ACEF 2019

DEEP DIVE WORKSHOP

Utility-Scale Renewables: Challenges in Developing Solar and Wind Energy Projects

ADB

NREL
NATIONAL RENEWABLE ENERGY LABORATORY

PFAN
Accelerating Investment for Climate and Clean Energy

USAID
FROM THE AMERICAN PEOPLE

POST-EVENT REPORT

OUTLINE

- Overview
- Part 1: Setting the scene: opportunities and barriers; updated costs for renewable energy
- Part 2: Stakeholder perspectives
- Part 3: Case studies
- Closing remarks

OVERVIEW

While utility-scale solar and wind energy projects have become increasingly cost-competitive with conventional power generation, the rate of deployment of both capacity and capital for such projects is far lower than the market requirement. There is a critical need for not only accelerating the pace of renewable energy (RE) deployment but also mobilizing more funds to meet the national targets set by countries as a part of the Paris Climate Agreement.

To initiate a dialogue on these issues, the United States Agency for International Development (USAID) in partnership with the Private Financing Advisory Network (PFAN), ADB's Environmental Thematic Group, the U.S. Department of Energy's National Renewable Energy Laboratory (NREL), the USAID Clean Power Asia program, and the Association of Southeast Asian Nations (ASEAN) Centre for Energy (ACE), organized a Deep Dive Workshop (DDW) at the Asia Clean Energy Forum (ACEF) 2019.

Asia Clean Energy Forum

A regional platform to define and discuss critical issues

The organizers chose to have the workshop at ACEF 2019 to leverage the 1,000+ energy and climate professionals that convene at this Forum in Manila each year. The 14th edition of ACEF was held from the 17th–21st of June 2019 with 1,625 participants from 75 countries. ACEF 2019 included 22 DDWs including "Utility-Scale Renewables: Challenges in Developing Solar and Wind Energy Projects", which was held on Friday, 21 June 2019 with more than 200 participants in attendance.

ABOUT THE WORKSHOP

The Deep Dive Workshop (DDW) on “Utility-Scale Renewables: Challenges in Developing Solar and Wind Energy Projects” primarily focused on identifying on-the-ground challenges faced by different stakeholders (project developers, investors, and governments) in the development of utility-scale wind and solar energy projects, and identifying effective solutions to address them.

20 +
Speakers

200 +
Participants

The full-day workshop consisted of three parts, with thought-provoking presentations and panel discussions.

PART 1

Setting the scene: Opportunities and barriers for renewable energy

- Unveiling and presentation of results of NREL's recent geo-spatial analysis of the levelized cost of energy of utility-scale wind and solar energy in Southeast Asia.
- Discussion of results of recent survey on barriers to private sector investment and audience poll on barriers to investment in renewables in Asia.

PART 2

Stakeholder perspectives

Insightful panel discussions highlighting the perspectives of four groups of stakeholders:

1. Project developers;
2. Investors and lenders;
3. Government and utilities; and
4. International donor agencies.

PART 3

Case studies in Solar and Wind Energy

Case studies highlighting specific aspects of project development, financing, and implementation, covering:

- Wind energy in Bangladesh,
- Solar energy in Vietnam,
- Protection of migratory birds at wind farms, and
- RE Auctions in Cambodia and Kazakhstan.

OPENING REMARKS

The workshop kicked off with opening remarks by co-organizers including Jennifer Leisch, Climate and Energy Specialist and USAID-NREL Partnership Manager, USAID; Angela Hogg, Regional Environment Office Director, RDMA/USAID; Srinivas Sampath, Head of PPP Thematic Group, Office of Public Private Procurement, ADB; and Peter du Pont, Asia Regional Coordinator, Private Financing Advisory Network (PFAN).

Jennifer Leisch, USAID

PART 1: SETTING THE SCENE: OPPORTUNITIES AND BARRIERS UPDATED COSTS FOR RENEWABLE ENERGY

A key market deterrent today is the lack of reliable data and analyses that can help make informed decisions on the investment and deployment of RE, particularly in developing Asian countries. NREL has developed a "Cost of Energy Mapping Tool" within the ASEAN Renewable Energy Data Explorer (www.re-explorer.org), which provides RE data and analytical tools to stakeholders. Nathan Lee, Researcher - Power Sector Planning, NREL, and Beni Suryadi, Manager - Policy Research and Analytics Program, ACE, provided the key takeaways of the first-of-its-kind analysis and tool, which estimates the generation costs of utility-scale wind and solar across ASEAN member states, expressed as the levelized cost of energy (LCOE).

This was followed by a presentation by Carishma Gokhale-Welch, Project Leader - Clean Energy, NREL, who provided highlights of a recent survey of private sector stakeholders on barriers to clean energy investment in emerging markets and conducted a poll of the DDW participants, both of which showed that inadequate policies and regulations are considered the major barrier in project development.

Carishma Gokhale-Welch, NREL

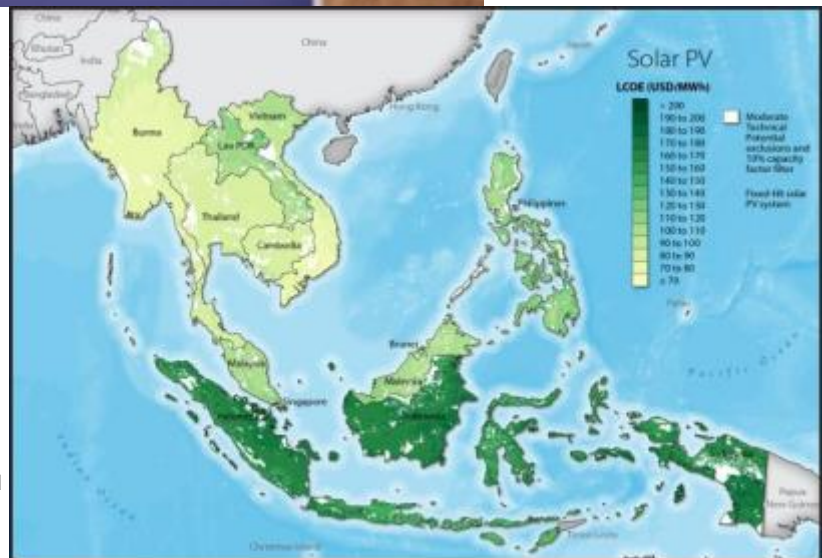

Figure: Nathan Lee, Francisco Flores-Espino, Ricardo Oliveira, Billy Roberts, Thomas Bowen, Jessica Katz. 2019. Exploring Renewable Energy Opportunities in Select Southeast Asian Countries: A Geospatial Analysis of the Levelized Cost of Energy of Utility-Scale Wind and Solar Photovoltaics. NREL/TP-7A40-71814. https://www.nrel.gov/docs/fy19osti/71814.pdf

Key Takeaways

- Economic growth in ASEAN is faster than the world average, and this requires significant growth in energy supply infrastructure.
- The ASEAN target to have RE account for 23% of its total primary energy supply by 2025 is likely to be met mostly by variable renewables.
- There is a lack of high-quality, robust cost data to support project development and assessment, and the ASEAN RE Data Explorer aims to fill this gap.
- The results of the Levelized Cost of Energy (LCOE) analysis and tool can be used by policymakers, planners, developers and utilities, to set targets, and identify attractive areas for RE development, and further inform RE analyses.
- Southeast Asia has abundant opportunities for renewables with LCOE below USD 150/MWh (US 15 cents per kWh). The potential for solar and wind exceeds 31 TW (44,441 TWh/year) and 1.4 TW (2,538 TWh/year), respectively.
- Key barriers to RE development identified in a survey and audience poll include political instability, access to finance, lack of local technical expertise, and renewable energy policy and incentives.
- Possible solutions include transparent interconnection standards, establishing enforceable contracts, well designed auctions and power purchase agreements, strengthening technical capabilities, building investor confidence, and sharing of best practices and peer learning.

Live Audience Poll: Barriers to Private Sector Investment

26% of the DDW participants were from the private sector and 25% said that they were involved in policy development.

Key Result

51% of the participants see the lack of supportive policies and regulations as the biggest barrier to RE investment.

PART 2: STAKEHOLDER PERSPECTIVES

A variety of stakeholders play a key role in shaping the market ecosystem for the uptake of renewables. Be it a project developer, investor, utility or a donor—each stakeholder has unique perspectives, challenges and even success stories of what has worked, based on their experience in the region.

Part 2 of the DDW included two 45-minute panel discussions to hear from different stakeholder groups on what they feel are the real issues on the ground.

The first panel discussion focused on project developers, investors, and lenders. The panellists included: Iñaki Perez, Asia Practice Lead -Solar, Mott Macdonald; Gary Zieff, Principal Energy Advisor - Renewable Energy, Deloitte; Eunjoo Park-Minc, Head of Sustainable Energy Finance, BDO; and Ugo Bernal, Senior Business Development Manager, Symbior Solar.

The panel discussion was moderated by Peter Storey, Global Coordinator, PFAN.

Peter Storey of PFAN (left) leads a panel discussion.

Key Takeaways

- A key challenge for project developers is the long development time. This is particularly true for auctions with a requirement of obtaining land use rights before the bidding process.
- Challenges are highly diverse and vary across countries. The challenges with land topography are complex in ASEAN, with high competition for land use and processes for obtaining land rights not always transparent. Natural hazards are also significant and more severe in this region than elsewhere.
- The existing grid infrastructure in many countries is inadequate to absorb large quantities of RE and needs an upgrade.
- Private banks are concerned about corporate risk, even in project finance. For them, relationships and sponsors are important, besides projected cash flows.
- Multinational development banks such as ADB need to be more innovative and unlock private finance for development and engage them to promote green growth.
- There is limited knowledge sharing among countries and stakeholders in the region.
- Utility-scale projects often involve foreign partners, subject to foreign ownership restrictions. This makes it critical to have a strong local partner with good relations.
- Moving from feed-in-tariff to auctions helps in adequate price discovery and control over the volume of procurement. However, it is important to note that overly aggressive developers are making low price bids but may be unable to deliver.
- Distributed RE for commercial and industrial applications is where the market is going, this comes with its own set of challenges, such as credit-worthy offtakers and challenges to finance small-scale projects.

The second panel discussion focused on the perspective of the government, utilities and donor agencies. The panellists included: Emma Marsden, Senior Environment Specialist, ADB; Rajiv Rishyakaran, Minister's Special Officer and SEDA Board Member, Malaysia; Camilla Fenning, Head of Climate Change and Energy Attaché Network in South East Asia, UK Foreign and Commonwealth Office (FCO); and Julie Dulce, Utility Economics Analyst, Meralco. The panel discussion was moderated by Dana Kenney, Chief of Party, USAID Clean Power Asia.

Key Takeaways

- Malaysia discontinued its feed-in tariff (FIT) for solar and switched to auctions. It is currently running the third large-scale tender for 500 MW. The Government is concerned about the tariff and long-term costs of RE and is looking to work with the private sector to achieve cost reductions.

- The three-year £15m FCO Prosperity Fund's ASEAN Low Carbon Energy Programme will support six ASEAN countries (Vietnam, Thailand, Myanmar, Malaysia, Indonesia, Philippines) in facilitating green finance flows and establishing an enabling policy and regulatory environment for energy efficiency.

- Green Bonds have raised USD 5 billion for green projects resulting in ADB financing for 1,500 MW of wind projects; most of which have come from private sector.

- National and international standards are not always aligned. In some cases, ADB has been unable to finance wind projects because potential impacts on birds were not taken into account. So, it is important to ensure international social and environmental safeguards are met at an early stage.

- Malaysia is planning to open up the grid for third-party access which will pose a new challenge for financing as Malaysian banks are more used to dealing with the utility than private corporations for power transactions.

- Bureaucracy is a huge barrier. Approval process for renewables should not only be shorter and simpler but also transparent.

PART 3: CASE STUDIES

Case studies can help stakeholders identify practical solutions and provide insights to real challenges and facilitate the dissemination of best practices. For this purpose, part 3 of the DDW was designed solely to focus on case studies demonstrating particular aspects of project development, financing, and implementation, including the range of issues from environmental assessment, community engagement, land procurement, PPA development, securing of investment, effective project implementation, and eventual exit of initial investors.

Five examples of real-world experience with perspectives from the ground from Bangladesh, Vietnam, Cambodia, Kazakhstan and the Asia region were shared with the DDW participants.

Case Study 1

Opportunities and challenges to utility-scale wind development in Bangladesh

Presenter: Salima Jahan, Sustainable and Renewable Energy Development Authority (SREDA), Bangladesh

Bangladesh is facing a shortage of energy resources, with the domestic natural gas supply gradually depleting and the dependency on energy imports increasing. The country has significant potential for wind power and the government has ambitious plans to expand investment in wind. The government has set a target of generating 10% of electricity from renewables and wind is targeted to account for approximately 35% of all renewables.

Currently, Bangladesh has two pilot projects on wind power, installed in 2006 and 2008. In 2014, with support from USAID, NREL conducted the first wind resource mapping in Bangladesh. The assessment report in 2018 showed three good areas for wind development. Following the NREL mapping exercise, the government has asked for support to develop policy and regulations to promote wind development in the country.

Key Challenges:

- Lack of adequate infrastructure poses a significant challenge in accessing sites and delivering wind power equipment
- Land scarcity, with competing demands for land associated with food security
- Lack of local technical expertise in wind energy development
- Insufficient legal and regulatory framework to incentive investment in wind
- Absence of evacuation facilities to evacuate power from a wind farm to the grid

What is required to boost the market?

- Infrastructure: Develop the necessary infrastructure for wind turbines and other equipment.
- Land: Identify potential land for wind development.
- Resource assessment: Conduct an offshore wind study
- Capacity building: Build the capacity of stakeholders.
- Evacuation system: Construction of power evacuation facilities.

“We need new investment and improved technologies to develop the wind power sector in Bangladesh.”

Salima Jahan, Sustainable and Renewable Energy Development Authority (SREDA), Bangladesh

Case Study 2

Challenges in developing large-scale solar in Vietnam

Presenter: David Yeo, Regional Transaction Manager, PFAN

This case study focused on challenges encountered by a local project developer (BIDICO) in developing large-scale solar in Vietnam, including in finalizing a PPA and seeking financing. BIDICO is a conglomerate that owns land at an industrial estate on which it plans to develop a 40 MW solar power plant.

Vietnam's ambitious push for renewables has resulted in an aggressive pipeline of 17 GW of solar since April 2017, aiming to complete installation by the COD deadline of June 30, 2019. The transmission infrastructure is not keeping up with solar project development, and the grid is faced with an overcapacity of solar, leading to curtailment risks.

Vietnam's Energy Strategy outlines the country's RE targets, which include 6.5% from RE by 2020, 6.9% by 2025, and 10.7% by 2030. To meet these aggressive targets, the country should explore Public-Private Partnerships to expand the grid. This could be in the form of a single private entity or a consortium of companies.

Key Challenges:

- The amount of solar under development is much higher than what the transmission infrastructure can handle.
- Standard PPA is not bankable. Even with a signed PPA, EVN can reject power if the grid is overloaded.
- Closest connection to grid from BIDICO's project is 2km away but needs to share with multiple solar projects. An alternative connection point is 5km away, but government does not allow BIDICO to build transmission line to further connecting point due to government monopoly on transmission.

What is required to boost the market?

- Greater and more effective interaction between key stakeholders, including government and developers.
- Government should allow private sector participation in the development of grid infrastructure
- Planning must be developed to enable large-scale solar in Vietnam.
- Resource allocation and project preparation are critical for market offtake.

"If a private party can come in and make a proposal to expand grid capacity, a leasing model or other mechanism could allow that private party to recover costs."

David Yeo, *Regional Transaction Manager, PFAN*

Case Study 3

Mitigation of negative impacts of wind farms on birds and bats

Presenters: Ding Li Yong, Birdlife International; Tami Putri, The Biodiversity Consultancy; Filipe Canario, Strix; and Sue Mulhall, Birdlife International

This case study presented examples from wind energy projects worldwide to demonstrate the negative impacts of wind energy farms on birds and bats, and approaches to mitigate these, including proper siting, special design of wind farm and turbines, and technology-based solutions.

Birdlife International supports the shift to RE and wants to work with the industry through science, partnership and practical action. The organization monitors the health of more than 13,000 areas important to birds and biodiversity globally.

Two case studies provided a perspective of how wind parks can be planned, designed and developed to mitigate negative impacts related to birds. In Kenya, The Biodiversity Consultancy did a strategic environment assessment for the wind sector, with a focus on critically endangered vultures that are at risk from wind power development. It produced heat maps that show collision risks and identify sites where wind farms could be located to minimize impacts.

Strix shared its experience with radar-assisted shutdown of wind turbines on demand, which is an active turbine management solution that avoids bird mortality at wind farms by selectively shutting down turbines as bird flocks approach and pass through. A case study using Shutdown on Demand in Egypt found that 34 species of soaring birds were present at the wind power site and that nearly 400,000 soaring birds cross through the site each year. Using the Shutdown on Demand system achieved a 99.99% bird protection rate with only a 0.03% energy loss due to the shutdowns.

Key takeaways

- RE and other infrastructure development can result in displacement of and disturbance to birds, collision mortality, habitat destruction and alteration, barrier effects to key migratory routes and flyways, and other cascading “impact effects” on ecosystem services.

- Nature-sensitive siting of RE projects and technology-based solutions can help address these adverse impacts.

“We should choose the best locations for wind farms, but even if we choose the best locations, there will still be impacts to birds that should be avoided and minimized.”

Sue Mulhall and Ding Li Yong, Birdlife International

“The Shutdown on Demand radar-assisted system is a very good way to align clean energy production and the protection of biodiversity.”

Tami Putri, The Biodiversity Consultancy; Filipe Canario, Strix

Case Study 4

Solar in Cambodia

Presenter: Ferran Vila Planas and Pradeep Tharakan, ADB

This case study showcased an exemplary partnership between ADB and the Cambodian government to develop solar power in the country in stages. This included investment in the first competitively tendered solar farm (10 MW), investment in the transmission infrastructure, and development of a solar park to reduce transaction costs and bring in international technology and investment to partner with Cambodians.

ADB is providing support to Cambodia's state-run electricity supplier Electricité du Cambodge (EdC) to build a 100 MW capacity national solar park and tender out a 60 MW (Phase 1) solar plant. Approximately 150 companies acquired tender documents and 26 submitted bids. ADB's role includes supporting a grid study to review the capacity to integrate solar in Cambodia's generation pool; and a feasibility study for solar park infrastructure and providing transaction advisory for Phase 1 of solar PV power plants. In addition, ADB is providing sovereign financing of the solar park infrastructure, including pooling substation and transmission lines to the national grid.

Lessons Learned

- A ‘One ADB’ approach integrating sovereign operations and Private Sector Operations Department (PSOD) enables a strong value proposition to clients.
- There is very strong market interest in solar projects in Cambodia if structuring and risk allocation is sensible.
- In this example there remains some credit payment risk (e.g. no sovereign guarantee) and an untested market.

“We hope this project, once concluded, will be an example model for the region.”

Pradeep Tharakan,

Principal Energy Specialist, ADB

Case Study 5

Solar in Kazakhstan

Presenter: Ruslan Dosmaiyl, Development Department Manager, Financial Settlement Center of Renewable Energy, Kazakhstan

This case study provided an overview of the renewable energy auction process in Kazakhstan, presented from the perspective of the system operator.

Kazakhstan's RE targets include a 3% RE share of total generation by 2020, 10% by 2030, and 50% by 2050. The country's 2013 Energy Support Law guaranteed purchase of RE for 15 years through power purchase agreements. The feed in tariffs were indexed each year to inflation currency exchange rates and RE facilities were given priority to dispatch and exempted from power transmission costs. This led to the rapid growth of RE in the country, with 500 MW of RE by the end of 2015. However, the energy prices remained too high for consumers, and there was uncertainty in future RE capacities. The low attractiveness of the RE market was also a challenge.

Transitioning to a RE auction mechanism helped address these challenges. Kazakhstan's solar auction included a sealed-bid process, strong transparency, least-cost winner selection criteria, and a clear and non-changeable auction schedule provided by the government. It also focused on stakeholder engagement through workshops that led to several changes in the auction process, such as simplifying applications, increasing competition, adjusting rules for bank guarantees, and optimizing the auction process in other ways. Kazakhstan also worked with UNDP and NREL to conduct wind and solar resource assessment. These assessments provided useful data to further develop the auction process. The RE auction resulted in 113 companies participating from nine countries, with 857 MW awarded to winning bids from a total of 36 projects.

Lessons Learned

- We need strong planning for variable RE (VRE) deployment, wind and solar measurements, and VRE forecasting, and we need to adjust the auction design to reach our goals.
- Our upcoming auctions will include a mix of sealed-bid auctions and site-specific auctions, and in the future, we plan to transition to entirely site-specific auctions.

"Our Minister of Energy attracts investors using a lot of channels. We also have a Kazakh investment company that is responsible for attracting new investors."

Ruslan Dosmaiyl,
Development Department Manager,
Financial Settlement Center of Renewable Energy, Kazakhstan

CONCLUDING REMARKS

Mark Lister, Asia Clean Energy Partners provided a summary of key recommendations and best practices that could be leveraged across Asia. He said that there is a critical need for good market design to help achieving efficiencies. Similarly, there is great potential for market facilitators to take innovative approaches for greater impact. Most importantly, there is a need for partnerships, aligned with the ACEF 2019 theme of Partnering for Impact, including formalizing mechanisms for partnerships at scale.

WHAT NEXT?

The DDW organizers developed the following set of recommendations based on the workshop discussion and inputs:

- Consider a survey suggesting possible tracks or future discussion topics
- Accessing and digesting the significant amount of information available in our community of practice is a challenge; a directory of some sort could be useful.
- Profiles of projects successfully developed in the region could be useful as a guide, to provide insights on challenges encountered and how they were overcome.
- Identifying the types of technical assistance resources that donors can develop and provide to best support our community of practice would be helpful.
- For more information and to access the presentations visit: http://www.asiacleanenergyforum.org/