

**PEREZ-GUERRERO TRUST FUND FOR ECONOMIC AND TECHNICAL
COOPERATION AMONG DEVELOPING COUNTRIES**

(G77 Project)

Final Report

on

**Seminar on the Application of Solar Power Technology for
Asian Countries**



**NATIONAL RESEARCH INSTITUTE FOR RURAL ELECTRIFICATION,
MINISTRY OF WATER RESOURCES, P. R. CHINA /
HANGZHOU REGIONAL CENTER (ASIA-PACIFIC)
FOR SMALL HYDRO POWER**

October 2022, HANGZHOU, CHINA

G77 PGTF Project Final Report

Introduction

The Group of 77 approved the project entitled “Seminar on the Application of Solar Power Technology for Asian Countries” with the funding source from the Perez-Guerrero Trust Fund (PGTF)-Reference Number INT/21/K04 at the 44th Annual Meeting of Ministers for Foreign Affairs of the Group of 77, which was submitted by National Research Institute for Rural Electrification, Ministry of Water Resources, P. R. China (hereinafter referred to as NRIRE). The duration of the project is 1 year, and according to the signed project document, it started in October 2021, and completed in October 2022.

The Final Report included the project implementation activities, expenses and other related content.

I. Project Overview

1. **Project Title:** Seminar on the Application of Solar Power Technology for Asian Countries
2. **Abstract:** Solar power, as an environmentally sound energy, has outstanding advantages compared with hydropower and wind energy, since it is not only feasible for both off-grid and on-grid operation, but also applicable for being integrated with hydropower, solar and even diesel engine as a hybrid development mode. However, how to tap this unlimited renewable energy resource becomes a common challenge to all Asian nations since it needs know-how and proven practice, but actually, there is short of technology, talent and associated production lines etc. in most Asian countries. The seminar aims to share the hands-on practice about the application of solar power technology, so as to tap solar power for the sustainable development of economies and societies in Asian countries, and help to mitigate the climate change affects and promote the achievements of SDGs globally.
3. **Background Analysis:** Most of the Asian countries have been experiencing social, economic, and environmental effects of fossil-fuel dependence including energy crisis, dramatic fluctuations in oil price, polluted atmosphere and finally the documented consequences of climate change, while the most Asia is naturally endowed with huge potential of solar energy, owing to the geographical location on the globe. It is unanimously agreed solar power, as an environmentally sound energy, has outstanding advantages compared with hydropower and wind energy, since it is not only feasible for both off-grid and on-grid operation, but also applicable for being integrated with hydropower, solar and even diesel engine as a hybrid development mode. Solar power is now getting much more popular in the world and is providing a large amount of electricity to households, industry and

agriculture as well.

How to tap this unlimited renewable energy resources becomes a common challenge to all Asian nations since it needs know-how and proven practice, but actually, there is short of technology, talent and associated production lines etc. in most Asian countries. In contrast, China accumulated quite a lot of experience in the development of solar energy through years of practice and there is massive production capacity, and the related equipment like PV panels and inverters etc. has been widely accepted in the world market. Therefore, it seems meaningful to share Chinese know-how, experience and practice with other Asian countries to tap solar power for the sustainable development of their economies and societies, and it will help to mitigate the climate change affects and promote the achievements of SDGs globally.

To address the issue of technological constraint in developing solar power, most Asian countries initiated a series of activities for improving the expertise about the solar power technology and its application, inclusive of technical training, R+D, technology transfer and project demonstration etc. so as to achieve sufficient experience and know-how. The result is still far from being expected, because there is neither competent technical & managerial talents, nor production lines. There needs multilateral South-South and Triangle cooperation where China is willing to share his know-how and proven practice to other Asian countries and to scale up the development of solar energy for the beneficiary countries with duplicable financing scenarios. Technical and economic cooperation between China and other countries in East Asia, South Asia, Southeast Asia and West Asia has been put into reality for a long run, but there is still an urgent need to improving the technical capability in most of Asian countries.

II. Implementation

The project is divided into three distinct stages. The first two stages are relevant to this current project document, with the last stage representing ongoing strategies into the future.

Supporting and Partner Institutions:

- ★China International Center for Economic and Technical Exchanges
- ★Department of Science, Technology and International Cooperation, Ministry of Water Resources of the People's Republic of China
- ★Institute for Hydropower and Renewable Energy, Ministry of Agriculture and Rural Development, Vietnam
- ★Pakistan Council of Renewable Energy Technology, Ministry of Science and Technology

- The first phase of the project involved the selection and compilation of training materials, allocation of lecturers and recruitment of participants from Asian Countries for the Seminar.
- The second phase of the project involved the organization of the Seminar on the Application of Solar Power Technology for Asian Countries online
- The third phase of the project involves substantial cooperation and promotion of the application of solar power technology, and exploring the possibility of implementing a demonstration project of solar power technology in several Asian Countries.

2. Benefits:

- An in-depth understanding of energy situation and facing problems of most Asian countries
- Awareness of the importance of developing solar power technology for households lighting, solar-powered water purification, water supply and farmland irrigation etc.
- Dissemination and sharing of experience, technology and research findings of China and other Asian countries in relevant areas of solar power technology
- Enhancement of understanding, communication and cooperation among relevant governmental authorities of China and other Asian countries
- Establishment of bilateral as well as multilateral relationships and cooperation among Asian Countries in order to exchange knowledge, transfer technologies and carry out R&D on solar power technology development to tackle the common issues and problems faced by the participating countries through the efforts of the institutions and agencies involved

III. Completed Activities at the First Stage

Activity – 1: Selection and compilation of training materials, allocation of lecturers

Time: October 2021– May 2022

Location: China

Participants: NRIRE; Institute for Hydropower and Renewable Energy, Ministry of Agriculture and Rural Development, Vietnam

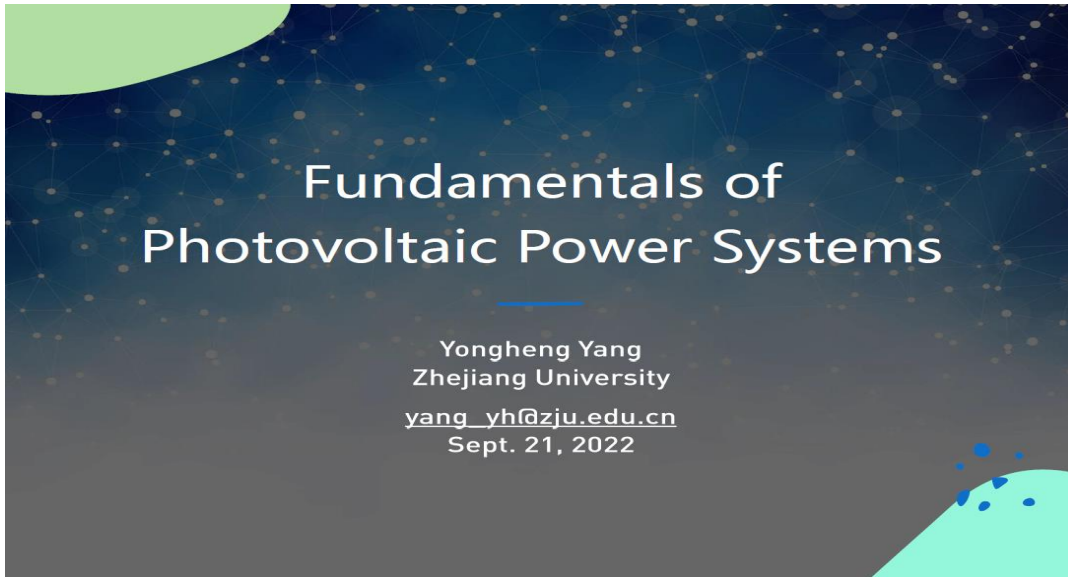
Implementation: Entrusted by Ministry of Water Resources, Ministry of Commerce, Ministry of Science and Technology, Ministry of Foreign Affairs, UNDP, UNIDO, ILO, FAO, ASEAN Secretariat, etc., NRIRE has successfully organized both at home and abroad in total 139 seminars, training courses and workshops covering the subjects of clean energy, rural electrification, water management, small hydropower, and etc., which have embraced about 4000 participants both at managerial and technical levels from some 123 countries. Till now, HRC successfully held 22 online seminars with the attendance of around 1500 participants. All the seminars were highly appraised by the officials and experts attending the event. Based on the experience in training programs and considering the features of this project, NRIRE appointed 6 experts who are quite experienced in the field of solar power technology and its application to give the lecture on special topics for the coming Seminar after several discussions. Meanwhile, experts from Institute for Hydropower and Renewable Energy, Ministry of

Agriculture and Rural Development, Vietnam put forward suggestions and provide assistance at the preparation stage through extensive contact with NRIRE. Training materials of the lectures were well prepared, checked, translated and compiled.

The presentations on special topics include,

- Fundamentals of Photovoltaic Power System (by Zhejiang University)
- Solar Pumping System Technology Application and Development (by SHENZHEN SOLARTECH RENEWABLE ENERGY CO., LTD)
- Renewable Hybrid Off-grid Generating System Application (by NRIRE)
- BIPV typologies & Integration (by Hohai University)
- Community Infrastructure Construction Planning in Remote Areas Based on Photovoltaic Power Generation (by Hangzhou Haixing Electric Power Technology Co., Ltd)
- Study on Key Technologies of Floating PV Power Station Construction and Establishment of Water Surface Photovoltaic Related Standards (by Carbon Free Tech PTE. LTD)

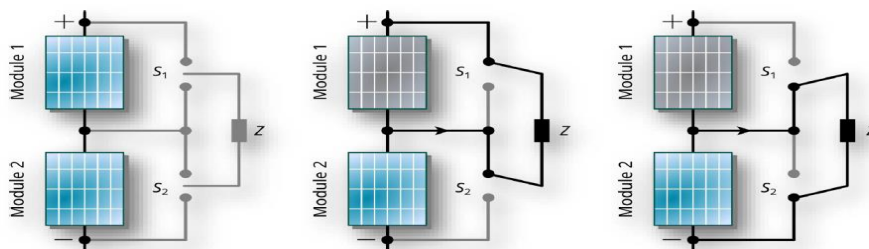
Excerpts of PPT Training Materials



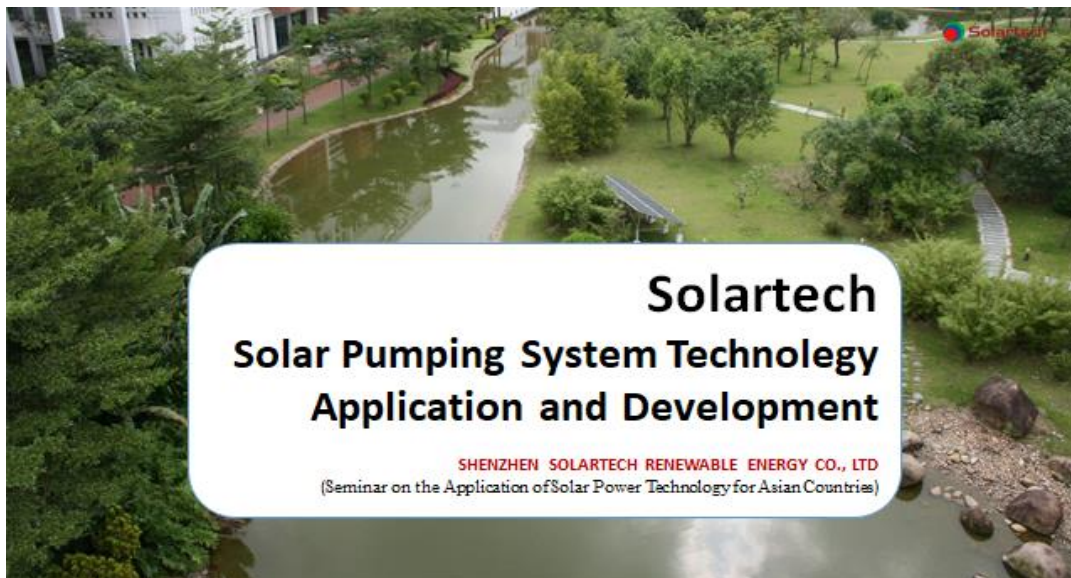
Smart PV Modules

Switched-Impedance converter

- ▶ Impedance Z to balance the current during mismatch
- ▶ Complementary switch S_1 and S_2



The contents of “Fundamentals of Photovoltaic Power System” include the basic of photovoltaic power systems, the general requirements on photovoltaic system, and the design and operation of PV systems, how PV power system integrates to the grid friendly, demands on PV systems and related technologies.



Solartech

多泵并联- Solar Pumping System - Multi-linkage System

Solar Pumping System - Multi-linkage System

- powered by a unified solar array, and multiple sets of solar pumps operate in parallel
- Adopts patented algorithm to adjust the energy distribution according to the change of solar radiation intensity
- ensure that the pump works at the best efficiency point
- the effective utilization rate of solar energy can be increased by 10% ~ 15%
- The system reliability can be improved, and the transportation / installation / maintenance cost can be reduced

The contents of “Solar Pumping System Technology Application and Development” include the solar pumping usages, introduction of solar water conservancy industry, solar pumping products, components, solar pumping technologies, solar pumping advantages, solar pumping benefits, and case studies and so on.

Renewable Hybrid Off-grid Generating System Application 多能互补离网供电系统应用研究

Hangzhou Regional Center (Asia-Pacific) for Small Hydro Power (HRC)
Hangzhou Yatai Hydro Equipment Completing Co., Ltd. (Hangzhou Yatai)



Application range 应用范围

Hybrid

Applications – irrigation

应用场景-灌溉

Normally
Solar + wind
通常采用风光组合供电

Suit for big
irrigation area
适合大面积灌溉区域

Big capacity
requiring
大功率供电需求



Hangzhou Regional Center (Asia-Pacific) for Small Hydro Power (HRC)
Hangzhou Yatai Hydro Equipment Completing Co., Ltd. (Hangzhou Yatai)



The contents of “Renewable Hybrid Off-grid Generating System Application” introduce the connotation of the hybrid power generation system, the application range of the system, the technical solution in different scenario and the investment and development of hybrid power generation projects based on many practical case studies.

PV in Buildings I

BIPV Typologies & Integration

Low Energy Buildings and Photovoltaics

PV well integrated into the building design

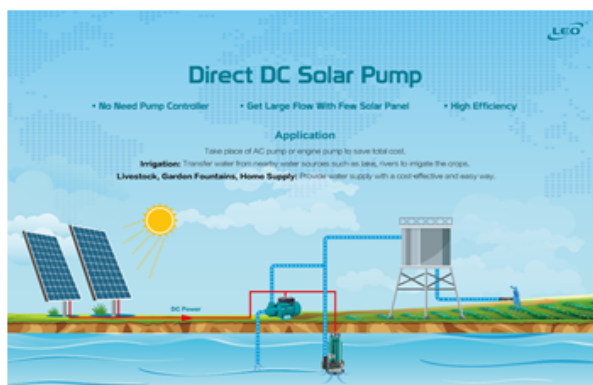
- 5 MW site, Langedijk, Holland
- Well integrated.
- PV system forms a logical part of the building.



The contents of “BIPV typologies & Integration” cover the introduction to BIPV system, technology of BIPV system and its application in different scenario with different solutions



➤ Principles and Application Scenarios



What is the function of the water tank?

The solar water pumping system makes full use of photovoltaic panels to convert solar energy into electricity, and drives water pumps to pump water from deep wells, rivers, lakes, reservoirs and other water sources.

The solar water pumping system is mainly composed of solar modules, solar inverters (controllers), water pumps, water purifiers, water-sale machines, water tanks, etc.

The solar water pump utilizes the lasting energy of the sun, works at sunrise and rests at sunset, without fuel, power grid and batteries. It directly drives the water pump to pump water, which greatly saves construction, operation costs and maintenance.

It can be widely used in agricultural irrigation, desert control, animal husbandry, seawater desalination, landscape fountain, domestic water supply, etc.

The contents of “Community Infrastructure Construction Planning in Remote Areas Based on Photovoltaic Power Generation” provides us with the best solutions for the rural electrification in remote areas based on the increasing global energy and water issues, including micro-grids, photovoltaic pumps and other applications in different scenarios.



漂浮式光伏电站建设关键技术探讨 及水面光伏相关标准制定

Study on Key Technologies of Floating PV Power Station Construction and
Establishment of Water Surface Photovoltaic Related Standards

2022年9月

Sep. 2022

ADB

漂浮式光伏电站设计要点 Important design points of floating PV power station

1. 总平面布置 General layout
2. 子方阵布置 Sub-array arrangement
3. 浮体选择 Floating body selection
4. 设备浮体设计方案 Floating body design for equipment
5. 设备选型 Equipment selection
6. 锚固系统 Anchorage system
7. 电缆选型 Cable selection
8. 接地设计方案 Grounding design

The contents of “Study on Key Technologies of Floating PV Power Station Construction and Establishment of Water Surface Photovoltaic Related Standards” make analysis of the design of floating PV power system, and introduce the anchorage system, as well as the cooperation in design and construction of the system together with some engineering cases.

Screenshots of Online Visit Video



Online Visit to Hybrid Power Generation Lab



Online Visit to Tianhuangping Pumped-Storage Hydro Plant



Online Visit to China's Rural Yucun Village

Activity – 2: Recruitment of participants from Asian Countries

Time: May – June, 2022

Location: China, Bangladesh, Cambodia, Indonesia, Lao PDR, Nepal, Pakistan, the Philippines, Thailand, Uzbekistan and Vietnam

Participants: NRIRE, Ministry of Water Resource of the People’s Republic of China

Implementation: With the great support of Ministry of Water Resource of the People’s Republic of China and related institutes and agencies, project information was disseminated to relevant departments of Asian countries. 50 officials from 10 Asian countries are selected to participate in the coming Seminar

Participants' Information

Seminar on the Application of Solar Power Technology for Asian Countries

No.	Country	Name	Organization	Position	Tel.	Email
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5	Cambodia	Mr. Vuthy Chhon	Kampong Cham province's Department of Mine and Energy of Ministry of Mines and Energy	Vice-Chief Energy and Petroleum	+855-11399322	vuthy.chhon2@gmail.com
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39	Thailand	Mr. ParadornMatchan	TEAM Consulting Engineering and Management PCL.	Hydraulic / Structural Engineer/	+66-894598416	paradorn_m@team.co.th
40	Uzbekistan	Mr. ShokhzodIslamov	Ministry of economic developmentand poverty reduction of the Republic of Uzbekistan	Head of Department	+998 712326594	shislamov@mineconomy.uz
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48	Vietnam	Ms. Thi Thanh Nga Ngo	Institute for Hydropower and Renewable Energy	Researcher	+84-96040981	ngottnga81@gmail.com
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50	Vietnam	Mr. Manh QuangNguyen	Institute for Hydropower and Renewable Energy	Researcher	+84-944802410	Nguyenmanhquang249@gmail.com

IV. Completed Activities at the Second Stage

Activity – 1: Preparations of the Seminar

Time: June-August, 2022

Location: China

Participants: NRIRE

Implementation: NRIRE made considerable preparations for the Seminar together, including:

1. Domestic travel and relevant insurances purchasing for all the participants, lecturers;
2. Establishment of working team for implementing the Seminar and submission of work reports to the related authority on the preparation to launch the project;
3. Selection and determination of the Seminar venue, and the projects and laboratory to produce online visit during the Seminar;
4. Shooting and producing online visit video, including post-production, video subtitle translation, etc.;
5. Drafting of the speeches needed during the seminar and translation work for the presentation delivered at the seminar.

Activity – 2: Implementation of the Seminar

Time: September 19th-21st, 2022

Location: Hangzhou, China

Participants: NRIRE

Implementation: From September 19 to September 23, the " Seminar on the Application of Solar Power Technology for Asian Countries", sponsored by Perez-Guerrero Trust Fund (PGTF) for South-South Cooperation, was held by National Research Institute for Rural Electrification (NRIRE), MWR of China (also known as Hangzhou Regional Center (Asia-Pacific) for Small Hydro Power) (HRC) online. There were in total 50 participants from 10 Asian countries including Bangladesh, Cambodia, Indonesia, Lao PDR, Nepal, Pakistan, the Philippines, Thailand, Uzbekistan and Vietnam attending the 3-day online seminar. Prof. Xu Jincai, Director General of NRIRE addressed the opening ceremony.

During the seminar, presentations covering the topics on solar power technology were arranged. Online visits to HRC's Hybrid Power Generation Lab, Tianhuangping pumped storage power plant and China's Rural Yucun Village were included in the seminar. Moreover, country reports were presented by participants and in-depth discussion and communication also were made.

Excerpts of Country Reports

Country Report of Bangladesh

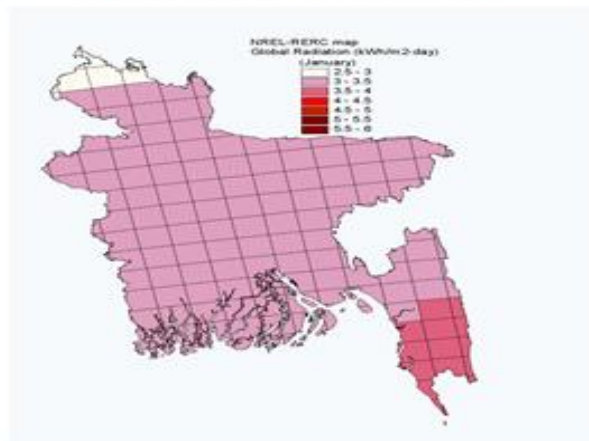
Seminar on the Application of Solar Power Technology for Asian Countries
September 19th-23rd, 2022

Hangzhou, China

Submitted by
Kamrul Ahmed (XEN), BPDB
Md. Ekramul Pasha (SDE), BPDB
Mukul Shikder (AE), BPDB
Kazi Saifi Sami (AE), BPDB
Marla Akhter (AE), BPDB



Resource Potential : Solar



Country Report by Bangladeshi Delegates



Seminar on the Application of Solar Power Technology for Asian Countries

Country Report, Cambodia

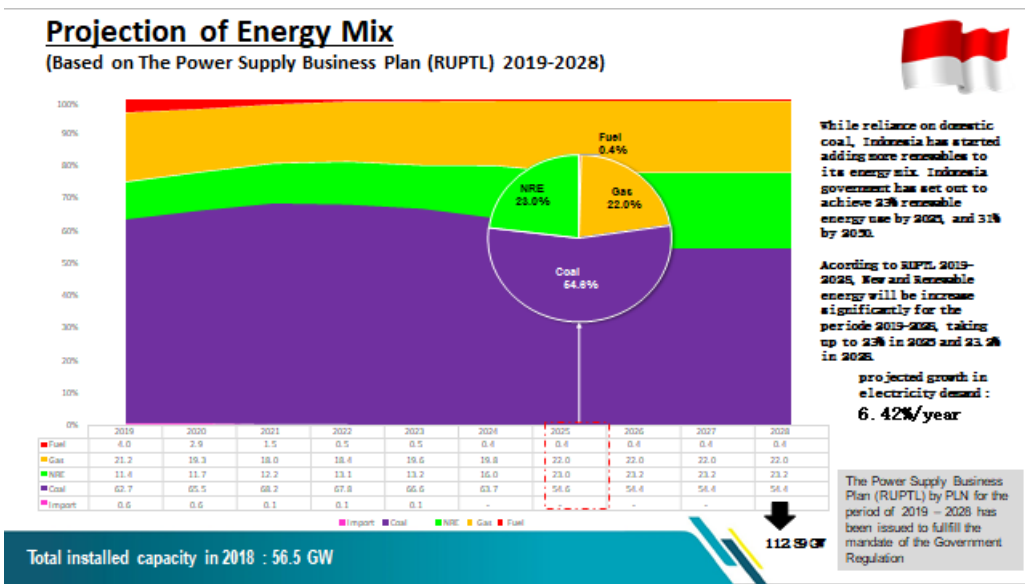
2. Solar Power

- Solar station (Existing 2019-2022)
 - Solar station in Kompong Speur Province 80MW
 - Solar station in Kompong Chang Province 60MW
 - Solar station in Pour Sat Province 30 MW

H. o	Name of Project	Location	Capacity	Existing Year
01		Pour Sat Province	60	2021
02		Battambang Province	60	2020
03		Banteaymeanchey Province	30	2020
04		Svary Rierng Province	20	2021
05		Kompong Chang Province	60	2022
Total			230	

- And there are 4 Solar station is under constructing with total capacity 170MW

Country Report by Cambodian Delegates



Country Report by Indonesian Delegates

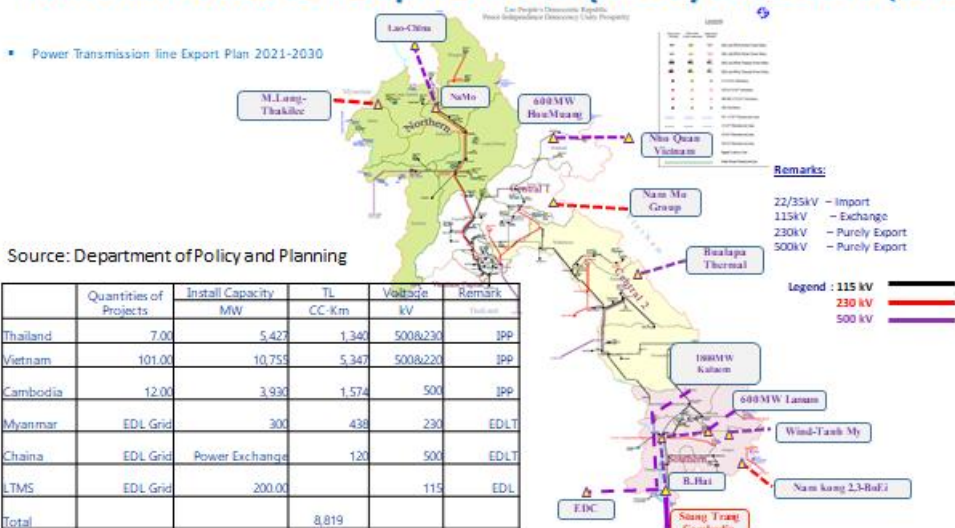
Seminar on the Application of Solar Power Technology for Asian Countries

Country Report of Lao PDR

Name: Latsyakone PHOLSENA
 Position: Technical officer
 Organization: Department of Energy Efficiency and Promotion
 Email: tingpholsena1990@gmail.com

September 2022

National Power Development Plan (NPDP) 2021-2030 (cont.)



Country Report by Lao Delegates



Country Report, Nepal

KOMAL NATH ATREYA

UTSAV ADHIKARI

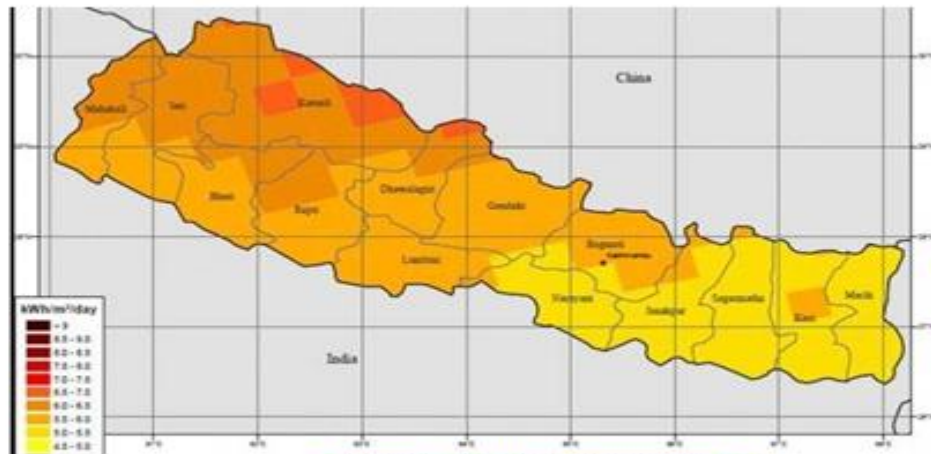
NITESH KUMAR YADAV

Prepared for

Seminar on the Application of Solar Power Technology for Asian Countries
September, 2022
Hangzhou, China

Presenter: Utsav Adhikari

Potential of Solar Power Development



Solar : 2100 MW (grid connected)

Source: Solar and Wind Energy
Resource
Assessment in Nepal (SWERA), 2008

Country Report by Nepalese Delegates

Solar Power IN PAKISTAN



Energy Department

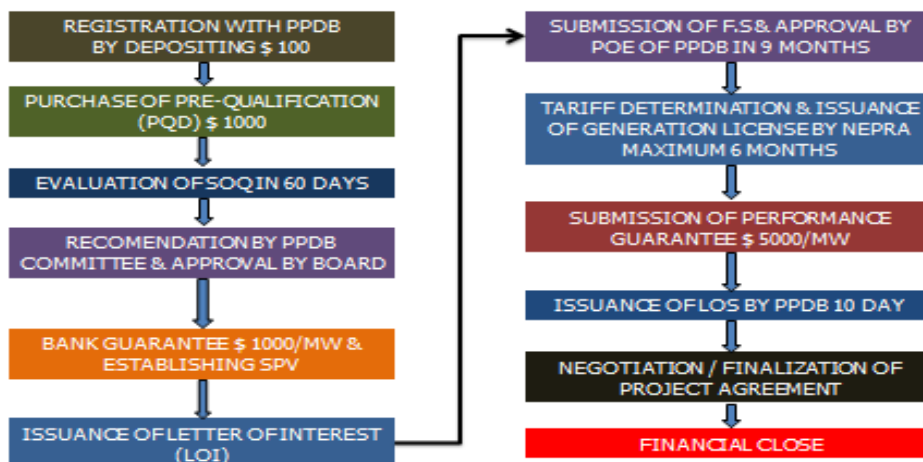


September 21, 2022

Project Development Cycle



Energy Department

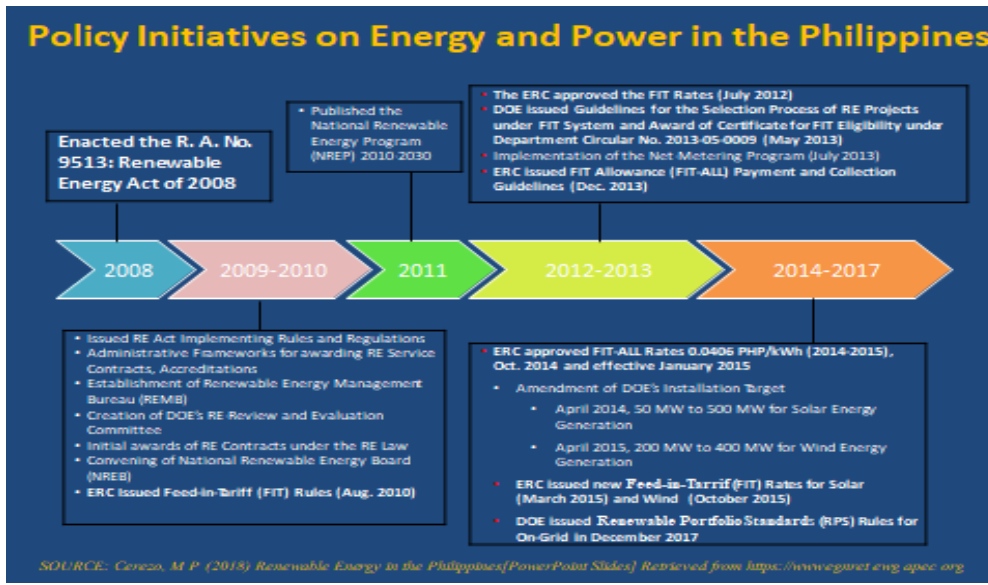


Country Report by Pakistani Delegates



PHILIPPINES

A COUNTRY REPORT



Country Report by Pilipino Delegates



Social Aspects of the Electrification in Thailand

2) Energy Prices and Affordability

- In Thailand, the electricity tariff structure has been separated into a base tariff and a fuel adjustment mechanism (Ft).
- During 2009-2013, the affordability of electricity for Thai people has decreased (Thamsereekul and Wangiraniran). The main reason is that the average retail electricity price has been increasing as a result of higher costs of natural gas, of which Thailand's electricity generation is disproportionately reliant upon.
- In Thailand, solar power and biomass have been abundant as renewable energy sources at a cost competitive price. However, without ESI restructuring and non-discriminatory third-party access, the growth of renewable-based electricity is limited.



Country Report by Thai Delegates



Ministry of Energy
of the Republic of Uzbekistan

Renewable Energy in Uzbekistan

Shohrukh Karabaev,
Chief specialist in RES department,
Ministry of Energy,
Republic of Uzbekistan

Tashkent 2022

PPP Solar PV Investment opportunities for Investors (1)

On October 18, 2019, the Government of the Republic of Uzbekistan and International Finance Corporation (IFC) signed an agreement to attract consulting services and increase the capacity of the Scaling Solar projects to 1000 MW of PV stations.



Scaling Solar 1

We, together with IFC, conducted a competitive selection of potential companies for the implementation of a pilot investment project of a solar PV station with a capacity of 100 MW on the basis of PPPs and based on the results "Masdar" (UAE) company was recognized as the winner at a rate of **2.679 US cents / kWh**.



Scaling Solar 2

In February 2020, there was an announcement about the projects - "Construction of two PV stations with the capacity of 220 MW each in Samarqand and Jizzakh regions". **84 companies and/or consortiums** worldwide expressed their interest to participate on the bidding. Based on the results "Masdar" (UAE) company was recognized as the winner with the average tariff of **1.807 US cents / kWh**.



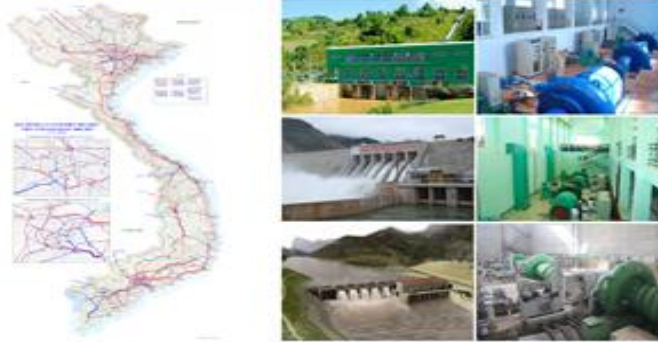
Scaling Solar 3

In August 31, 2021, there was an announcement about the next projects - "Construction of three PV stations with 250 MW in Bukhara, 150 MW in Namangan and 100 MW in Khorazm regions.



Country Report by Uzbekistan Delegates

VIETNAM COUNTRY REPORT



2 – GENERAL CONDITION OF ENERGY AND POWER IN VIETNAM

Rural electrification conditions:

Most of rural areas have access to electricity except some mountainous and island areas.



Current solution:

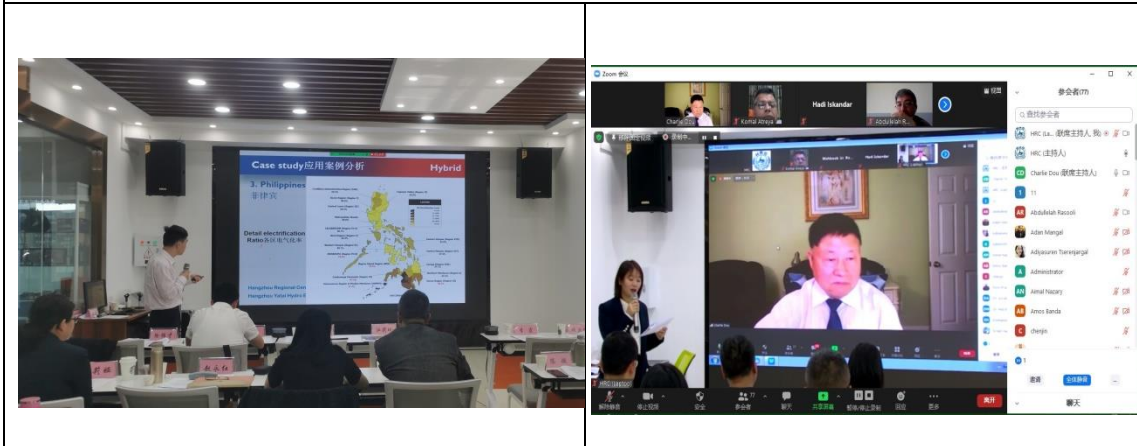


Country Report by Vietnamese Delegates

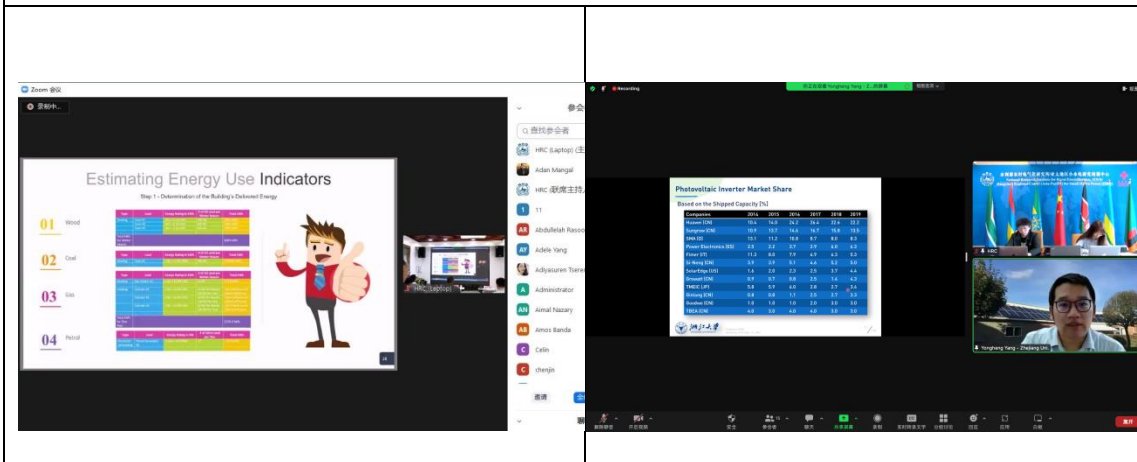
Photos of Main Activities



Opening Ceremony



Technical Presentations



Technical Presentations



Online visit



Online visit



Country Reports

2. Solar Power

- Solar station (Existing 2019-2020)
- Solar station in Kompong Speur Province 80MW
- Solar station in Kompong Chang Province 60MW
- Solar station in Pour Sat Province 30 MW

N.o	Name of Project	Location	Capacity	Existing Year
01		Pour Sat Province	60	2021
02		Battambang Province	60	2020
03		Banteaymeanchey Province	30	2020
04		Svay Rieng Province	20	2021
05		Kompong Chang Province	60	2022
Total			230	

- And there are 4 Solar station is under constructing with total capacity 170MW

Tem Phanit MME...

Renewable Energy: Sources & Potential

RESOURCES	POTENTIAL
Solar PV	<ul style="list-style-type: none"> Solar Park - 3400 MW (Utility scale solar PV project) Solar Rooftop - 635 MW (On-grid/off-grid solar PV systems) Solar Home System - 230 MW Solar Irrigation - 345 MW (To replace diesel pumps) <p>Source: JICA (Study on Renewable Energy Program) Investment Plan</p>
Wind	Mostly Coastal areas and a few islands. Several Studies conducted but conflicting information needs comprehensive resource assessment.
Hydro	Unsuitable potential for micro/hydro or small hydro. There are several feasible for run-off-river hydro power plants
Biomass gasification	300 MW from rice husk, crop residue, wood, fish stock, animal waste, municipal waste, sugarcane bagasse etc.
Biogas plants	250 MW (4 million biogas plants) 0.6 Million Cubic Meter of Domestic Biogas from animal, kitchen and municipal wastes
Waste to Energy	High potential, but to take off
Geothermal	No study, but to be explored
Wave/Tidal/OEC	No study, yet to be explored

Country Reports

Technical and Cooperative Discussions

V. Follow-up Work at the Third Stage

- During the seminar, a conference was held, through which all the participating countries exchanged information on solar power development status, policies and strategies, problems and challenges in solar power development and cooperation opportunities in their countries and conduct in-depth discussions on the cooperation and joint research among Asian countries on promoting the application of solar power technology in a variety of fields, and the possibility of implementing a demonstration project of solar power technology in several Asian Countries. It is expected that, based on full communication and exchange of expertise in the field of solar power technology, etc., efficiency of solar power development and technical capability could be improved, so as to promote the social-economic development in participating countries.
- By virtue of sound relationship between China and other Asian countries and with the backing of incentive policies of all countries in the field of solar power, NRIRE shall make

efforts together with relevant authorities of Asian countries to get the financial support from respective government and international organizations which shall be the powerful guarantee for substantive cooperation in the future;

3. NRIRE actively seeks opportunities to launch the bilateral and multilateral projects to improve the capacity building, popularize the know-how in the field of solar power development for Asian countries, and promote the efficient and sustainable development of solar power for these countries.

VI. Financial Costs and Expenses

The project costing for those activities is strictly based on the budget. NRIRE organized financial staffs specifically to evaluate and review the expenses of the project. Project leaders are also responsible for monitoring of the cost for each activity and required for submission of periodical report to the General Director of NRIRE for supervising the project better at its each stage.

No.	Items	PGTF Fund	NRIRE Fund	Total
1	Seminar materials	2,150 USD	2, 850 USD	5,000 USD
2	Domestic travel	1,260 USD	1,740USD	3,000 USD
3	Boarding and lodging	1,100USD	1,900 USD	3,000 USD
4	Allowances for Chinese consultants	2,720 USD	3,080 USD	5,800 USD
5	Local insurance	200 USD	300 USD	500 USD
6	Shooting and producing online visit video, including equipment use, post-production, music copyright fees, transportation fees, video subtitle translation and dubbing fees and other related expenses	10,560 USD	14,440 USD	25,000 USD
7	Simultaneous interpretation	1,640 USD	2,860 USD	4,500 USD
8	Rental of seminar venue and other facilities	2,100 USD	3,000 USD	5,100 USD
9	Rental of online conference platform, live broadcast equipment	1,430 USD	2,070 USD	3,500 USD
10	Local transportation	840USD	1,260 USD	2,100 USD
	Grand Total	24,000 USD	33,500 USD	57,500 USD
	Unpaid PGTF fund			2,400 USD

Bank Information:

Organization: 水利部农村电气化研究所

Bank Account: 1202026209008801954

Bank Name: 工行杭州高新支行

VII. Conclusion

The project is implemented by National Research Institute for Rural Electrification, Ministry of Water Resources, P.R. China (NRIRE). The rewarding event, designated to provide a platform for China and the other Asian countries to fully discuss and communicate in the field of solar power and related technologies in its application, has achieved great success. The officials and experts from different countries shared not only the technology, but also the development methodology and cooperation confidence, which is deemed to make much contribution to economic and technical cooperation on solar power among Asian countries. It is expected that the participants, as the direct beneficiaries, can apply the knowledge gained during the seminar and at the same time, transfer the knowledge and technologies to other people in their respective country.