needed to resolve the issue. The government needs to list a lot of things that must be done to reform and produce the biggest bang for the buck. In other words, to generate the highest spillover effects. Economies need to focus on the binding constraint by addressing different risk.

Association Perspective: Energy Investment in Developing Economies - Transforming Southeast Asia's Power Sector

Presentation by Mr. Fabby Tumiwa – Chairman at Indonesia Solar Energy Association.

- Asia Pacific is one of the fastest growing and most populous in the world. The needs of electricity is high and nowadays, most of the electricity are generated by coal and contribute to high carbon.
- The promotion of electricity from renewable energy in Asia Pacific economies needs to be done. As of Indonesia, the government has set the target. For Asia economies,

the energy transition is getting started in emerging. Asia will lead in solar, wind, even batteries, followed by Africa and Latin America.

- Investment in renewable energy is showing incremental trend, even in pandemic situation. Investment in energy transition technologies reached $501 bn globally in 2020, increased 9% than previous year. Particular technology that soars in investment is solar energy. Overall demand in PV increase in all market. PV has become low cost energy.
- Asia Pacific economies are the frontier for renewable energy investment as energy demand grow and market readiness to host large scale investment. Some of the technologies that will be needed in the future, such as mini grid, solar PV, battery storage, blue and green hydrogen, and energy efficiency & conservation.
- Indonesia has huge untapped solar potential to deploy in Indonesia. 20 TWp with generation up to 26,972 TWh/year. Installed capacity is very low and still have many room to grow and to have some positive development. Ministerial regulation give opportunity on Rooftop solar started to grow after 2018; C&I rooftop solar slowly grow in 2019; PLN has more confident in solar technologies; and utility remains concern on intermittency of solar and its impact to the power system.
- Investment in storage is important as more renewable energy coming in to the grid and Government aspires to increase the deployment of Solar PV to reach 23% renewable energy mix target by 2025.
- There is a huge opportunity for start-ups in Indonesia energy transition journey, from technology provider, jobs and finance. There is a need for technologies and tools that can empower consumers to make better informed low-carbon decision; renewables mini grid technologies; small EPC to serve solar PV installation (residential); financing energy transition – peer to peer lending; skilled worker in RETs installation and O&M; empowering P2P electricity market; small scale green hydrogen production; remote energy management system; and low cost & affordable electric mobility.

Start-up Perspective: Experiences in Developing Sustainable Renewable Energy Startup Companies.

Presentation by Mr. Andre Susanto – Founder PT Inovasi Dinamika Pratama.

- Startup is a human institution designed to create a new product or service under conditions of extreme certainty. It is not just about idea, but it has to solve specific problem that has sufficient value.
- Not all idea create value for other. Startup need to be critical to seek whether the idea create a useful products or services. Innovation does not always mean a progress. Good innovation requires ideas that can create impact or value. Several startups in Indonesia succeed to create value on their products and services, such as Bukalapak, Tokopedia, Traveloka, Pundi, etc. But the fact is, there are still many startup fails.
- Some investors are having risk averse profile. When investors plan to invest on startups, they will think about the amount of return, the period of return, and the risks that will be faced. These factors make a lot of investors looking for startup companies that have a lot more traction before they support the startup in any significant ways.
- It is important for business incubator to not focus solely on the products development. There is a huge difference between a product-oriented startup and a service-oriented startup. If the incubator only focuses on the creation of the tangible product, it will be hard for service oriented startup to catch up.
- Consulting driven energy startups rely on human resources, expertise, and knowledge to provide services. Contractors of solar PV system is one of example. Other examples, such as project development companies that have knowledge about renewable energy development and asset management companies that are also service-oriented.
- It's really important for incubators and accelerators to assist and support service oriented startup companies in their business model. One thing that is missing in start-up development is a mentor. There is a need to find a mentor who can tell start-ups how their innovation can deliver value and impact as early as possible
- In supporting start-ups, mentors need to guide them to create innovations and inventions that have a real impact. When products and services have an impact on the people, start-ups will achieve business sustainability.

- In order to create sustainable startup, several factors need to be considered, such as
  - The reason of startup is built. It really takes a lot of thinking to create sustainable startup;
  - Generate mutual team respect. Startup need to find a founding team and co-founders who can share the same goals and visions.
  - The 3Hs for a startup team, namely hacker (developer), hipster (designer), and hustler (businessman).
- In the early stages of development, the start-up may not have a lot of funds and be unable to provide high salaries and benefits. Start-ups need to ensure future growth to maintain a team existence. The important thing is to create a culture where everyone wants to work with you. In achieving business sustainability, start-ups need to find the right team, mentor and financing.

Accelerator Perspective: Business Model and Promoting Market Development of Clean Energy Start-Up

Presentation by Mr. Danny Kennedy – Chief Energy Officer, New Energy Nexus

- There are only a few hundred solar companies and contractors trading in Indonesia. On the other hand, Australia currently has around 8000 solar companies and contractors. There is a massive market for solar roofs in Indonesia in the coming decade.
- New Energy Nexus is an international organization that support for clean energy entrepreneurs with funds, accelerators, and networks. So far, we have supported many companies, we have invested in Tesla since 2006. We also invested in Bridgelux and that makes led lights a phenomenal now.
- Currently, Nexus has operations in 10 economies. We recently launched a fintech accelerator program with a European-based organization called F-10 that specializes in fintech companies.
- Financing for the solar project in Indonesia is critically needed. There are barrier to entry for solar PV contractors and developers in Indonesia to get financing. The solar project is an expensive project, consumers need to pay a high upfront investment.

Financing solutions such as power purchase agreements, solar power leases, and solar loans have become a way to open up the solar market in many economies, especially in the United States.

- Currently, there are not many financial institutions in Indonesia that can finance solar projects. Therefore, P2P existence is urgently needed in the solar market. But there are still many things to consider, such as legal and sharia compliance.
- New Energy Nexus has about 3000 entrepreneurs and investors in a slack community. Nexus has powerful tools for you to connect with a community of startups and exchange ideas. Energy Nexus also has a hackathon, incubator, accelerator, and funding program in Southeast Asia economies.
- In energy transition process, startups can create opportunities for job creation as well as wealth creation. Indonesia needs to make a more flexible market design that allows massive adoption as done by Viet Nam, China, India, and Australia.
- Energy Nexus can increase the rate of innovation and the adoption of clean energy by increasing the inputs. The commitment of the G-7 economies to stop investing in coal is a strong signal to the market that there will be an energy transition. In California, we are required by law to completely switch to renewable energy. Our investment in Tesla in 2006 resulted in 35,000 manufacturing jobs in California. The biggest export from the state of California last year was electric vehicles.
- Overall, Energy Nexus has conducted training and acceleration programs for 44 companies. We have invested nearly three-quarters of a million dollars in these companies in the past year. New Energy Nexus is a mission-based organization, our mission is to support diverse entrepreneurs and drive innovation in the clean energy sector.

- **Breakout Session**

ROOM 1: Market Ecosystem for Sustainability Clean Energy Startups

The session will identify: (1) How ready are economies to explore and seize innovation in building more environmentally sustainable start-ups; (2) What are the key roles that each player should play to build a more sustainable RE startup ecosystem?

Ms Elrika Hamdi - Energy Finance Analyst, Institute for Energy Economics and Financial Analysis

- Most of startups fail, startups need to come up with problems that has not been solved and have market opportunities. It comes up with the solution that can be scale up and have traction. It has to be better/cheaper/faster. Sometimes, start-up can't achieve all of these three points.
- Next step is to build a solid team. Hackers to ensure product; Hustlers to ensure cash flow; and hipsters to ensure user experience. A team have to trust each other, to minimize miss communication.
- Startup need to build product that at least reach MVP (Minimum Viable Product). Startup needs to create traction to attract investors. Most of the startup only focus on the result, not the process. In the process, it can be messy.
- Clean energy startups need mind map that consists several factors contribute to the sustainability of startups. The most important is consistent and clear regulations, so startup can innovate. The first thing regulators need to aware is the light touch of policy. Don't make barrier for startup to enter the market. The other factors are competent human resources; investors; financial incentives; mentorship; tax incentives; access to financing; and penetrable market.

Brainstorming:

Sarah Hobgen - Indonesia

Sarah commented that one of the challenges is to focus solely on technology startups that create new and innovative products, whereas the main barriers to energy access in Indonesia are distributing financing to low-income households and improving existing businesses.

Ms. Elrika responded that there's a mismatch between the existing startups in general that are trying to create impact. The Government has given significant help such as blended finance with the investor.

Andre - Indonesia

Andre share his experience, that there are many startups whose ideas address the fundamentals but it’s not interesting for the investors. But if they can make your pitch to show that your business model is scalable, that's what's going to attract them. Speak about of financiers earlier. Consider the stages of a startups journey and that financing are available from the middle stages to the end. The very early stages are difficult to get external funding, and as they grow as a company (having prototype or models, having pilot projects, etc.) there are more funding available. Startups founders should have a strong mind and perseverance to be strong enough to stick with their own feet to be successful.

Chris Longdon - Indonesia

Chris is a startup founder on waste energy turning plastic waste and cooking oil to biosynthetic fuel, renewable energy for cooking. He said that the problem is regulation because biosynthetic fuel is not in the renewable energy list. As a startup founder that is entrepreneurial, he try to not let barriers stop him from moving forward.

Zagy - Indonesia.

The most important problem to tackle is talent readiness to run their business. He argues in Indonesia the labor quality is quite low and they need to get some training and get a relevant project with their focus. He also added one of solutions, such as industry should be more open to the public like giving internships and incubator programs.

Hasna - Indonesia

She has Startups called BIOL in coordinate with Shell Startups Incubator Programs. She suggests that Startup Founders could give a try to Shell Startups Incubator Programs for new entrepreneurship in the RE Sector. Hasna also argues collaboration is strongly needed for RE’s entrepreneurs.

Alons Tela - Indonesia

Alons said that regulations and financing is the most important thing to maintain and sustain RE's Business. He argues that project financing is not regulated by OJK, thus lot of actors have to stop their activities.

ROOM 2: Fostering Collaborative Business on Clean Energy Policy
Facilitator: Ms. Marlistya Citraningrum – Program Manager, Institute for Essential Services Reform.

In this session, one representative of each economy will be required to prepare and present an oral presentation to discuss the issues and obstacles faced by clean energy start-ups in their respective economies. Each economy will also present their findings, benefit of the workshop, and possible collaboration between APEC member economies in the near future.

Ms Marlistya Citraningrum – Program Manager, Institute for Essential Services Reform.

- Collaborative action between stakeholder and innovative technology is needed to achieve the zero emission target by 2030.
- Support from the government and civil society is urgently needed by clean energy start-ups from an early stage.
- This support would bring clean energy start-ups to economies of scale. This allows their products to be introduced in a larger market and affordable to the people.
- In general, there are four stakeholders who can be involved in the development of clean energy start-ups, there are private sector, investor, government, and civil society.
- Collaboration and proper policy design would create a sustainable clean energy start-ups ecosystem. What kind of collaboration and policy design can be promoted to help clean energy start-up to achieve business sustainability?
- The participants will be given three minutes to present the landscape of the start-up, current policies, scope of work, and challenges faced by clean energy start-ups in their respective economies.

Brainstorming:
Ms. LJ – Singapore

- LJ is a representative of Right People Renewable Energy (RPRE), a Singapore-owned start-up that also operates in Indonesia. This start-up is a legal entity that provides solutions related to renewable energy to industrial clients.
- The challenge faced by our start-up is how to find a vendors that fits our company value. They might be too much involved in price-setting. It would be great if the community could see things beyond price
- We hope that consumers can value a product by its impact on the environment, not just by its price.
- Companies also need to disclose their products, consumers have the right to know whether the products they buy have a bad impact on the environment. In this case, consumers could make better moral decision.
- Singapore has a pro-environment policy, Producer Responsibility Scheme (PRS). This policy was developed to encourage public to re-cycle e-waste.

Mr Fano Alfian – Indonesia

- Mr. Fano Alfian is a representative of clean energy start-up in Indonesia, Ailesh Power.
- Indonesia has a lot of renewable energy resources, such as biomass, geothermal, wind, solar, etc. For the current situation, the government has a target of achieving a 23% percentage of renewable energy in the energy mix by 2025.
- The main challenge in the renewable energy industry lies in price. Renewable energy prices need to be more competitive than conventional energy prices, such as coal and oil.
- In accelerating the transition to renewable energy, more efficient technology development and business matching are needed.
- The low awareness of the Indonesian people towards renewable energy is another challenge that needs to be address. Providing education regarding renewable energy is an important thing. Campaigns can be created to encourage people to use renewable products.
- Conventional energy and renewable energy cannot be compared in term of price. The conventional energy industry has experienced economies of scale so that they are able to provide products more affordably. The civil society should look more at the sustainability side and adopt green lifestyle.

Ms Herlin – Indonesia

- It's been five years since Ms. Herlin developed a solar cooling device. Ms Herlin has introduced this technology to the Indonesian Ministry of Energy and Mineral Resources and the Ministry of Fisheries. However, she believes that the government will not help her business to scale up. Then, she decided to develop it independently until now.
- We estimate that the return on investment from solar cooling technology will be less than three years. Solar cooling technology has enabled an increase in the quality of the fish being stored.
- The project is 100 percent financed by private investment. Start-ups should not always need to rely on policies or regulations, they can scale up by understanding the market.
- Sometimes, the investors forgot that we also bought the solar plant to start this project. So comparing the cost between our project and conventional project will be always obstacles for us.

Mr Yaowateera Achawangkul - Thailand

- Renewable energy in Thailand is targeted to be 30% of the total energy production by 2037. Renewable energy has an important role in reducing emissions in Thailand.
- We encourage farmers to collect resources that can be turned into biomass.
- We have an agenda to increase the consumption of renewable energy and also reduce the use of fossil fuels.
- There is collaboration between the private sector and the government to increase the use of renewable energy. Local communities usually do not have experience regarding renewable energy so that government support is still needed.

Ms Hershey Dela Cruz – The Philippines

- In the Philippines, the clean energy or energy transition is anchored on energy efficiency programs and resilience policy.
- In order to encourage business, the Philippines government provides incentives in the form of fiscal and non-fiscal incentives for developers.
- The government has also developed a system that helps stakeholder process permits faster from central to local government units.

- The obstacles in the development of renewable energy in the Philippines include connectivity to transmission and distribution lines. Renewable resources are not found in areas where electricity is needed.
- The cost is one of the problems for consumers. Battery energy storage is completely unused as it costs twice the electricity cost.
- The Philippines also has green energy options. In purchasing energy, consumers can choose the type of energy and where the energy source comes from.

Bayu Jati – Indonesia

- Bayu Jati is a representative of Technovation, a start-up founded in 2020. This start-up focuses on developing IoT and energy storage products. By combining these two, they can provide more efficient energy storage products.
- Based on our experience, there are two main challenges in developing energy storage in Indonesia, namely demographics and policies.
- In the demographic context, rural areas have relatively lower demographic intellectual compared to urban areas. This causes inefficiency in power plant maintenance. Currently, many solar power plants are no longer active and are causing losses of around USD 400,000.
- In the policy context, product certification in Indonesia takes a long time. It can take months, even years to complete certification. Certification requires a lot of investment. From my point of view, start-ups won't have much funds to pay for certification fees. The bureaucracy in Indonesia should be made easier, especially in terms of certification.
- In addition, return on investment in clean energy start-ups may take longer time due to the R&D and certification processes
- So far, we have launched our project in early 2020. We already have an agreement with the village head and village-owned enterprises. However, there is a problem because project funds have been diverted to the covid-19 social program. After being delayed for 4 to 5 months, the village authorities revealed that they could not continue the project due to a lack of funds.

Day 2

Brainstorming Activities Summary.

Presentation by Elrika Hamdi – Energy Financial Analyst, Institute for Energy

Economics and Financial Analysis.

- Clean energy startups need mind map that consists several factors contribute to the sustainability of startups. The most important is consistent and clear regulations so that startup can innovate. The first thing regulators need to aware is the light touch of policy, don't make barrier for startup to enter the market. The other factors are competent human resources where Indonesia have human resources that still low capacity but can be upgraded; Investors; Financial incentives; Mentorship; Tax incentives; Access to financing; and Penetrable market.

- Identified issues:

    - Mismatch between what the VCs expect (profit, return on investment) and how the socio-entrepreneur startups would like to achieve and offer.
    - Missing of collaborations between talents and the industry
    - Regulation loophole
    - Blended finance to support energy startups
    - Key roles are needed from each player to build more sustainable RE start-up ecosystems, and they are coming from:
        - Regulators. Regulators need to listen before proceeding to policy making. Regulations need to be consistent and implementable, with clear long-term roadmap to match with the nature of long-term energy investment. Do not make regulations become a barrier for start-ups to innovate.
        - Financiers. They risk-averse characteristic won't help the start-ups to grow. So, financiers need to share the risks. Some ideas appear on the creation of first loss guarantee fund – especially for distributed energy system start-ups in remote area. This would create a lot of impact, but mostly are not financially feasible, without proper incentives and support many areas in Indonesia.
        - Incumbents. Industry practitioners need to collaborate with start-ups, instead of competing. Trainings for talents is needed to fill in the gap of industry needs.

- Other parties. Start-up founders need to be fully committed to their business. Creating and growing a start-up is never easy. Perseverance is key. See loophole in regulations as an opportunity instead of as a barrier.

- The key things needed to create the ecosystem for clean energy start-ups are consistent & clear regulation, penetrable market, collaboration, mentorship, access to creative financing

Presentation by Marlistya Citraningrum – Program Manager, Institute for Essential Services Reform

- In general, there are four stakeholders who can be involved in the development of clean energy start-ups, there are private sector, investor, government, and civil society.
- There are several challenges faced by start-ups, including:
  - Price sensitivity is a common challenge: providing services and products that are affordable to users and achieve economies of scale.
  - Awareness and public engagement. Different people have different motivations in adopting new technologies. Start-ups need to deliver different messages for different targets so that the new clean energy technology can be accepted by targeted consumers.
  - Policy and regulation. Strong political conditions and clear regulations will provide positive signals for investors as well as consumers.
- However, there are also several opportunities, including:
  - The energy transition is trending, more curiosities and interested parties in renewable energy.
  - Clean energy technologies are democratic, they can answer contextual problems and applicable to surrounding needs.
  - Policies are now moving towards clean energy transition.
  - Hyper-connected world with virtual meetings, IoT, and blockchain.
- In order to achieve sustainable clean energy start-up, several way-forward can be taken, including:

    - Collaborate to create an ecosystem suitable for start-ups. Some stakeholders will play a bigger role than others for different context (e.g. government with policies, investors with funds).
    - Ease of doing things are important. Designing effective process should be the paradigm.
    - Expanding outreach and advocacy. Different markets react differently to products/services. Start-ups need to listen to users.
    - Comfort should be fostered. Collaborative and communication are key to bring out a comfortable setting so that all interested parties can grow together in the ecosystem.
- In the near future, there are several follow-ups that can be done, namely collecting stories as showcases, facilitating exchange and brokering, collective outreach, and make use of our hyper-connected world.

- **Session 2:**

  Moderator: Made Aditya – Head of Sales and Business Solution of SUN Energy.

  Association Perspective: Catalytic Development Capital to Accelerate the Low Carbon Transition in Southeast Asia.

  Presentation by John Colombo – Country Manager, Southeast Asia Clean Energy Facility SEACEF.

  - The increase in CO_2 in SEA should be a primary focus for financing institution and government over coming decade. We estimate that between 2020 and 2030 investment will be required to unlock over USD 500 billion of clean energy projects and businesses in Viet Nam, Indonesia, and the Philippines between now and 2030.
  - Variety of financial resources will be required. SEACEF priorities to finance clean renewable energy to make an impact relatively fast. Energy efficiency is still untapped in South East Asia, including Indonesia. Like charging facility to vehicle and electricity.
  - Funding can deliver impact at scale in South East Asia. Move market that focus on proven, scalable, high-impact technologies that are moving down the cost-curve,

address priority areas and engage locally, build on impact that generate large-scale climate impact by catalyzing private capital, diversify portfolio across sectors and technologies, and Serve as bridge between local developers, private capital and multi-lateral donors.

- It is important to collaborate with local players because they can manage market and projects that foreign company may not and finally build an impact. Leveraging to bring even more capital is important to diversify investment. Patience is needed to founder because build a business is hard. Clear policy, communication and collaborative is a key to startups to grow.

Government Perspective: **Indonesia's Iniatives on Digital Start-up.**

Presentation by I Nyoman Adhiarna – Director of Digital Economics, Ministry of Communication and Information Technology.

- Indonesia through ICT Ministry established capacity building program that facilitates digital ecosystem players to encourage the growth of the startup ecosystem and digital economy of Indonesia. It explores Potentials to create more Solutions to overcome current economic problems and provide positive impacts for society.
- Participants form June 2016 – October 2020 78, 853 number of applicants with 426 startup created, about 4000 direct jobs created, 20,000 indirect jobs created that reach 826,000 users and customers. This program involve 7 main sectors, namely education 28%, agriculture 20%, tourism 18%, health 10%, fintech 10%, energy 9%, and logistics 5%.
- Mentors are the founders of CEO from unicorn. This program need strong participation of young generation in Indonesia, which program to identify specific participants, let the participants to come up with the output idea and prototype, achieve solution, collect more data and give solution for that. Bootcamp are provided and try to create the most feasible product. The success story: Bizhare, Botika, Lindungihutan, Sampahmuda, Jahitin, Kandangin

Government Perspective: International Financing Support for Renewable Energy Start-up Development

Presentation by Noor Syaifudin – Senior Policy Analyst representative ef Dian Lestari, Head of Policy Center for Climate Change & Multilateral Policies, Fiscal Policy Agency, Ministry of Finance

- Indonesia will support the emission reduction target of 26% (or 41% with international assistance) from the business as usual scenario by 2020. Under the Paris Agreement the target was strengthened and renewed to 29% (or 41% with international assistance) by 2030. Adaptation is also part of Indonesia's concern Emission reduction target are from forest, energy and transportation, waste, agriculture, and IPPU.
- Government drive to finance to achieve the target. According to the budget tracking, the climate change mitigation budget during the last 3 years (4.1% of the total budget) was only equal to 23.5% of the climate change mitigation financing needs in BUR-2 which reached IDR 266.2 trillion per year in average.
- State revenue policy is directed to support the development of renewable energy as well as environmentally friendly business areas. The Ministry of Finance provides tax facilities in the form of tax holiday, tax allowance, import duty exemption, VAT reduction, government borne income tax, and reduction of property tax to support the development of geothermal and other renewable energy.
- State expenditure policies are directed to encourage low-carbon and climate-resilient government spending (spending better). The Ministry of Finance implements the Mechanism of Climate Budget Tagging at the Economy and regional levels to determine the contribution of the State Budget and Sub—National Budget to tackle the climate change.
- Financing policy is directed to support expansive fiscal policy through the development of prudently managed innovative financing instruments in order to maintain fiscal sustainability. The Ministry of Finance issued Sovereign Green Sukuk (Green Islamic Bond) both global green sukuk and green sukuk retail to finance the climate change mitigation and adaptation projects.

- International funds for Indonesia are important to finance mitigation and adaptation projects/programs. The funds are currently still dominated by loans with low realization. In the future, international funds is expected to play a more important role in a form that is more supportive to further support climate mitigation and adaptation.
- Commitment to reduce emission has significant financing consequences. Indonesia capacity to finance climate mitigation and adaptation is limited especially after the Covid-19 Pandemic. Indonesia has made several policies to address the financing gap, including through the taxation policy of transfer funds, issuing bonds / sukuk, and establishing a financing platform. International funds are also expected to play a role in supporting climate change adaptation and mitigation, especially in developing Economies such as Indonesia.

Association Perspective: Green Policy Incentive.

Presentation by Florian Kitt – Energy Specialist (Coordinator Indonesia Energy Program), Asian Development Bank.

- Indonesia has a target of achieving 23% renewable energy by 2025. The progress has been lagging, Indonesia currently stands at about 14.6% renewable energy and it is unlikely that 23% will be met over the next four years.
- Global pressure influence Indonesia regarding the emission reduction commitment. If Indonesia does not fulfill this commitment, it will result in a loss of competitiveness. Major economies, such as Singapore, China, Japan, Republic of Korea and the European Union have committed to reduce emissions or achieve net zero emissions. These economies may impose non-tariff barriers on imported products from high-emitting economy. It also applies at the micro level, companies that have committed in achieving zero emissions by 2030 will reconsider their supply chain and investment decisions.
- Currently, Indonesia still depends on fossil energy. Indonesia's electricity system consists of 64% coal and gas power generation. Currently, Indonesia has experienced an oversupply of fossil energy, making it difficult for clean energy start-ups to find a niche to operate in Indonesia.

- However, Indonesia also has great potential in the renewable energy sector. It is estimated that there are 699 gigawatts of untapped potential, consisting of geothermal, hydro, solar, biomass, and land wind.
- Solar PV and wind are becoming more cost-competitive compared to coal and gas. Several small diesel generators in eastern Indonesia need to be replaced by the government. This is a clear opportunity for clean energy start-ups to enter new markets and bring cost-effective technologies to replace the incumbent technologies.
- The price of solar PV in Indonesia tends to be more expensive compared to other economies, one of which is Malaysia. The problem lies in the cost of capital and domestic market liquidity. Indonesia's financial market is still classified as conservative. There is no project finance for renewable energy or energy efficiency.
- Currently, PLN tariff revenues are below cost recovery and it results in the unattractiveness for Indonesia's renewable investments.
- There are 3 impediments to renewable energy development in Indonesia, including caps on power purchase prices are set below renewable energy process project costs, the energy sector is very highly regulated, higher cost and risk.
- Startups also need to be able to avail new technologies easily so that they can reduce costs and innovate. Currently in Indonesia, this is not possible due to high regulatory barriers. For example, For example, Indonesia does not even produce enough panels for the projects under planning.
- Indonesian regulations really need to be deregulated in certain aspects to provide incentives for start-ups participation in renewable energy sector. Deregulation will also help clean energy start-ups to secure bilateral and multilateral financing.

Gender Perspective: How Renewable Energy Start-ups Power Up Access to Energy.

Presentation by Rebekka Angeline – Executive Director of Rumah Energi Foundation.

- Rumah Energi Foundation is an NGO and also a start-up that also participates in the incubator program.

- As an NGO, Rumah Energi Foundation work in three major programs, there are renewable energy, sustainable agriculture, and social business incubator.
- In the renewable energy program, one of our largest portfolios is the Indonesian domestic biogas program, also known as the BIRU program. The BIRU program has been running for nine years and has installed 25,000 biogas facility in 14 provinces in Indonesia.
- Rumah Energi Foundation has around 120,000 beneficiaries and has trained 60 local SMEs in terms of marketing activities and biogas installation services.
- There are several problems that we want to solve. There are 21.710 villages or equals to 7.2 million households that still use firewood for cooking in Indonesia. Then, LPG needs are almost 7 million tons per year, 70% of which is imported and the remaining 30% from the domestic supply. In addition, the level of CO2 emission from livestock untreated waste is potentially at level of 18-21 million CO2 in 2035. Last but not least, the APEC member economies experienced a decline in the use of biogas for cooking since 2016.
- In our biogas installation project, we use simple technology. So it would be more affordable by the village community.
- Currently we have adopted sensor technology and are piloting 50 smart-biogas projects. Sensor technology is important because it relates to our business model, one of our sources of income comes from carbon sales.
- In the training program, we provide technical training so that all biogas produced meets Indonesian national standards. In addition, we also help them to do business and management.
- From a business point of view, we are not only engaged in the biogas sector, but in the process of establishing another start-up in the agricultural sector. In a renewable energy project, the process in the value chain is important. We target that 50% of women beneficiaries across the value chain
- There are 3 barriers to entry for women in renewable energy sectors, namely perception of gender role, cultural and social norms, and prevailing hiring practices. In order to increase women's participation in start-ups, it is necessary to reduce

investor bias, provide a framework and tools for designing acceleration program, and more women in the selection committee.

WRAP UP SESSION

Dr. Cary Bloyd - USA

- The USA is trying to cut off some of its traditional energy sources by 2030.
- Google is targeting a carbon-free company in 2030.
- Amazon pledging to achieve the same commitment in 2040.
- Clean Energy jobs are a potential industry in the future.
- He argues this workshop could be a good-start to encourage APEC's economies to be more aware to the Renewable Energy. This is proven by wide range speakers from many perspectives and fruitful discussions.

Manuel Heredia - Perú

- The barriers other economies experienced are quite relevant. It is important to understand the Startups initiatives
- He argues even though the Pandemic is devastating, we still have the biggest problem that occurred in our timeline. World is experiencing climate change, and this kind of workshop could be a leverage for us.

Prof. Glen Swetnam - APERC

- He is simply impressed by the participants and the speakers for the productive workshop

L.J - Singapore

- Right People Startup, working on Renewable Energy.

- She was really glad with the workshop by supporting the SDGs Target number 7.
- She also promotes her movement about the Catalyst program from Singapore called Catalyst 2030. Catalyst 2030 is a global movement of social entrepreneurs and social innovators from all sectors who share the common goal of creating innovative, people-centric approaches to attain the Sustainable Development Goals by 2030.

Wong - Malaysia

- He stressed the interest on Renewable Energy markets in Indonesia, it is has high potential within the region.
- The challenge for Startups are must be able to find the right current market and tariff structure, since Renewable Energy is really competing with traditional energy sources.
- Malaysia is working on Renewable Energy issues by working on Policy and Regulations to achieve the Sustainability and Clean Energy Country by 2040.
- The implementation mechanism in Indonesia gives positive necessary insight to Malaysia, for learning about the common problems, business models and policies.
- He also send the warmest thankyou to the Organizer because of the very insightful discussion for the last 2 days.

Lisa - PH

- The workshop provide an innovative exchange information to the participants.
- Best practices and sharing information regarding Renewable Energy projects are necessary for future prospects.

Wipassapon - THA

- He stressed Key Messages from Startups Ecosystem could be more emphasized on some economic sectors such as Agriculture, Industrial, Residential and Transportation.

Andante Hadi - JPN (andante.hadi@aoni.waseda.jp)

- She is working in Waseda University as a Researcher. She’s creating a Guideline about Renewable Energy.
- The information given by the Speakers related to market environment and financing are very useful for practitioners.
- She also commended the best practices by BIRU program by providing accessibility on financial mechanisms and technical assistance for their bio-gas clients.
- Japan's situation is close to 90% imported from abroad. Japan's dependency on energy supplies and Indonesia’s abundance of energy could complement the supply-demand opportunities on Renewable energy.
- She also stressed the importance of energy storage. Energy storage is important for Renewable Energy distributions.

Elaine YIP - Hongkong China

- HKC conditions are similar to other APEC Economies. Which means seeking for Clean Energy Startup.
- The Development of Renewable Energy in HKC is considerably progressing since the government is giving consideration towards this issue.
- She also added this kind of event could be a great opportunity to APEC Economies, specifically to the Start-Ups could achieve the sustainability Green Industries.

Zagy - Indonesia

- He stated the urgency of the dynamic era that can shape the Renewable Energy trends.
- He proposes an Idea called : The Holistic Ecosystem for Raising the Renewable Energy Startup

- Attract the government to promote the start-up, policy friendly to scale the business, and involve the start-up in government agenda or program. The key factor is the Government.
- Open for collaboration between Univ and the Startup to invent the technology or join research. The key factor is Academics/Researcher.
- Ask the private sector to invest or conduct business acquisition. The key factor is The Investor.
- Mapping the talent pool to do internships or full time candidates for the Startup. The key factor is the Private Sector.

- **Closing Remarks**

  Saleh Abdurrahman – Minister' Expert Staff on Environmental and Spatial Planning.

  The continued use of depletable resources in large scale is the chief threat to future standards of living. The implications of climate change, including rising sea level, heat extremes, droughts, and storm surges, are potentially so severe as to force a major re-evaluation of our carbon-based energy choices. In recent years, the world has moved towards renewable energy. According to the International Renewable Energy Agency (2020), renewable power is increasingly cheaper than any new electricity capacity based on fossil fuels. The cost of installing and maintaining renewable energy continues to decline. On average, new solar photovoltaic (PV) and onshore wind power cost less than keeping existing coal plants in operation.

  Since market tend to be sensitive to changes in price, these lower costs are expected to further encourage mass adoption of renewable energy. This is also an opportunity for clean energy start-ups to grow their business and gain a wider market share. As a pioneer of renewable energy, we need to remain optimistic and show that renewable energy is a future that promises economic and environmental prosperity in the future.

IV. Briefings on Discussions at the Workshop

In this session, participants were actively participating in the discussion.

Q&A / Discussion

- **Session 1**

  The participant ask whether the location with high solar power potential matches the location where electricity is needed.

  Mr. Fabby Tumiwa responded that most of the electricity demand in Indonesia is on Java and Bali islands. The demand for electricity on Java island is around 75 percent, while the demand for electricity on Sumatra island is only around 9 percent. Eastern Indonesia has a higher potential for solar power generation compared to other areas. However, in terms of solar roofs installment, Java, Bali and Sumatra islands have higher potential. The islands of Java and Bali also have several reservoirs and hydroelectric power plants. In this case, floating PV can also be widely installed in Java and Bali islands. As a demand increase in the near future, there's need to build more solar PV. There are also considerations to build solar power at ex-mining sites on the islands of Sumatra and Kalimantan.

  Currently, electricity production on Java island has not been able to meet the demand so that the electricity supply needs to be taken from other province. There are challenges to integrating electricity transmission from each island. This is costly, so solar PV installment is the most cost effective option at present time.

  Mr. Ander Susanto also responded in the start-up perspective. Some companies already provide solar PV installation services in Indonesia. Some of them are under the Energy Nexus incubator program a few years ago. Start-ups and their supporters need to create value for the sector, especially in the energy transition. Many enthusiasts of renewable energy need to be supported so that more clean energy start-ups will emerge.

  The participant asked about strategies in increasing the transmission and distribution network of solar PV.

Mr Fabby Tumiwa responded that in order to be able to deal with the variety of demand and supply, the grid needs to be upgraded along with the increase in renewable energy production capacity. Currently, the penetration of renewable energy in Indonesia is still low, but network upgrades will be needed in the near future. PLN has introduced a smart grid application and this may indicate there will be an increase in meters in the coming year.

The participant asked about local and international financing that could enable solar PV development.

Mr Fabby Tumiwa responded that in an effort to achieve the energy mix target by 2025, the development of solar PV in Indonesia requires a lot of domestic and international funds. It may take around a billion dollars annually to support solar PV development in Indonesia. Currently, the common business model in Indonesia is zero capex and consumers tend to prefer cheap electric energy. So a clean energy start-up in Indonesia requires competitive financing and sophisticated technology. However, interest rates in Indonesia are relatively higher than those in other economies. In the renewable energy sector, start-ups require funds from abroad with relatively lower interest rates. The Indonesian local bank has provided loan services for the installation of residential solar roofs. However, the interest rate offered is still quite high because this loan is classified as risky. In the future, cheap loans for the installation of residential solar roofs will be urgently needed.

Mr. Andre Susanto also responded that the returns on private equity averaged between 6 percent and 10 percent last year. Overall, the rate of return was around 6.8 percent. Investors want a return of around 12 to 14 percent, but only get 6.8 percent in the third quarter of 2020. Financing renewable energy projects using private equity is an expensive option because investors will expect to get a high return.

Risk-free interest rates in Indonesia are already in the range of 4 percent to 5 percent. This means that the interest rate that can be offered to clean energy start-ups will be more than that. In addition, it is difficult to obtain a cheap loan from ADB or IFC with an

interest rate of 2 percent. Condition in Indonesia does not allow clean energy start-ups to access cheap loans.

Mr. Danny Kennedy responded that there was almost no solar PV in India in 2016 and currently India has 100 gigawatts of solar PV. At that time, many people were pessimistic regarding the development of solar PV in India because of the difficulty of funding. Energy Nexus has a $ 5 million debt financing facility in India. Energy Nexus has successfully catalyzed the rooftop solar market in India when banks were uncomfortable to finance it. Then with the growing market, local banks began to be willing to finance the installation of solar roofs in India. It is possible to install solar PV on a large scale in Indonesia. Just like in Canberra, every household will have solar PV in their house. This results in more jobs and entrepreneurs. All we need to do is create a market for renewable energy.

The participant asked about the problems in subsidized electricity tariff.
Mr. Fabby Tumiwa responded that the tariff policy is key in the development of the renewable energy sector. Currently, electricity rates in Indonesia are heavily subsidized. Tariffs that reflect costs and removing subsidies will help renewables energy become more competitive. Higher electricity rates will attract more home owners to install solar roofs.

The participant asked about the contribution of clean energy start-ups in achieving zero emissions by 2030 and the role of the government in supporting clean energy startups.
Mr. Andre Susanto responded that clean energy start-ups can contribute to achieving the 2030 emission target. The issues is they often do not have mentors who can work together and exchange ideas. For example, the USA has a solar roadway and the project is getting a lot of support, but what kind of impact could the project have if it was installed on a large scale.
Technology is not an issue, I believe that currently there is technology that can be utilized to achieve zero emissions by 2030. The problem lies in regulatory barriers. Currently, Indonesia does not have a P2P energy service due to regulatory barriers. In addition,

start-ups also need to get the right mentors so they know how to get prototypes, traction, and funding.

As a founder, you might work for another company and only do projects on the weekends. However, when it gets more serious, you may have to quit your job and focus on the start-up project. This means you will lose financial security and rely solely on start-up income. Incubation, accelerations program, and grants can help address this problem.

Mr. Danny Kennedy also responded that the regulatory construct cannot keep up with the pace of change of the electricity markets. Technology has developed and can be accessed at a relatively low cost, but regulation still adopts the old-school monopoly way of thinking. Regulations need to promote an energy transition from fossil energy to renewable energy. However, the government is disrupting the energy market by providing subsidies on fossil fuels, this is hampering the growth of the renewable energy sector in Indonesia. Since solar PV is a technology that has a high adoption rate, the only way for Indonesia to achieve its 2030 emissions target is to install solar PV on a large scale. The appropriate technology, funding and regulation are needed to accelerate the energy transition.

Mr. Fabby Tumiwa responded that opportunities for clean energy start-ups arise from the high potential of the solar PV market in Indonesia. In order to increase the utilization of renewable energy, the government has created several regulations, such as the national energy policy and the national energy plan. The regulation requires all government buildings need to be covered with at least 30 percent of solar roofs and luxury building also need to be covered with at least 25 percent of solar roofs. In addition, government regulation number 49 of 2018 allows PLN consumers to install solar roofs. This regulation is currently being revised, may be completed in the coming week. Hopefully with this revision, the solar roof market in Indonesia will grow more rapidly. IESR estimates that Indonesia will be able to build 1 gigawatt of solar PV each year if it has the proper regulations and financing. This number can still increase in the following years. Peer to peer market and power wheeling are not yet available in Indonesia, the

government realizes this along with increasing concern to meet the targets of the Paris agreement.

The participant asked about the reason why start-ups that are already involved in the incubation and acceleration program can still participate in the energy nexus program and the reasons why only 22 percent of applicants were accepted into the nexus program.

Mr. Danny Kennedy responded that Energy Nexus doesn't have an exclusivity clause. We want to give startups the freedom to develop themselves in any way they can. In an effort to support the clean energy start-up ecosystem in the United States, there are around 36 incubators dedicated to supporting clean energy entrepreneurs. Indonesia has a population that is almost the same as the United States, Energy Nexus is the only specialist in clean energy accelerators and incubators in Indonesia.

On the second question, New Energy Nexus' doors are never closed. So rejected applicants are encouraged to improve their proposals and re-apply. Energy Nexus also try to serve the rejected through things, such as online resources, and ongoing events. We are not looking for unicorns or zebras, we want companies that can collaborate and participate in the growing renewable energy market.

Mr. Andre Susanto also responded that Indonesia does not have an easily accessible platform and public places to find a co-founder, exchange ideas, and create start-up value. In building a start-up, it takes hard work and persistence. The Community to share ideas is important in the development of start-ups, entrepreneurs can find the right information about product and financing. This will create a big leap for clean energy start-ups development in Indonesia and other APEC economies.

The participant asked about subsidy/incentives for solar energy from the government.

Mr. Fabby Tumiwa responded that the price of solar roofs has decreased and this has made solar roofs relatively more affordable in Indonesia. Based on the IESR market research, 2 percent of Indonesian households are willing to buy a solar roof. If it translates to numbers, there are 1 to 1.5 million households in Indonesia that have the

financial capacity and want to buy a solar roof. They don't need subsidies, all they need is information and the trust of technology. Middle-income households need support in making up-front investments because they may have other priorities, such as education, mortgages, or other things. Even though it requires an expensive upfront investment, they are still willing to purchase. It is the same when someone prefers the iPhone to Android even though it has a relatively more expensive price. Currently, the price of solar roofs in Indonesia is around USD 1000 per kilowatt. They don't really need subsidies, but if the government can provide subsidies, it will attract more interest.

The participant asked about the global policies to accelerate energy transition in Indonesia and also in the APEC member economies.

Mr. Fabby Tumiwa responded that the Paris agreement makes every economy seek to reduce its emission levels. Economies are working to limit global warming to below 2 and makes best effort to reach 1.5 degrees Celsius. In an effort to achieve zero emissions by 2030, investments in the fossil energy sector need to be stopped, while investment in the sustainable energy sector needs to be increased. In addition, each economy has its own target in cutting emission levels. The NDC sets a target for reducing greenhouse gas emissions in Indonesia, which is 29% unconditional (with own efforts) and 41% conditional (with adequate international support) by 2030. This target is not compatible with the Paris agreement, this target aims to achieve zero emissions by 2060. But I believe that Indonesia can achieve zero emissions sooner than the target set.

Mr. Danny Kennedy also responded that the Paris agreement creates an opportunity to achieve zero emissions. G-7 economies have made the decision to no longer invest in coal. Asia Pacific economies can collaborate and exchange ideas to increase the penetration of renewable energy. Economies can learn from Viet Nam, which has successfully built 6 gigawatts of solar PV in one month. Asian Pacific economies can learn from Viet Nam about the training, skills building, certification, and how they can do it.

The participant asked about jobs that were lost from extractive industries when there was an energy transition.

Andre Susanto responded that true engineers will have no difficulties, they can learn new things and adapt to situations. Coal power plant can be converted into other steam power plants. State electricity enterprises have introduced biomass co-firing. In addition, coal power plants can also be converted into solar thermal power plants. The technology is already exists, it's a matter of willingness and the willpower from the individual level, whether they want to learn new skills or not.

Mr. Fabby Tumiwa also responded in order to achieve zero emissions, eliminating the coal power plant is a must. This is a challenge for Indonesia to meet the target of the Paris Agreement, Indonesia still has large coal resources. Indonesia needs to transform its energy system from fossil fuels to renewable energy. This requires sacrifice because the government needs to close down the coal power plant. If the Indonesian government is serious about meeting the target of the Paris agreement, it will need to close the coal power plant before 2045 and stop building new coal power plants after 2025. Many local economies rely heavily on coal supply chains as a source of income. Therefore, the energy transition needs to be carefully planned by the government. The National Development Planning Agency found that if Indonesia could achieve zero emissions before 2050, Indonesia would have higher economic growth. The IESR research found that Indonesia's energy transition in 2050 will create 3.6 million green jobs and replace around 100,000 to 200 thousand jobs in the coal sector. So in the long term, the energy transition will yield higher benefits but in the short term, it requires tradeoffs. Unfortunately, people tend to see things in the short-term point of view. Currently, several coal companies in Indonesia have started investing in the renewable energy sector.

Closing Statement

- **Mr. Danny Kennedy – Chief Energy Officer of New Energy Nexus (USA).**

  As Mr. Fabby Tumiwa said that the energy transition will create 3 million green jobs and replace 200 thousand jobs in the coal sector. We need to take care of the communities

affected by the closure of the coal sector. The renewable energy industry is starting to grow, more clean energy entrepreneurs are needed in Indonesia and APEC member economies. They need to collaborate and create products that offer solutions to problems. New energy nexus is ready to help entrepreneurs and we currently have the electric mobility space program. So get involved in our hackaton immediately and move faster with us.

- **Mr. Andre Susanto – Founder of PT Inovasi Dinamika Pratama.**
  Entrepreneurs regardless of gender and age need to identify and realize the potential of renewable energy. Developing and criticizing ideas so that they can be implemented to help with the energy transition at the global level

- **Mr. Fabby Tumiwa – Chairman of Indonesia Energy Solar Association.**
  We need a market for clean energy and it needs to start with us. So if you have your own house, immediately install a solar roof if possible. I will leave my contacts, I can offer the best product at the best price.

- **Session 2**

  The Participant asked how to take advantage of low capital costs in the United States and Europe markets for renewable energy projects in Indonesia.

  Mr. Florian Kitt responded that currently ADB is probably the cheapest source of financing in Indonesia. There are euro-based bilateral and multilateral loans that offer interest rates of almost zero percent. In a large-scale project, the problem is not the financing. Projects can be financed by bilateral and multilateral loans. In another example, PLN has succeeded in obtaining direct market financing by issuing bonds. Entrepreneurs need to work with major international players so that they can attract financing from the European and US markets.

  Mr. John Colombo also responded that financing is available for large-scale projects, but large-scale renewable energy projects are still scarce, especially solar and wind projects. Finding bankable PPA renewable energy projects is a challenge.

The participant asked how to develop a start-up with a traditional business model and limited funds.

Mr. Florian Kitt responded that we aware of the people wish to develop renewable energy and it is a good thing. However, having hope is not enough, they need to have the capacity and capital. Startups must be at a stage where they can carry out the project, just having the wish without the necessary capital, capacity and knowledge is not enough. Indonesia has a significant number of local renewable energy startups. The government needs to invest its money in start-ups that offer new technology. Due to low financing in Indonesia, start-ups will not have sufficient funds to try new things, such as ocean power plant.

Mr. John Colombo responded that in the case of Seacef, we want a developer that already has something that can be commercialized. Seacef is also working with grant and financing providers so they can bring start-ups to a point where we can support them. In an effort to mobilize funding, the project needs to be advanced enough to be commercialized. The challenge for seacef and other institutions is to work together and take a holistic approach to identify gaps between projects and companies.

Mr. I Nyoman Adhiarna also responded that based on my experience in initiating 1000 startups in Indonesia, funding and financing is not a problem for digital start-ups. The most important thing is how to assist them by providing business solutions. As startups grow, we help them to get investment from big companies. This allows startups to scale up their business.

Ms. Rebekka Angelyn responded that Rumah Energi Foundation is not involved in large-scale renewable energy projects because it requires high capital. We have successfully obtained access to grant funds and currently there are a lot of investors looking for projects, this is a great opportunity for start-ups.

The participant asked how much solar PV contributes in reducing global emissions.

Mr. John Colombo responded that solar power can make a significant contribution in reducing emissions in Indonesia through the installation of solar rooftops in Java island. Seacef estimate that a solar roof with a capacity of 300 megawatts can provide at least 9.2 million tonnes of CO2 offset over 25 years. Floating solar has also developed in Indonesia and the price has become more competitive. In other parts of Indonesia, solar PV technology has been combined with battery storage to have an even bigger impact.

The participant asked about the speaker's opinion about a start-up that is engaged in processing waste into clean energy.

Ms. Rebekka Angelyn responded that logistics and geographic location are challenges that startups in Indonesia must overcome. It can be overcome by adopting technology and launching apps. If your start-up is able to collect waste from some places at once and convert it into energy, then the biggest challenge will be resolved.

The participant asked about the impact of investment and loans in the renewable energy sector on emissions reduction.

Mr. Noor Syaifudin responded that currently, he does not have specific data to answer this question, but he has experience in green sukuk investment. In green sukuk framework, it is a sharia contract financing that requires an underlined asset. Green sukuk provides financing for eco-friendly projects that can reduce carbon emissions in Indonesia.

The participants asked about the reasons why the realization of funding and grants is low for renewable energy projects in Indonesia.

Mr. Noor Syaifudin responded that loan agreement is usually given for long term programs. The terms of agreement may change due to several administrative or technical reasons. Sometimes projects that require funding are no longer in line with the objectives of the Indonesian Ministry of Finance.

Mr. Florian Kitt also responded that not all renewable energy projects are financed by state loans or state guaranteed loans, but they are also financed by the private sector. ADB provides private sector lending, I would like to encourage you to visit the ADB website and find information on clean energy projects financed by ADB. Solar power plants has about 50 grams of CO2 emissions per kilowatt hour, while coal fired power plants has 1 kilo of CO2 emissions per kilowatt hour. We need to see the big picture, what needs to be done to reduce emission levels.

The participant asked the reasons for the low number of renewable energy start-ups compared to other types of startup in Indonesia.

Mr. John Colombo responded that there are several factors that differentiate between clean energy start-ups and other start-ups, such as the level of capital intensive, the type of early-stage financing approach, the type of capital required, and potential returns. These factors determine the number of start-ups within the industry.

Mr. I Nyoman Adhiarna responded that Digital start-ups have a low barrier to entry and only a few investments are needed to support start-up growth. However, clean energy start-ups face a higher barrier to entry and require large investments to build physical infrastructure.

The participants asked about the possibility of solar PV to replace the coal power plant.

Mr. John Colombo responded that the utility scale of solar will increase and become more competitive in Indonesia. The government also plans to reduce the use of diesel. The government needs to create policies to support the commercialization of solar and battery storage. Solar is not the only answer, there are several other renewable energies, such as geothermal and hydro. Compared to other renewable energies, solar PV installation can be implemented much faster.

The participants asked about the government support that can be provided to start-ups in order to improve electricity access in Indonesia, especially in Nusa Tenggara Timur.

Mr. Noor Syaifudin responded that from a price perspective, subsidies are targeted at specific communities in Indonesia. The government has also created a carbon pricing policy to internalize externalities. The price of renewable energy in Indonesia will be more competitive than the price of fossil energy.

Mr. Florian Kitt also responded that the government is providing the possibility for electricity provision to communities. There are several power providers at the village level in Indonesia, some of them are also funded by foreign governments. The challenge is that start-ups tend not to appear in inaccessible village areas. Clean energy start-up can be the right solution to reach and provide electricity in inaccessible village. Electricity providers at the village level can be licensed by ESDM and local governments under recent legislation.

The participants asked about the subsidies provided to PLN and the reasons why the government did not provide subsidies to other companies.

Mr. Florian Kitt responded that the government has a long-term policy to shift the subsidy base from PLN to direct subsidies. This regulation allows start-ups to be able to increase electricity rates in line with the increase in people's ability to pay. It is a solution to current conditions which requires companies to charge uniform electricity prices in Indonesia. Currently, the problem is that clean energy startups are operating at a high cost and still have to ensure the affordability of electricity.

- **Wrap Up Session**

  Dr Cary Bloyd – United States

  - At the Leader's Summit on 22 April 2021, President Biden announced that the United States will target reducing emissions by 50-52 percent by 2030 compared to 2005 levels. It is also a commitment to achieve zero emissions by 2050.
  - The US announced a goal of cutting solar energy prices by 60% by 2030 and deploying 30 gigawatts of offshore wind by 2030.

- The US plans to reduce the cost of clean and renewable hydrogen by 80% by 2030. The US also aims to slash battery prices in half.
- Google was actually the first major company to be carbon neutral in 2007 and has plans to become carbon free by 2030.
- As one of the largest companies in the United States, Amazon started the climate pledged to be carbon neutral by 2040. Amazon has agreed to operate on 100% renewable energy by 2025.
- Amazon announced that it will have 10,000 electric delivery vehicle vans by 2022 and plans to have 100,000 electric delivery vehicle vans by 2030.
- President Biden has announced a goal of developing 10 million new clean energy jobs over the next five years.
- This workshop aims to create a suitable environment for the development of the startup community. I think you've made an excellent start moving towards this goal by providing a variety of speakers. From that point of view, I encourage you to think about follow-up projects.

Manuel Heredia – Peru

- In the context of renewable energy and energy efficiency, it is necessary to promote companies that can provide products and services.
- This workshop allows economies to understand the barriers faced by other economies. The barriers that other economies experienced are quite relevant. It is important to understand the startups initiatives.
- He argues even though the pandemic is devastating, we still have the biggest problem that occurred in our timeline. World is experiencing climate change, and this kind of workshop could be a leverage for us

Prof. Glen Swetnam - APERC

- He is simply impressed by the participants and the speakers for the productive workshop

L.J - Singapore

- LJ is a representative of Right People Renewable Energy (RPRE), a Singapore-owned start-up that also operates in Indonesia. She was very happy with this workshop which also supports SDGs target number 7.
- She also promotes her movement about the Catalyst program from Singapore called Catalyst 2030. Catalyst 2030 is a global movement of social entrepreneurs and social innovators from all sectors who share the common goal of creating innovative, people-centric approaches to attain the Sustainable Development Goals by 2030.

Wong - Malaysia

- He stressed the interest on Renewable Energy markets in Indonesia, it is has high potential within the region.
- The challenge for Startups are must be able to find the right current market and tariff structure, since Renewable Energy is really competing with traditional energy sources.
- Malaysia is working on Renewable Energy issues by working on Policy and Regulations to achieve the Sustainability and Clean Energy Country by 2040.
- The implementation mechanism in Indonesia gives positive necessary insight to Malaysia, for learning about the common problems, business models and policies.
- He also send the warmest thank you to the Organizer because of the very insightful discussion for the last 2 days.

Lisa - PH

- The workshop provide an innovative exchange information to the participants.
- Best practices and sharing information regarding Renewable Energy projects are necessary for future prospects.

Wipassapon - THA

- He stressed Key Messages from Startups Ecosystem could be more emphasized on some economic sectors such as Agriculture, Industrial, Residential and Transportation.

Andante Hadi - JPN (andante.hadi@aoni.waseda.jp)

- She is working in Waseda University as a Researcher. She's creating a Guideline about Renewable Energy.
- The information given by the Speakers related to market environment and financing are very useful for practitioners.
- She also commended the best practices by BIRU program by providing accessibility on financial mechanisms and technical assistance for their bio-gas clients.
- Close to 90% of energy in Japan is imported from abroad. Japan's dependency on energy supplies and Indonesia's abundance of energy could complement the supply-demand opportunities on renewable energy.
- She also stressed the importance of energy storage. Energy storage is important for Renewable Energy distributions.

Elaine YIP - Hongkong China

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- The Development of Renewable Energy in HKC is considerably progressing since the government is giving consideration towards this issue.
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- He stated the urgency of the dynamic era that can shape the Renewable Energy trends.
- He proposes an Idea called : The Holistic Ecosystem for Raising the Renewable Energy Startup
- Attract the government to promote the start-up, policy friendly to scale the business, and involve the start-up in government agenda or program. The key factor is the Government.
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- Mapping the talent pool to do internships or full time candidates for the Startup. The key factor is the Private Sector.

V. Summary of the Workshop

From the speaker's presentation and the productive discussion in the workshop, several key finding that could be summarized are as follow:

- Asia Pacific is one of the fastest growing and most populous region in the world. That makes demand of electricity is continuously growing while most of the electricity are generated by coal and contribute to high carbon. To attain APEC goal to double the share of renewable energy in APEC's overall energy mix by 2030, there is need an increase in renewable energy investment, particularly for relocation of capital within the sector.
- Energy efficiency is still untapped in South East Asia for example charging facility to vehicle and electricity. South East Asia Clean Energy Facility (SEACEF) estimates that between 2020 and 2030 investment will be required to unlock over USD 500 billion of clean energy projects and businesses in Viet Nam, Indonesia, and the Philippines between now and 2030.

- Investment in renewable energy is showing incremental trend. In 2020 it reached $501 bn globally, increased 9% than previous year. Asia Pacific economies are the frontier for renewable energy investment as energy demand grow and market readiness to host large scale investment.
- There is a huge opportunity for startups to support energy transition from technology provider, jobs and finance. In energy transition process, startups can create opportunities for job creation as well as wealth creation. APEC economies need to make a more flexible market design that allows clean energy startups be massively adopted as occurred in Viet Nam, China, and Australia. Here are some opportunities for clean energy startups development:
    - The energy transition is trending, more curiosities and interested parties in renewable energy.
    - Clean energy technologies are democratic, they can answer contextual problems and applicable to surrounding needs.
    - Policies are now moving towards clean energy transition.
    - Renewable power is increasingly cheaper than any new electricity capacity based on fossil fuels.
    - The cost of installing and maintaining renewable energy continues to decline.
    - On average, new solar photovoltaic (PV) and onshore wind power cost less than keeping existing coal plants in operation.
    - Hyper-connected world with virtual meetings, IoT, and blockchain.
- However, funding renewable energy sectors still have various limitations in some developing economies. In several economies in Southeast Asia, capital costs are relatively high while in some cases getting international funding are hindered by uncertain regulation. The other investor's concerns to finance renewable energy sectors are availability of land, cost of land, and the level of transmission infrastructure.
- Local entrepreneurs still face difficulties to initiate startup in renewable and clean energy sectors. In the early stages of development, the start-up may not have source of funding and stable business model. The risk averse investors count on amount of

return, the period of return, and the potential risks. Some of the problem faced by clean energy startup entrepreneurs are:

- Mismatch between ideas from startups with investors interest.
- Financing renewable energy projects using private equity is an expensive option because investors will expect to get a high return
- Regulation such as uncertainty and the scope of what are defined as renewable energy. Regulatory construct that cannot keep up with the pace of change of the electricity markets.
- Lack of human resources to run the business especially in rural area.
- Consumers still view that renewable energy is expensive, in the other hand, energy from fossil are subsidized by government. Tariff policy is key in the development of the renewable energy sector.
- Lack of consumers consideration to consume products and services that protect environment.
- The limitation of connectivity to transmission and distribution line.
- Lack of collaboration between related stakeholder in renewable energy sectors. In general, there are four stakeholders who can be involved in the development of clean energy start-ups, there are private sector, investor, government, and civil society.

- It's really important for incubators and accelerators to assist and support service oriented startup companies in their business model. The role of business incubator and startups accelerators are crucial for clean energy startups development to create innovation and inventions that have real impact to the targeted consumers.
- From a business point of view, clean energy startups should not only focus on energy itself but could be more emphasized on some economic sectors. For example, the development of solar cooling equipment used on fishing vessels. Another example is the domestic biogas program carried out in Indonesia that can create other startups in the field of agricultural sector development.
- Regarding the gender issue, women engagement in clean energy sectors is still limited. There are three main burdens to entry for women in this sector, namely perception of gender role, cultural and social norms, and prevailing hiring practices.

VI. Pre-Test and Post-Test Evaluation

The participants were suggested by the committee to take the pre-test prior to the event began and to take another post-test upon the completion of the event. Pre and post-test consisting of 10 matched true/false and multiple-choice questions were designed to test similar areas of knowledge with each question set. Test were used as comparative data to measure the level of knowledge of the participants before and after the workshop. The number of participants that managed to fulfilled both pre-test and post-test were 111 or 45% of the total participants. In average, the level of participants understanding after the workshop is 92,66%. The level of knowledge from all responding participants increased is 33,7%. The proposal set the target that 80% of al participants will increase their knowledge after the workshop. The test results confirmed all participants that fulfilled the post-test acquired higher score compare to their score in pre-test. Table below shows the percentage of participants with correct answers on the pre-test and post-test.

Result of Pre and Post-Test

Question	Pre-Test	Post-Test
	% Correct	% Correct
Q1	47.8	60.32
Q2	80.3	93.6
Q3	45.5	90.2
Q4	75.9	90.6
Q5	65.9	93.4
Q6	81.9	92.3
Q7	42.1	93.6
Q8	24.7	95.1
Q9	67.6	92.4
Q10	57.6	94.1
Average	**58.9**	**92.66**

VII. Recommendation

Recommendation for business and start-ups actors:

- In order to create sustainable startup, several factors need to be considered by the entrepreneurs, such as
  - The initial purposes of building the startups. It really takes a lot of thinking to create sustainable startup. Start-up founders need to be fully committed to their business. Perseverance is key. See loophole in regulations as an opportunity instead of as a barrier.
  - Generate mutual team respect. Startup need to find a founding team and co-founders who can share the same goals and visions.
  - The 3Hs for a startup team, namely hacker (developer), hipster (designer), and hustler (businessman).
- The business incubator currently still focusses on tangible product, while renewable energy is considered as services-oriented business. It is really important for incubators to give more assistants and supports the services-oriented startups companies to catch up.
- In accelerating the transition to renewable energy, it is need more efficient technology development and business matching.
- In general, there are four stakeholders who can be involved in the development of clean energy start-ups, there are private sector, investor, government, and civil society. Collaboration and proper policy design would create a sustainable clean energy start-ups ecosystem. Support from the government and civil society is urgently needed by clean energy start-ups from an early stage. In the same time, incumbents Industry practitioners need to collaborate with start-ups, instead of competing.
- One of the important problems to tackle is talent readiness to run the renewable energy startups business. One of solutions is the industry should be more open to the public involvement like giving internships and incubator programs.

Recommendation for government

- Governments need to list the many things that need to be done regarding renewable energy sectors to reform and generate the greatest benefits for society. Clarity of regulations is important because investors can assess the risk of financing

accordingly. Policies need to ensure effective pure integration and reduce risk of curtailment. It is important to formulate electric policies that reduce the cost of capital and increase financing and investment in renewable energy.

- The obstacles in the development of renewable energy in various developing economy include connectivity to transmission and distribution lines. The government needs to immediately build an equitable transmission and distribution network that reaches the entire community.
- Renewable energy prices need to be more competitive than conventional energy prices, such as coal and oil. Thus, the subsidy policy needs to be reform in order to provide same level of competition between conventional energy resources and the renewable energy based.
- Government be supposed to provide education regarding the important and benefits of renewable energy to society. Campaigns can be created to encourage people to use renewable products.
- Government should encourage and facilitate collaboration between stakeholders engaging in renewable energy sectors. Ensuring that all government agencies can work together and cooperatively support and facilitate renewable energy targets or programs.