



Post-Training Report

Online Training on “Power Purchase Agreements of Renewable Energy Projects”

8th-12th November, 2021

Organized by

SAARC Energy Centre, Islamabad

Program Coordinator:

**Muhammad Ali Qureshi
Research Fellow (Power)**

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Post-Training Report for Online Training on Power Purchase Agreements of Renewable Energy Projects (8th -12th November, 2021)

Introduction

1. As part of programme activities for FY 2021, SAARC Energy Centre (SEC), Islamabad organized a 5-day online training for SAARC Professionals on “Power Purchase Agreements of Renewable Energy Projects” held from Monday, 8th November 2021 to Friday, 12th November 2021. The online training was conducted successfully by a selected party Indian Institute of Technology (IIT) Roorkee, India. The detailed agenda of the training is available in [Annexure-I](#).

2. The online training aimed to enhance capacity of SAARC Professionals engaged in RE sector to prepare and negotiate the RPPAs focusing on competitive energy market regimes. The five-day technical sessions were focused on basic concepts of RPPAs, its current state-of-the-art with respect to competitive power markets, different RPPAs models, its strategies of design, skill for analyzing and negotiation of power purchase agreements (PPAs), techniques for risk assessment and mitigations, knowledge of financing structures and bankability of RPPAs, involvement of various parties of RE projects, provisions for O&M and decommissioning and dispute settlement mechanisms, globally, as well as in the SAARC region. The comprehensive sessions were designed to target a broad audience, ranging from policy and decision-makers, regulators, project developers and project managers, private sector investors, academia/researchers, and independent power producers (IPPs).

Participation

3. The training was attended by 154 professionals representing various government organizations, private sector companies, project developers, academia and researchers from the SAARC Member States. The complete list of registered participants is available in [Annexure-II](#), respectively.

Description

4. The training commenced with the introductory remarks by training moderator, Mr. Muhammad Ali Qureshi, Research Fellow (Power), of SEC. This was followed by the inaugural address by Dr. Tanvir Ahmad, Deputy Director SEC and Prof. Manoranjan Parida, Deputy Director, IIT, Roorkee. The training comprised of interactive sessions, including the trainers' presentations followed by Q&A sessions and a short self-assessment quiz for the participants. A mock regulatory session organized on the fifth day of the training provided the participants with a case-study based discussion platform for practicing all the concepts discussed in the course for designing and negotiating RPPAs. This innovative session proved to be the main highlight of the training programme.

Inaugural Address

5. The inaugural address by Dr. Tanvir Ahmad, Deputy Director, SEC highlighted the present situation of renewable energy proliferation and development of competitive power markets in SAARC Member States, its future potential, and the associated challenges. He explained that although the SAARC region contribute to around 23% of the world's population, still, energy scarcity is a common challenge. This has necessitated the development of renewable energy sources. He further elaborated that the development of a competitive power market with appropriate provisions for uptake of renewable electricity will go a long way in alleviating the electricity shortages in the SAARC region. As stated by Dr. Tanvir Ahmad, the policymakers in the SAARC region should prioritize the development of competitive power markets in their respective domains. The inaugural address was further concluded by a brief outline of the various sessions of the training programme.

6. Prof. Manoranjan Parida, Deputy Director, IIT, Roorkee highlighted the outstanding contributions the Department of Hydro and Renewable Energy, IIT Roorkee, has made towards strengthening the proliferation of renewable energy technologies over the last four decades. As per Prof. Manoranjan Parida, the time is ripe for increasingly higher integration of renewable electricity in the power grid in the SAARC region. Thus, in this context, the theme of this training program is very pertinent for capacity building in this crucial area. He encouraged the speakers and the participants to contribute towards interactive sessions. He emphasized the importance of discussions and Q&A sessions in such training programs to achieve the learning objectives. He concluded that various collaborated efforts and interdisciplinary actions are still required to overcome the existing challenges for the development of competitive power markets in the SAARC region.

Technical Proceedings

7. The training was conducted for five days, with each day's technical session comprising of two lectures (1 hour each) by trainers followed by the Q&A. The technical sessions included quizzes for self-assessment of the participants, discussion on case studies/industrial examples, participant feedback and open discussions to meet the learning objectives. A unique attraction was a mock regulatory session for hands-on practice of designing and negotiating RPPAs for a case study conducted on the fifth day of the training. A panel discussion by eminent panelists followed the mock session. This was the concluding session of the training program. The sessions were moderated by Mr. Muhammad Ali Qureshi. The trainers' profiles, along with their presentations are available in [Annexure-III](#) and [Annexure-IV](#), respectively. The list of suggested reading materials is available in [Annexure-V](#).

Training Sessions

Day 1 – Theme: Introduction to Power Purchase Agreements of Renewable Energy Projects

Slot 1: Review and importance of competitive power markets in SAARC Region in increasing RE scenarios by Prof. Rhythm Singh, HRED, IIT Roorkee, India

Prof. Rhythm Singh, the lead trainer of the program, started the technical session by shedding light on the historical development and status of competitive power markets in the SAARC Member States. Further, he elaborated on the importance and the requirements for establishing quality competitive power markets in increasingly RE-dominated scenarios. The talk was further tuned toward wholesale and regional power market aspects by presenting case studies on some of the successful examples across the globe. Along with the importance of competitive power markets, the economic and social aspects were also presented. Moving ahead, Prof. Rhythm Singh gave an overview of the single-buyer model. Further, the talk was accompanied by a few success stories of Indian power market development. Finally, he concluded by highlighting that wholesale power markets are likely further enhancing the efficiency of the restructured power industry. Regional power markets can offer a way out in many cases, especially for a group of smaller countries.

Slot 2: Different models of RPPA and strategies for the design and regulation of RPPAs by Prof. Himanshu Jain, HRED, IIT Roorkee, India

Prof. Himanshu Jain explained the concept of RPPAs and the various models of RPPAs. He started by introducing RPPAs, and different payment approaches for Feed-in-Tariff (FIT), including advantages and disadvantages across the globe. Further, he emphasized the role of various strategies for the design and regulation of RPPAs. He further continued discussing different compensation options and the vital component, considering for RPPAs model. Moreover, various design considerations, including liabilities, contract term, PPA price, environmental attributes, etc., were elaborated from a practical design aspects. Moving ahead, Prof. Himanshu Jain highlighted potential benefits to SAARC from the cross-border trade of renewable energy. Finally, he concluded his talk with some case studies illustrating practical and legal design aspects of RPPAs.

Day-1 Outcome: Highlighting the Importance and the requirements for establishing quality competitive power markets in increasingly RE-dominated scenarios and crucial role of RPPA set the stage for the training. The participants learned the basic concepts of RPPAs along with their practical and legal design aspects.

Day 2 – Theme: Executorial aspects and risk associated with RPPAs

Slot 1: Mechanisms for analyzing and negotiating RPPAs by Prof. Anand Kumar, HRED, IIT Roorkee, India

Prof. Anand Kumar highlighted the critical elements of RPPAs and consideration of key terms while negotiating an RPPA. He conceptualized various frameworks and mechanisms for analyzing and negotiating RPPAs. He also explained diverse regulatory and legislative practices on renewable energy in different countries; the RPPA becomes an essential element of any RE project. Along with addressing thoughtful negotiations of long term PPAs including but not limited to market price floor, capacity buydown, assignment rights, seller's security, availability guarantee, production guarantee, seasonal guarantees, fixed volume settings, etc. Further, he explained the risk of Re-negotiation in detail, which is also necessary to strengthen PPAs in the market. Finally, he concluded his presentation by acknowledging RPPAs to provide a hedge against future energy fluctuations in terms of financial, environmental and ability to transact.

Slot 2: Risk assessment and mitigation techniques for Renewable Energy Projects by Dr. Rakesh Kumar Goyal, Tetra Tech, India

The overall risk assessment and mitigation techniques for RE projects and learnings from the case studies were the highlights of the lecture delivered by Dr. Rakesh Kumar Goyal. He initiated his talk with an elaboration on the concepts and techniques of assessing risks associated with RE projects. He further discussed some analytical and numerical analysis along with conceptual understanding of the risks and uncertainties involved. Later, he highlighted the mitigation techniques for dealing with the uncertainty resulting from the intermittency of renewables. He gave recommendations for effective risk management and concluded his talk with a detailed case studies illustrating solar powered irrigation project for irrigation pumps facilities in rural Uttar Pradesh, India followed by a brief introduction about the U.P irrigation project.

Day-2 Outcome: The technical sessions facilitated learning about negotiations and risk management strategies of RPPAs. The case study of various countries helped the participants to gain practical knowledge of concepts and tools for conducting risk assessment for long term RE projects.

Day 3 – Theme: Financing and stakeholder management of RPPAs

Slot 1: RPPA's financing structures and bankability requirements for RE Projects by Prof. Anand Kumar, HRED, IIT Roorkee, India

Prof. Anand Kumar commenced his lecture with an overview of the financing structures of RPPA's and the ways for enhancing bankability for RE projects. His lecture was primarily focused on prevailing financing structures for RE projects. He highlighted some key barriers in development of RE projects in SAARC Member States. Further, he discussed on how to make RE projects bankable and mitigate technical and financial risks. Finally, he concluded his lecture by providing an insight regarding the bankability of the RE projects with appropriate financing structures and the ways for enhancing the same.

Slot 2: Roles and obligations of parties in RPPAs and dispute settlement mechanisms by Dr. Ram Prasad Dhital, Electricity Regulatory Commission, Nepal

The steps involved in finalizing the RPPAs; its regulatory requirements, roles and responsibilities of stakeholders, dispute resolution mechanisms were the prime focus of the lecture delivered by Dr. Ram Prasad Dhital. He initiated his talk with discussing institutional framework in different SAARC Member States. The centerpiece of his talk was an overview of the key steps involved in finalizing the PPA's including processing fee, generation tariff, provision for billing, payment, penalty, construction and testing. Dr. Dhital also highlighted key challenges involved on regulatory side in finalizing the RPPAs and discussed best practices to address those challenges. Later, he provided an insight into the tariff's structures for various RE projects in Nepal. Further, he also defined the roles and responsibilities of each stakeholder, along with instituting proper grievance/ dispute settlement mechanisms for the PPA based RE projects. He concluded his talk by discussing various mechanisms to achieve competitive price of electricity.

Day-3 Outcome: The learning was about conceptual as well as practical strategies for enhancing the bankability of the RE projects with appropriate RPPA financing structures. Further, participants learned about the key steps involved in finalizing the RPPAs, roles and responsibilities of various stakeholders, as well as the applicable dispute resolution mechanisms.

Day 4 – Theme: O&M, lifecycle aspects and case studies of RPPAs

Slot 1: Operations, maintenance, and decommissioning provisions in RPPAs by Mr. Vivek Mishra, Independent International Expert, India

The overall operations, maintenance, and decommissioning provisions in RPPAs was the prime focus of the lecture delivered by Mr. Vivek Mishra. He initiated his talk with a brief overview of operations and maintenance (scheduled outages, forced outage and O&M contract). He discussed provisions for ownership of assets after expiry of PPA and how to transfer price of

assets. Further, Mr. Vivek Mishra also highlighted the provisions for plant decommissioning in PPA. He concluded his talk by discussing various O&M success factors of PPAs.

Slot 2: Case studies of regional and international competitive markets based RPPA models by Dr. Rakesh Kumar Goyal, Tetra Tech, India

This lecture focused on case studies of regional and international competitive markets where the RPPA models has been successfully implemented. Dr. Rakesh Kumar Goyal commenced his talk with highlighting current global RE trends and RE penetration in highly competitive energy markets. He elaborated the system friendly procurement and its type such as round clock power (RTC). Further, he explained how RTC helped to address RE integration challenges. Dr. Rakesh Kumar Goyal provided insights of system friendly procurement from Chile, Colombia, Nevada, and Germany. Lastly, he concluded with sharing success story of RE 24x7 procurements from India and followed by a brief introduction about the Indian railway's project.

Day-4 Outcome: The learning was about the provisions of operations, maintenance, and decommissioning in RPPAs, and its importance for a renewable energy project, due to the long-term gestation period of such projects. Moreover, participants were familiarized with some relevant case studies of regional and international competitive markets based RPPA models.

Day 5 – Theme: Hands-on practice session for negotiating RPPAs

Slot 1: Mock regulatory session by Prof. Anand Kumar, Mr. Vivek Mishra, Dr. Ram Prasad Dhital, Dr. Rakesh Kumar Goyal, Prof. Himanshu Jain and Prof. Rhythm Singh

A mock regulatory session organized on the fifth day of the training provided the participants with a case-study based discussion platform for practicing all the concepts discussed in the course for designing and negotiating RPPAs. This innovative session proved to be the main highlight of the training programme. In this session, a case study pertaining to procurement of renewable electricity by a utility was presented to the participants. The participants were allocated to six categories of stakeholder groups (Government, Regulatory authority, Utility company, Project developer, Financing institutions, Customers) based on their preference. Each stakeholder group was allotted a breakout session for having an internal discussion regarding the terms and conditions they would like to see in the RPPA for the presented case. Finally, a mock regulatory hearing presided by Dr. Anand Kumar was conducted involving all the stakeholders to discuss the key provisions of the RPPA for the presented case.

Slot 2: Panel discussion on RPPAs by Prof. Anand Kumar, Dr. Rakesh Kumar Goyal, Dr. Ram Prasad Dhital, Mr. Ravi Kiran Kuchi, Mr. Muhammad Faisal Sharif and Prof. Arun Kumar

The panel discussion on Day 5 was the last and final session of the entire training program. The panel discussion was focused on competitive markets and RPPA models in SAARC Member States;

challenges and way forward. A total of six eminent panelists shared their insights on the topic. Prof. Anand Kumar from Hydro and Renewable Department, IIT Roorkee, having an experience of several decades of working with a regulatory authority in India, gave his inputs on the regulators' view on competitive markets for renewable energy. Mr. Muhammad Faisal Sharif from PPIB-MoE, Pakistan shared his insights on electricity market transformation in Pakistan. Dr. Rakesh Kumar Goyal, Vice President, Tetra Tech, India, shared his views on utilities' perspective on renewable energy purchase. Dr. Ram Prasad Dhital from Electricity Regulatory Commission, Nepal, gave his insights on RE purchase in Nepal. Mr. Ravi Kiran Kuchi, Indian Energy Exchange shared his valuable insights on RE Purchase on energy exchange in India. Finally, Prof. Arun Kumar from Hydro and Renewable Department, IIT Roorkee gave his views on the importance of capacity building of all the stakeholders involved with procurement of renewable electricity.

Day-5 Outcome: The learning was focused on providing hands-on experience of designing and negotiating RPPAs to the participants. The mock regulatory session proved to be very effective in achieving this goal. The participants found this experience to be engaging and valuable. Further, the panels discussion provided participants a platform to discuss and learn about the challenges and opportunities pertaining to RE integration in competitive energy markets.

Valedictory Session

Dr. Nawaz Ahmed, Director SEC giving his closing remarks expressed his satisfaction over excellent conduct of training by academic elites. He acknowledged everyone for their presence and active participation. He appreciated Prof. Arun Kumar, Prof. Rhythm Singh, lead trainer, and all Co-trainers for their valuable contribution. Prof. Arun Kumar added thanking remarks for everyone's cooperative indulgence in conducting such programme successfully. Screenshots for online sessions on different days are given in [Annexure-VI](#).

Annexures

Annexure -I: Agenda

The aim of this online training is to enhance capacity of SAARC Professionals engaged in RE sector to prepare and negotiate the RPPAs focusing on competitive energy market regimes. After getting this training, these professionals should be equipped with the necessary knowledge and expertise to devise the terms and conditions of RPPAs including key features/components of RPPA contract, pricing structure, payment mechanism, risk assessment and coverage etc. The training program on Power Purchase Agreements of Renewable Energy Projects comprises of nine sessions spread over 5 days. Each session comprised two lectures followed by Q&A and a self-assessment quizzes. Final time table of training is as below:

On-line Training of SAARC Professionals on Power Purchase Agreements of Renewable Energy Projects

8th-12th November, 2021

Training Schedule

Day/Date	Time (Pakistan Standard Time)	Title & Speaker	Description
Inauguration & Technical Session 01: Introduction to Power Purchase Agreements of Renewable Energy Projects (RPPAs)			
Day 1 (Monday) Nov 08, 2021	2:00 PM - 2:15 PM	Inauguration of the Training program	<ul style="list-style-type: none"> Inaugural Address by Dr. Nawaz Ahmad, Director, SAARC Energy Centre-Islamabad (Tentative) Address by Prof. Manoranjan Parida, Deputy Director, IIT Roorkee
	2:15 PM - 2:25 PM	Overview of the Training Program by Moderator Mr. Muhammad Ali Qureshi (Program Coordinator- SAARC Energy Centre)	<ul style="list-style-type: none"> Structure of the training program Introduction of the trainers Any questions from the participants about the training will be answered
	2:25 PM - 3:25 PM	Slot 1: Review and importance of competitive power markets in SAARC Region in increasing RE scenarios by Prof. Rhythm Singh, HRED, IIT Roorkee, India	<ul style="list-style-type: none"> Historical development and status of competitive power markets in the SAARC Region Importance and the requirements for establishing quality competitive power markets in increasingly RE-dominated scenarios
	3:25 PM - 3:40 PM	Break	
	3:40 PM - 4:40 PM	Slot 2: Different models of RPPAs and strategies for the design and regulation by Prof. Himanshu Jain, HRED, IIT Roorkee, India	<ul style="list-style-type: none"> Introduction to RPPAs and the various models, including: 1) RPPA for Feed-in tariff/preferential tariff, 2) RPPA for Tariff based competitive bidding by DISCOM or open access consumer/ wheeling, 3) RPPA for Cross-Border trading of electricity, 4). RPPA for hybrid renewable energy plants. Introduction to strategies for the design and regulation of RPPAs
	4:40 PM - 4:55 PM	Q&A Session & Evaluation	<ul style="list-style-type: none"> Q&A Session MCQ based on-line quiz on the content covered



Technical Session 02: Executional aspects and risks associated with RPPAs			
Day 2 (Tuesday) Nov 09, 2021	2:00 PM - 2:55 PM	Slot 1: Mechanisms for analyzing and negotiating RPPAs by Prof. Anand Kumar, HRED, IIT Roorkee, India	<ul style="list-style-type: none"> Frameworks and mechanisms for analyzing and negotiating RPPAs, including: Market price floor, Capacity buy down, Assignment rights, Seller's security, Availability guarantee, Production guarantee, Seasonal guarantees, Fixed volume settings, etc.
	2:55 PM - 3:10 PM	Break	
	3:10 PM - 4:25 PM	Slot 2: Risk assessment and mitigation techniques for Renewable Energy Projects by Dr. Rakesh Kumar Goyal, Tetra Tech, India	<ul style="list-style-type: none"> Risk assessment strategies for long-term viability of RE projects Mitigation strategies for risks associated with RE projects including: Proxy generation, Volume firming, Hedging instruments
	4:25 PM - 4:40 PM	Q&A Session & Evaluation	<ul style="list-style-type: none"> Q&A Session MCQ based on-line quiz on the content covered
Technical Session 03: Financing and stakeholder management of RPPAs			
Day 3 (Wednesday) Nov 10, 2021	2:00 PM - 2:55 PM	Slot 1: RPPA's financing structures and bankability requirements for RE Projects by Prof. Anand Kumar, HRED, IIT Roorkee, India	<ul style="list-style-type: none"> Financing structures for RPPAs Bankability requirements for RE projects Strategies for enhancing the bankability of RE projects
	2:55 PM - 3:10 PM	Break	
	3:10 PM - 4:25 PM	Slot 2: Roles and Obligations of parties in RPPAs and dispute settlement mechanisms by Dr. Ram Prasad Dhital, Electricity Regulatory Commission of Nepal, Nepal	<ul style="list-style-type: none"> Roles and responsibilities of stakeholders in RPPAs Legal design and provision of RPPAs (explanation of different articles of RPPAs) Grievance/ dispute settlement mechanisms for RPPA frameworks
	4:25 PM - 4:40 PM	Q&A Session & Evaluation	<ul style="list-style-type: none"> Q&A Session MCQ based on-line quiz on the content covered



Technical Session 04: O&M and lifecycle aspects of RPPAs			
Day 4 (Thursday) Nov 11, 2021	2:00 PM - 2:55 PM	Slot 1: Operations, Maintenance, and Decommissioning provisions in RPPAs by Mr. Vivek Mishra, India	<ul style="list-style-type: none"> Operations, Maintenance, and Decommissioning provisions in RPPAs Lifecycle aspects of RPPAs Provisions for force majeure during operation, owner ship of assets after expiry of PPA and transfer price for assets
	2:55 PM - 3:10 PM	Break	
	3:10 PM - 4:25 PM	Slot 2: Case Studies of regional and international competitive markets based RPPA models by Dr Rakesh Kumar Goyal, Tetra Tech, India	<ul style="list-style-type: none"> Case studies of regional and international competitive markets where RPPA models have been successfully implemented
	4:25 PM - 4:40 PM	Q&A Session & Evaluation	<ul style="list-style-type: none"> Q&A Session MCQ based on-line quiz on the content covered
Closing & Technical Session 05: Mock regulatory session and Panel Discussion			
Day 5 Nov 12, 2021	2:00 PM - 3:15 PM	Slot 1: Mock Regulatory Session by Prof. Anand Kumar, Mr. Vivek Mishra, Dr. Ram Prasad Dhital, Dr. Rakesh Kumar Goyal, Prof. Himanshu Jain and Prof. Rhythm Singh	<ul style="list-style-type: none"> The objective of this session will be to conduct mock regulatory proceedings, where the questions and processes that regulatory bodies in SAARC Member States may follow while evaluating the RPPAs will be emulated
	3:15 PM - 3:30 PM	Break	
	3:30 PM - 4:30 PM	Slot 2: Panel Discussion on competitive markets and RPPA models implemented in SAARC Member States	<p>Panelists:</p> <ul style="list-style-type: none"> Prof. Anand Kumar (Hydro and Renewable Energy Dept, IIT- Roorkee, India) Mr. Muhammad Faisal Sharif (Director-Projects Appraisal, PPIB-MoE, Pakistan) Dr. Rakesh Kumar Goyal (Vice President, Tetra Tech, India) Dr. Ram Prasad Dhital (Member, Electricity Regulatory Commission, Nepal) Mr. Ravi Kiran Kuchi (Vice President -Business Development & Regional Head, Indian Energy Exchange) Prof. Arun Kumar (Hydro and Renewable Energy Dept, IIT- Roorkee, India)
	4:30 PM - 4:45 PM	Participants Feedback	<ul style="list-style-type: none"> Trainees' feedback on the entire training program
	4:45 PM - 4:50 PM	Valedictory session	<ul style="list-style-type: none"> Closing remarks by Dr. Nawaz Ahmad, Director, SAARC Energy Centre-Islamabad

Information for Participants:

All times mentioned in agenda are according to Pakistan Standard Time (PKT). The participants from other Member States will attend training by following their own national time. The time conversion for all Member States is given below for reference:

Country	Afghanistan	Bangladesh	Bhutan	India	Maldives	Nepal	Sri Lanka
Local Time	(PKT-00:30)	(PKT+01:00)	(PKT+01:00)	(PKT+00:30)	PKT	(PKT+00:45)	(PKT+00:30)

For more information, please contact the following SEC professional:

Mr. Muhammad Ali Qureshi

Program Coordinator (RF-Power)

SAARC Energy Centre, Islamabad, Pakistan

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Annexure-II: List of Registered Participants

Sr.No	Name	Organization	Designation	Country
1	HAFIZ MUHAMMAD KASHIF MUNIR	AL-SHAFI GROUP OF COMPANIES	GENERAL MANAGER(POWER)	Pakistan
2	BASIT Ali	Bahria University Karachi	Senior Lecturer	Pakistan
3	Waqas Ali Khan	Punjab Energy Efficiency & Conservation Agency (PEECA)	Assistant Manager Program	Pakistan
4	Ali Raza Hafeez	Punjab Energy Efficiency & Conservation Agency (PEECA),	Program Engineer	Pakistan
5	Muhammad Abdur Rahman	Punjab Energy Efficiency & Conservation Agency (PEECA),	Program Manager	Pakistan
6	Redwanoor Rahman BulBul	Rahman Renewable Energy Co. Ltd	Managing Director	Bangladesh
7	Haider Ali Shah	Creative Engineering & Management Services	Renewable Energy Consultant	Pakistan
8	Ismail Ibrahim	Male Water and Sewerage Company Pvt Ltd	Assistant General Manager, Operations	Maldives
9	Titu Kumar Das	Bangladesh Biogas Development Foundation	Executive Member	Bangladesh
10	RABIA KHATOON	HAMDARD UNIVERSITY	ASSISTANT PROFESSOR	Pakistan
11	Syed Waqar Ali	Prism Energy (Pvt.) Ltd	Assistant Manager Execution	Pakistan
12	Waris Ali	Sindh Environmental Protection Agency	Deputy Director (Technical)	Pakistan
13	Adeel Khan	Nordex Pakistan	Local operations manager & operational efficiency manager	Pakistan
14	Usman Ghani	NESPAK	Senior Engineer Mechanical	Pakistan
15	HAMMAD ALI	Central Power Purchasing Agency (CPPA)	Technical Assistant	Pakistan
16	Namiz Mohamed Musafer	Energy Managers, and Integrated Development Associations, Sri Lanka	Director	Sri Lanka
17	Chamil Suranga Silva	Bioenergy Association of Sri Lanka	President	Sri Lanka
18	Rana Muhammad Zawar Sami	Kepco KPS, 660 MW Ultra Super Critical Coal Fired Power Plant, LEPCL	Shift Incharge Engineer	Pakistan
19	ASIF A KHOKHER	Innovasys Engineering (Pvt) Ltd.	Director	Pakistan
20	Irshad Hussain	Nizam Energy	Manager Projects	Pakistan
21	Khurram Atta	Water and Power Development Authority	Senior Engineer Electrical	Pakistan

Sr.No	Name	Organization	Designation	Country
22	Muhammad Amjad	Kepeco KPS 660 MW lucky Coal Power Plant	Lead Operations Engineer	Pakistan
23	Marium Khalid	Punjab Energy Efficiency and Conservation Agency (PEECA),	Manager Legal/Head of Legal	Pakistan
24	MUHAMMAD OMAR QASMI	ORIENT ENERGY SYSTEMS PRIVATE LIMITED	ASSISTANT GENERAL MANAGER	Pakistan
25	Chaudhry Fahad Ali	UNIDO	RE-Expert	Pakistan
26	Rida Fatima	Tetra Tech	Research Associate	Pakistan
27	Shahrina Amin	Reon Energy	Strategy Analyst-Sales & Commercial	Pakistan
28	Sandeep Gupta	G. B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand, India	Assistant Professor	India
29	Mohammad Helal Uddin	Ministry of Power, Energy and Mineral Resources, Dhaka, Bangladesh	Ex-Chairman	Bangladesh
30	Ammar ul Hassan	Renewable Resources Pvt Ltd	Deputy Project Manager	Pakistan
31	Muhammad Shehzad Ashraf	Multan Electric Power Company (MEPCO)/ Ministry of Energy (Power Division)	Sub Divisional Officer (SDO)	Pakistan
32	Muhammad Ramzan Mehdi	National Engineering Services Pakistan/ Ministry of Water and Power	Senior Engineer (Contracts)	Pakistan
33	M. Hannan Ahmad	Zero Carbon Private Limited	Proposal/Bid Engineer	Pakistan
34	Talal Amjad	Reon Energy /DawoodHercules	Head of Commercial	Pakistan
35	Rafaqar Bhutto	SCATEC Solar	Project Technical Manager	Pakistan
36	Muhammad Mohsin	Zonergy Company Limited (Solar Power Plant 300MW)	Operation and Maintenance Engineer	Pakistan
37	Muhammad Shahid	Kot Addu Power Company (KAPCO)	Principal Engineer Services	Pakistan
38	MUMTAZ ALI	RENEWABLE RESOURCES PVT LTD	SENIOR MECHANICAL ENGINEER	Pakistan
39	ASIF IJAZ CHOUDHARY	SIEMENS	BID MANAGER	Pakistan
40	Sheeraz Anwar Khan	AEDB	Director (Wind)	Pakistan
41	Naeem Memon	AEDB	Director (SPV).	Pakistan
42	Irum Firdos	National Energy Efficiency and Conservation Authority	Research Associate	Pakistan
43	Muhammad Irfan	PRIMACO-EOBI / MOPHRD Pakistan	Planning Engineer	Pakistan
44	Mahmood Subhani	Punjab Power Development Board	Manager Legal	Pakistan
45	Afifa Jabeen	Punjab Power Development Board	Director Legal	Pakistan
46	Hasnain Gohar	CPPA-G	Manager Technical	Pakistan

Sr.No	Name	Organization	Designation	Country
47	Deepak Kumar	Jamshoro Power Company Ltd. (GENCO-I)	Assistant Manager	Pakistan
48	Shoaib Ahmed Khatri	Mehran University of Engineering and Technology, Jamshoro	Assistant Professor	Pakistan
49	Farooq Yasir	Multan Electric Power Company (MEPCO)/ Ministry of Energy (Power Division)	Executive Engineer	Pakistan
50	Noureen Arif	Energy Department, Government of the Punjab	Environment Expert	Pakistan
51	SYEDA HIJAB FATIMA	NATIONAL TRANSMISSION & DESPATCH COMPANY/MINISTRY OF ENERGY	ASSISTANT MANAGER	Pakistan
52	Hafiz Muhammad Faisal Nouman	CPPA-G / Ministry of Energy (PD)	Assistant Manager Technical	Pakistan
53	Ahmed Ammar Yasser	Ace Engineering Services Private Limited	Director	Pakistan
54	Muhammad Salman Qayyum	Nizam Energy Pvt. Ltd	Team Lead Design	Pakistan
55	Jabbar Mohamed Mufashir	Vidul Engineering Limited	Plant Engineer – Africa Hydro Operations	Sri Lanka
56	Kavinda Prabhath Niwunhella	Vidullanka PLC	Civil Engineer - Projects	Sri Lanka
57	Mazahir Mohamed Mafas	Vidullanka PLC	Manager – Civil Engineering	Sri Lanka
58	Riyaz Mohamed Sangani	Vidullanka PLC	Chief Executive Officer	Sri Lanka
59	Md Mahafuzul Islam PK	Masum Bio-gas Engineering System (MBES)	Bio-gas Engineer	Bangladesh
60	Quratulain Jamil	Ministry of Energy (Power Division)	Policy Analyst	Pakistan
61	Muhammad Jahanzeb Lodhi	Albario Engineering (pvt.) Ltd.	Assistant Manager Projects	Pakistan
62	Ali Ghafoor	Renewable Resources	Manager	Pakistan
63	Kannangara Liyanage Rishantha Chandana Wijayasinghe	Ministry of Power, Government of Sri Lanka	Director, Ministry of Power	Sri Lanka
64	Muhammad Haris	NEECA	Management Trainee Officer	Pakistan
65	Abdus Salam Ahmad Bawany	The Hub Power Company Limited	Head of Financial Analysis & Planning	Pakistan
66	Ahmad Faizan	PEECA, Energy Department, Government of the Punjab	Program Engineer	Pakistan
67	Yasir Haleem	Nizam Energy Pvt. Ltd	Sr. Manager Technical & Operations	Pakistan
68	Ali Raza Hafeez	PEECA, Energy Department, Government of the Punjab	Program Engineer	Pakistan

Sr.No	Name	Organization	Designation	Country
69	Sajjad Hussain Muhammad	National Energy Efficiency & Conservation Authority (NEECA)	Research Associate	Pakistan
70	Arjmand Qayyum Amjad	Espire Consult	Manager Sustainability	Pakistan
71	MUHAMMAD UMAR	National Energy Efficiency and Conservation Authority-NEECA	Manager Technical-II	Pakistan
72	Jawad Siddiqui	Projects & Operations	General Manager	Pakistan
73	Ubaid Ur Rehman Zia	Sustainable Development Policy Institute (SDPI), Islamabad	Research Associate	Pakistan
74	Badr Mustan Sadqal	Central Power Purchasing Agency (CPPA)	Assistant Manager Technical	Pakistan
75	FEROZ MAHMOOD BAIG	Kot Addu Power Company Limited (KAPCO)	Services Engineer	Pakistan
76	Muhammad Saqlain Haider	Power Purchase infrastructure board (MoE)	Research Associate	Pakistan
77	Muhammad Yaseen Ibupoto	Alternative Energy Development Board / Ministry of Energy (Power Division)	Assistant Director	Pakistan
78	Waqas Idrees	Tetra Tech	Senior Energy Specialist	Pakistan
79	Md. Arifur Rahman Talukder	SNV Netherlands Development Organisation	Coordinator-Renewable Energy	Bangladesh
80	Hanea Isaad	Rural Development Policy Institute	Research Associate	Pakistan
81	Muhammad Uzair	KEPCO KPS	Operations Engineer	Pakistan
82	Bilal Hussain Babar	KEPCO KPS	Shift In-Charge	Pakistan
83	Anne Hiroshini Fernando	RIL Property PLC	Chief Executive Officer	Sri Lanka
84	Bulathgama Wedage Athula Bulathgama	Sri Lanka Sustainable Energy Authority State Ministry of Wind Solar Project Development	Director (Resource Mapping)	Sri Lanka
85	Satya Shiva Saswat	SAARC Development Fund	Director – Economic & Infrastructure	India
86	Amila Chaturanga Rajapaksa	Public Utilities Commission of Sri Lanka	Licensing	Sri Lanka
87	Shaheera Tahir	Rural Development Policy Institute	Research Associate	Pakistan
88	Muhammad Sohaib Zahoor	Sahiwal Coal Power Plant	Assistant Manager	Pakistan
89	Aezaz Raheem Paracha	Liberty Wind Power Plant	Mechanical Engineer	Pakistan
90	Tibinda Powdel	Department of Renewable Energy	Deputy Executive Engineer	Bhutan
91	Ugyen Rinzin	Department of Renewable Energy	Engineer	Bhutan
92	Chime Wangmo	Department of Renewable Energy	Deputy Executive Engineer	Bhutan
93	Karma Sangay	Department of Renewable Energy	Deputy Executive Engineer	Bhutan

Sr.No	Name	Organization	Designation	Country
94	Gamini Hearath	Public Utilities Commission of Sri Lanka	Director General	Sri Lanka
95	Adil Sharif,	PPIB	Director General (Law)	Pakistan
96	Mahesh Kumar	PPIB	Director (Hydropower)	Pakistan
97	M. Faisal Sharif	PPIB	Director (Projects Appraisal)	Pakistan
98	Moiz Uddin	PPIB	Joint Director (Finance & Policy)	Pakistan
99	M. Abrar Malik	PPIB	Joint Director (Hydropower)	Pakistan
100	Shahid Mahmood	PPIB	Joint Director (Finance & Policy)	Pakistan
101	Uluvitiya Gamage Vidura Kariyawasam	Provincial Ministry of Electricity, Southern Provincial Council, Sri Lanka	Secretary to the Ministry of Electricity	Sri Lanka
102	Buddhika Rasanga Suriyaarachchi	Provincial Ministry of Electricity, Southern Provincial Council, Sri Lanka	Deputy Director (Planning)	Sri Lanka
103	Sana Rizwan	Reon Energy Ltd	Head Of QHSE & Contracts	Pakistan
104	Amir Shahzad Butt	Punjab Power Development Board (PPDB)	Manager (Renewables / Biofuels)	Pakistan
105	Nisha Panth	BSP NEPAL	Senior Officer	Nepal
106	Siraj Yasir	Central Power Purchasing Agency	Deputy Manager Renewables	Pakistan
107	R.D. Rathnasinghe	Energy Management Systems Pvt. LTD	Engineering Manager (Project & Implementations)	Sri Lanka
108	Nissanka Haththowe Gamage	Ceylon Electricity Board	Chief Engineer	Sri Lanka
109	Mahamudul Hasan	Food and Agriculture Organization of the United Nations (FAO)	Field Facilitator	Bangladesh
110	Jalil Ahmed	Zorlu Energy Pakistan	Electrical Manager/Project Coordinator at 100p MW Zorlu Solar Project, Bahawalpur, Punjab	Pakistan
111	Maria Rafique	NEPRA	Advisor	Pakistan
112	Gul Hassan Bhutto	NEPRA	Consultant - CTBCM	Pakistan
113	Dr. Irfan Yousaf	NEPRA	Consultant - RE	Pakistan
114	Noor Saleem	NEPRA	Additional Director - Licensing	Pakistan
115	Ali Feroze	NEPRA	Additional Director - Tariff	Pakistan
116	Shahbaz Khan	NEPRA	Assistant Director -Legal	Pakistan
117	Zainab Ranjha	Project Management Unit, Punjab Energy Department	Manager Legal	Pakistan
118	Amila Dhananjaya de Silva	Ceylon Electricity Board	Electrical Engineer	Sri Lanka

Sr.No	Name	Organization	Designation	Country
119	Nerajan Rathnayake	Ceylon Electricity Board	Chief Engineer	Sri Lanka
120	W.P.Semini Nisansala	Ceylon Electricity Board	Electrical Engineer	Sri Lanka
121	Nihal Indrajith Weeraratne	Ceylon Electricity Board	Deputy General Manager	Sri Lanka
122	Welhenage Wickramarathna	Ceylon Electricity Board	Deputy General Manager	Sri Lanka
123	Nayomi Sandamali Bandara	Ceylon Electricity Board	Deputy Finance Manager	Sri Lanka
124	Himali Dammika Kumudumalee Hewage	Ceylon Electricity Board	Deputy Finance Manager	Sri Lanka
125	W.A.Lakshmi Vidusala Kumari	Ceylon Electricity Board	Electrical Engineer	Sri Lanka
126	Bandula Deshapriya	Ceylon Electricity Board	Electrical Engineer	Sri Lanka
127	S.A.Damith Tharanga	Ceylon Electricity Board	Chief Engineer	Sri Lanka
128	Kamal Purodha Perera	Ceylon Electricity Board	Deputy General Manager	Sri Lanka
129	S.Nihal Fernando	Ceylon Electricity Board	Additional Finance Manager	Sri Lanka
130	Namalee Erandathie Jayawardana	Ceylon Electricity Board	Chief Engineer	Sri Lanka
131	Ramjee Kuberalingam	Ceylon Electricity Board	Chief Engineer	Sri Lanka
132	P.L.Supun Bhasura	Ceylon Electricity Board	Electrical Engineer	Sri Lanka
133	U.N.Sanjaya	Ceylon Electricity Board	Chief Engineer	Sri Lanka
134	Shiraj Sharifdeen	Ceylon Electricity Board	Chief Engineer	Sri Lanka
135	Chandika Prasanna Liyanage	Ceylon Electricity Board	Chief Engineer	Sri Lanka
136	Lasith de Silva	Ceylon Electricity Board	Electrical Engineer	Sri Lanka
137	Thamara Lathika Bandara Aththanayaka	Ceylon Electricity Board	Electrical Engineer	Sri Lanka
138	Ahsaan Jamil	Ministry of energy	Assistant Manager (technical) at CPPA-G	Pakistan
139	Ahammad Sifat	North-West Power Generation Company Limited	Sub-Divisional Engineer Sustainable Energy Cell (P&D)	Bangladesh
140	Papon Das	BR- Power Generation	Superintending Engineer	Bangladesh
141	Ziniya Afrin	Bangladesh Power Development Board	Assitant Engineer	Bangladesh

Sr.No	Name	Organization	Designation	Country
142	Mr.Sabindra Bahadur Shrestha	Ministry of Energy, Water Resources and Irrigation	Engineering Geologist	Nepal
143	Suha Hussain	Fenaka Corporation Limited	Assistant Director	Maldives
144	Jumana Rasheed	Fenaka Corporation Limited	Assistant Director	Maldives
145	Tibinda Powdel	Department of Renewable Energy	Deputy Executive Engineer	Bhutan
146	Ugyen Rinzin	Department of Renewable Energy	Engineer	Bhutan
147	Chime Wangmo	Department of Renewable Energy	Deputy Executive Engineer	Bhutan
148	Karma Sangay	Department of Renewable Energy	Deputy Executive Engineer	Bhutan
149	Mr. Md. Ferdous Ahmed Opu	Power Grid Company of Bangladesh	Sub Divisional Engineer, Project Planning	Bangladesh
150	Mirza Safiqul Islam	Rural Power Company Limited (RPCL)	Executive Engineer (O&M)	Bangladesh
151	Mrs. Rajika Bandara	State Ministry of Solar Wind and Hydro Power Generation	Additional Secretary	Srilanka
152	Muhammad Hasnat Morshed		Senior Assistant Secretary	Bangladesh
153	Abdullah Al Mohit	Power Cell	Assistant Director (Act. Policy & Contract Management). Power Cell. Dhaka	Bangladesh
154	Mr. Mohammad Tanvir Masud	SREDA. Dhaka	Assistant Director (Wind & Others)	Bangladesh

Annexure – III: Trainers’ profiles and contact details

On-line Training of SAARC Professionals on Power Purchase Agreements of Renewable Energy Projects Oct 04 – 08, 2021

Coordinator:

Prof. Arun Kumar
Hydro and Renewable Energy Dept.,
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Lead Trainer:

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Hydro and Renewable Energy Dept.,
Indian Institute of Technology Roorkee, INDIA
Email: rhythm@hre.iitr.ac.in

Co-trainer(s):

Prof. Himanshu Jain
Hydro and Renewable Energy Dept.,
Indian Institute of Technology Roorkee, INDIA
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Prof. Anand Kumar
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Dr Rakesh Kumar Goyal
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Dr. Ram Prasad Dhital,
Member
Nepal Electricity Regulatory Commission, NEPAL
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Mr. Vivek Mishra
cKinetics and Meghraj Capital
Email: vivmishra25@gmail.com

Ms. Arai Monteforte
Tetra Tech, USA
Email: Arai.Monteforte@tetrattech.com

Experts for Panel Discussion:

Mr. Ravi Kiran Kuchi

Vice President (Business Development) & Regional Head- South, East & North-east
Indian Energy Exchange Limited (IEX)

Email: Ravi.Kuchi@iexindia.com

Mr. Muhammad Faisal Sharif

Director (Projects Appraisal) at PPIB,
Ministry of Energy (Power Division), Government of Pakistan

Email: faisalw@ppib.gov.pk



Prof Arun Kumar is a civil engineer with specialization in water resources and hydropower engineering by education is working at Department of Hydro and Renewable Energy, Indian institute of Technology, Roorkee since 1981. He has been awarded MNRE Chair Professor (Renewable Energy) in July 2013 and again in April 2015 by IIT Roorkee. He served as independent director on Board of NHPC Ltd, Govt of India PSU during 2015-2019. His research areas are Hydropower Development, Environmental Management of Water Bodies, Energy Economics and Policy. Prof. Kumar has over 39 years of experience in the field of Hydropower and environmental management of river and lakes. He served CLA for Hydropower on SRREN for IPCC. He has been elected on the board of London based International Hydropower Association and is Vice President of Federation of Indian small hydropower. He is Bachelors in civil engineering and PhD in hydropower from IIT Roorkee, Masters in Civil Engineering from IISc Bengaluru and Hydropower Diploma studies from NTH, Norway. He is Fellow of ASCE, International association of Hydropower, Institution of engineers (India), IWRS. He was appointed as Coordinating Lead Author (chapter 5 on Hydropower) for preparing Special Report on Renewable Energy Sources (SRREN) for IPCC – working group III during 2009–11. He has been involved as international expert in various UN sponsored projects on assessment of small hydropower and Capacity Building in Zambia, Sierra Leone, Tanzania, Cambodia, Sudan and Indonesia.



Prof. Rhythm Singh is currently working as an Assistant Professor in the Department of Hydro and Renewable Energy at IIT Roorkee, India. He holds a PhD in Energy Science and Engineering from IIT Bombay (2018), a Master of Technology degree in Energy Studies from IIT Delhi (2009) and a Bachelor of Technology (Gold Medal) degree in Electrical Engineering from MNNIT Allahabad (2007). Dr Singh's research interests lie at the intersection of technological analysis and policy support for enabling a transition to renewable energy technologies. Some of the problems he has worked on are developing a methodology for estimating the rooftop PV potential of Indian cities; optimizing the generation scheduling to maximize the benefit of renewable energy integration in the grid; analyzing the possibility of incorporating renewable energy generation requirements for buildings in the green building codes; study and optimization of the design of a built-up area to maximize rooftop PV potential; analysis and quantification of the solar resource variability for PV applications at a city-level; creating and analyzing possible renewable energy scenarios in the Indian context; and, using system dynamics to develop policy prescriptions for supporting renewable energy growth. He was awarded the Best Poster Award at the 2017 IEEE 44th Photovoltaic Specialists Conference held in Washington D.C., USA, for his paper on solar resource variability assessment. He is an active reviewer for around 11 reputed journals published by Elsevier, Taylor and Francis, IET and AIP Publishing. He has also been awarded the "Certificate of Outstanding Contribution in Reviewing" by the journals Solar Energy (Elsevier), Applied Energy (Elsevier) and International Journal of Electrical Power and Energy Systems (Elsevier). He was also awarded the reputed IET International Scholarship by the Institution of Engineering and Technology (IET), United Kingdom in the year 2006.



Prof. Himanshu Jain is an Assistant Professor in the Department of Hydro and Renewable Energy at IIT Roorkee. He has over 10 years of combined research and industry experience in modelling and analysing the impacts of integrating high levels of renewable energy in power systems. Before joining IIT Roorkee, Dr. Jain worked as a Senior Research Engineer and Research Engineer at the National Renewable Energy Laboratory (NREL), Golden, Colorado, USA from February 2017 to February 2021. At NREL, he led projects and tasks worth \$1.9 million and worked on several other high impact research projects that focused on improving the reliability and resilience of power systems under high penetration levels of renewable energy resources. Dr. Jain also has two and half years of industry experience having worked at ICF as a Senior Associate and Associate from 2011 to 2013, where, among other things, he led the efforts to develop distribution systems analysis capabilities. Dr. Jain has published 18 peer-reviewed journal and conference articles. He holds PhD, MS, and B. Tech degrees in Electrical Engineering from Virginia Tech, the University of Texas at Arlington, and G.B. Pant University of Agriculture & Technology, respectively.



Prof. Anand Kumar is currently working as Professor of Practice in Electrical Engineering Department at Indian Institute of Technology, Gandhinagar, Gujarat. Prior to this, he worked as Chairperson of Gujarat Electricity Regulatory Commission & Meghalaya State Electricity Commission. He also served Uttarakhand Electricity Regulatory Commission as Acting Chairperson & Member. He holds Master of Business Administration (Finance) degree and Graduate degree in Electrical Engineering from IIT-Roorkee. He has done Advanced Software Programming training Course from Hitachi, Japan and training in Economics Regulation from National Regulatory Research Institute, at Ohio University USA. Out of some key assignments, was his association in Unbundling and Restructuring of the power sector in Uttar Pradesh and assignments at 4 State Electricity Regulatory Commissions of Uttar Pradesh, Uttarakhand Meghalaya and Gujarat.



Mr Rakesh Kumar Goyal has over 30 years of power sector experience in full value chain from generation to customer and regulatory. Rakesh possess experience of working with Electric utilities and institution managed by MNC, private sector, public undertaking, and Government. Presently, Rakesh is Vice President in Tetra Tech a US based consultancy firm. Prior to joining Tetra Tech Rakesh worked with SIEMENS, and Tata Power. His areas of interest are power sector governance and reform, clean energy, demand side management and regulatory matters related with power sector. Mr Rakesh holds a bachelor's and master's degree in Engineering from the Indian Institute of Technology Roorkee and a Masters' in Business Administration. He has recently been awarded a Doctor of Philosophy. Rakesh has co-authored four books and published several papers.



Dr. Ram Prasad Dhital is member of the electricity regulatory commission in Nepal. He is responsible for planning and monitoring, institutional development, regulatory and external affairs in the commission. He is also the spokesperson of the commission. Dr. Dhital has spent two decades working in the renewable energy sector on national and international levels, in executive, advisory and technical roles. He served as the

Executive Director of Alternative Energy Promotion Center under the ministry of energy, water resources and irrigation overseeing operations, strategic and technical initiatives in Nepal. He also worked as the Energy Advisor in Afghanistan for two years and Vanuatu in the south pacific for a year. He has been able to utilize the learning in national level by reforming renewable energy subsidy policies, institutionalizing central renewable energy funds and mobilizing internal and external resources (annually USD 55 million) to realize Nepal government's target of clean cooking and lighting solution to all by 2022. Dr Dhital holds a Masters and PhD degree in Renewable Energy Engineering. He has more than 15 research publications and conference paper written and presented at national and international platform globally representing Nepal. He is also an APMG certified PPP professional, Nepal Engineering Council certified Professional Engineer and National Vigilance Centre certified Technical Auditor.



Mr Vivek Mishra is an Electrical Engineer with Master's in Finance and ICWA. Vivek has around thirty-three years of consulting, regulatory and operational experience in Generation, Transmission, Distribution and Material Management functions of Power Sector. Mr Vivek has held partner level positions in cKinetics and Meghraj Capital Advisors and was responsible for their practice development. Presently he is an independent expert. He has also worked in senior positions with Mercados EMI and KPMG. He has also worked as Director with MPERC and UPERC. Vivek has also worked with Energy Utilities such as UPSEB and GAIL Ltd. Mr Vivek has worked across the energy value chain and with almost all the relevant institutions including International (ADB and WB) and National Financial Institutions, Central and State Governments, Private and Public Utilities, Electricity Boards, Investors and Regulatory Commissions. Vivek has also worked for various organizations of UN. He also has significant experience in Energy including Renewable. In energy consulting he has worked in areas of Energy Efficiency, Sustainable Energy Access, Policy, Demand Side Management, Business Process Improvement, Reforms & Institutional Capacity Development, Transaction and Strategy. Apart from India, he has also worked in Bangladesh, Bhutan, Maldives, Nepal, Philippines, Sri Lanka, Solomon Islands, Seychelles, Uganda and Swaziland. He has participated regularly in various capacity building programs organized by IITR, IITK, IIML, Drums Training Program of USAID and Institute of Cost Accountant.



Ms. Arai Monteforte is an economics, finance, and policy professional focusing in the energy sector. Ms. Monteforte brings international and domestic experience gained through more than 15 years of consulting work for private companies and institutions such as the United States Agency for International Development (USAID), the United States Trade and Development Association (USTDA), the Inter-American Development Bank (IDB), and the International Financial Corporation (IFC). She currently serves as Chief of Party (COP) for USAID's million Scaling Up Renewable Energy project (SURE) and its million follow-on, SURE II, overseeing technical assistance in almost 30 partner countries, including India, to implement work on strategic energy planning, variable renewable energy grid integration, and competitive procurement. For the Millennium Challenge Corporation, she oversees due diligence support for the Burkina Faso Power Compact, and the regional Compact, focused on electricity generation, distribution and transmission improvements, and the implementation of electricity sector reform. Previously, she served as Senegal Resident Advisor under USAID's Power Africa, where she co-

led and contributed to the utility's generation-transmission master plan and Senegal's gas-to-power roadmap. Ms. Monteforte holds a M.A. in International Economics and Energy Policy from Johns Hopkins University, a M.S. in Quality and Reliability Engineering, a B.S. in Chemical Engineering, and a B.S. in Computer Science.

Experts for Panel Discussion:



Mr Ravi Kiran Kuchi is currently working as Vice President (Business Development) in IEX, India's leading energy trading platform. He is an electrical and electronics (EEE) engineer from JNTU, Kakinada and a post-graduate in management (PGDM) from IIM Lucknow. He has more than 15 years of experience across the value chain of the power sector. He started his career as a power system planner in the Central Transmission Utility (POWERGRID). Subsequently, he worked as a consultant in the power sector for more than 7 years in two Big 4 firms (PwC & EY) and advised discoms, generators, regulators, funding agencies etc in a variety of engagements in policy, regulatory, techno-commercial, capacity building and transaction advisory aspects. Subsequently, he looked after strategic initiatives and specific business development opportunities for one of the top integrated energy developer in the country (Sembcorp).



Mr Muhammad Faisal Sharif is currently serving as Director (Projects Appraisal) at PPIB, Ministry of Energy (Power Division), Government of Pakistan. He has around 18 years of professional experience in energy sector (both in private and public sector's organizations) with sound international exposure and extensive involvement in energy policy, regulatory affairs, renewable energy & environment, electricity market reforms & development, techno-economic valuation, competitive auctioning, contract administration, project finance and tariff structuring of electricity generation & related infrastructure projects. He has diverse academic qualifications including graduation in "Mechanical Engineering" from University of Engineering and Technology Lahore, "Master in Energy Management" from CIIT Islamabad, "Master in Business Administration" from SZABIST Islamabad and "M.Sc. in New and Renewable Energy" from Durham University, United Kingdom. Besides, he attended number of national and international trainings in the related areas.

Annexure – IV: Technical presentations

Presentations and video recordings are available on SEC Website and can be assessed through the following link:

<https://www.saarcenergy.org/on-line-training-of-stakeholders-on-power-purchase-agreements-of-renewable-energy-projects/>

Annexure – V: List of suggested reading materials

1. Repository of several PPAs for renewable energy from different parts of the world, including SAARC
<https://ppp.worldbank.org/public-private-partnership/sector/energy/energy-power-agreements/power-purchase-agreements>

<https://ppp.worldbank.org/public-private-partnership/library/power-purchase-agreement-ppa-example-1>

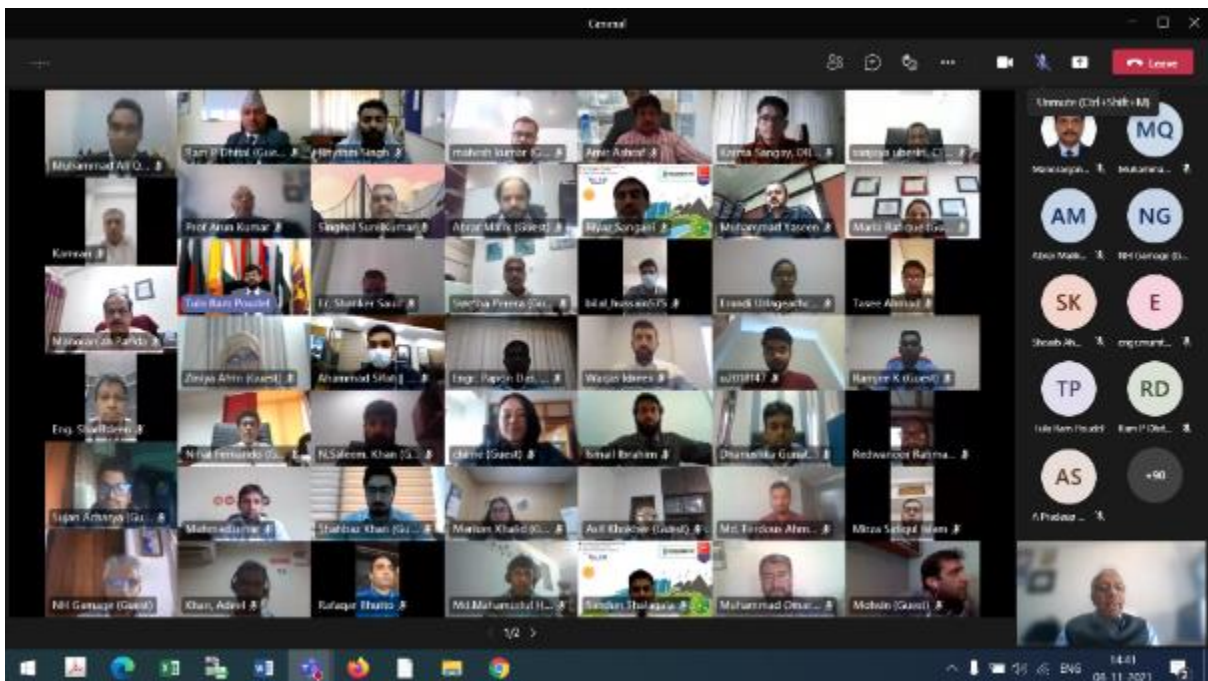
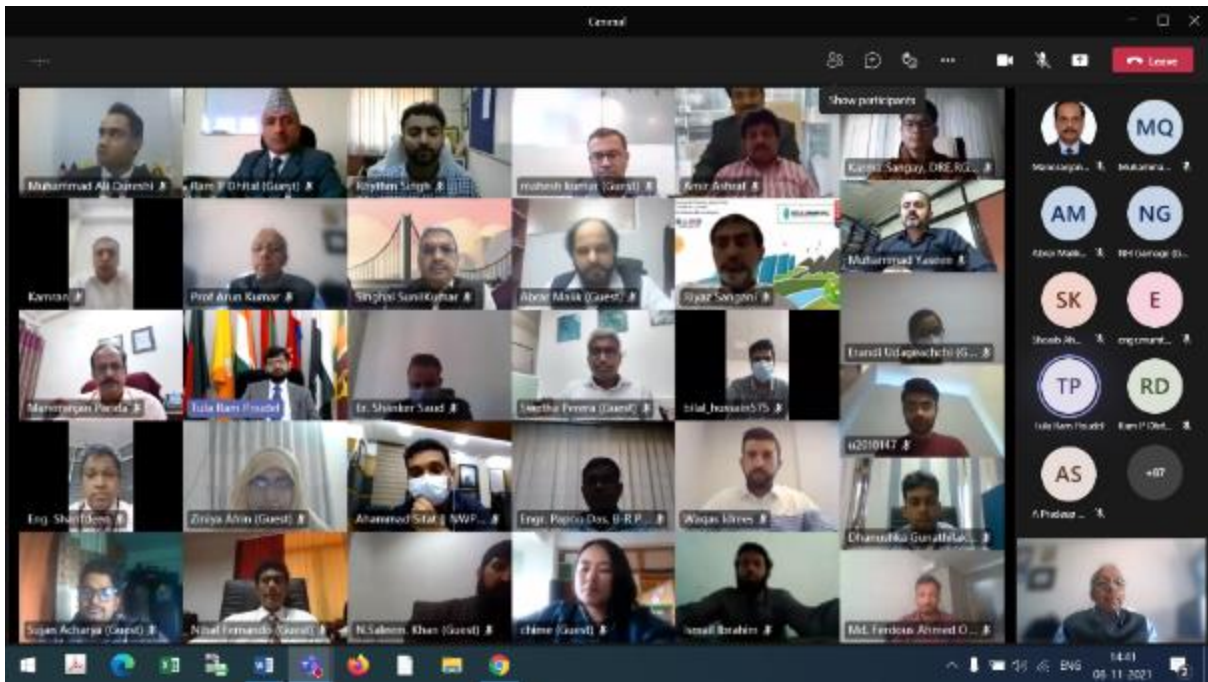
<https://www.irena.org/-/media/Files/IRENA/Agency/Events/2018/Aug/Renewable-Energy-PPAs.pdf?la=en&hash=C365D5D08EBFF26A1F7A29A13D721C5B3C4390D9>
2. Ministry of Power, Govt Of India
https://powermin.gov.in/sites/default/files/uploads/standard_bidding_doc_PPA.pdf
3. SECI Solar Energy corporation of India
Draft Standard Power Purchase Agreement for Solar Power (SECI)
<https://www.seci.co.in/web-data/docs/Final%20PPA%205%20MW%20OFCK.pdf>
4. Tata Power
<https://www.tatapower.com/pdf/ppa-procurement.pdf>
5. Bangladesh Power Development Board
https://www.bpdb.gov.bd/bpdb_new/d3pbs_uploads/files/PPA%20for%2050-60%20MW%20Solar%20Project%20at%20Rangunia.pdf
6. Photovoltaics at DOE's National Renewable Energy Laboratory License
<https://www.seia.org/research-resources/solar-power-purchase-agreements>
7. PPA definitions –
<https://www.next-kraftwerke.com/knowledge/ppa-power-purchase-agreement>
8. Synthetic PPA details –
<https://www.projectfinance.law/publications/2013/april/synthetic-power-contracts/>
9. Traditional vs Renewable PPA: <https://perspectives.se.com/renewable-energy/what-s-the-difference-between-a-traditional-and-renewable-ppa#:~:text=One%20of%20the%20big%20differences,contract%20are%20much%2C%20much%20different>
10. Google Texas PPA: <https://www.environmentalleader.com/2020/09/google-candela-texas-solar-ppa/>

11. GE India PPA: <https://www.tatapowersolar.com/press-release/tata-power-renewables-signs-ppa-with-ge-for-5-mw-solar-projects/>
12. Apple PPA: <https://www.pv-magazine.com/2020/09/04/apple-data-center-in-denmark-powered-by-50-mw-of-solar/>
13. FIT Reference: <https://www.nrel.gov/docs/fy10osti/44849.pdf>
14. Competitive bidding: https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2015/Jun/IRENA_Renewable_Energy_Auctions_A_Guide_to_Design_2015.pdf
15. Hybrid Resource PPA (India): https://mnre.gov.in/img/documents/uploads/file_s-1602674926052.PDF
16. Hybrid Resource PPA (USA): <https://www.utilitydive.com/news/solar-wind-storage-developers-gearing-up-as-hybrid-projects-edge-to-m/556480/>
17. PPAs for Distributed Generation.:
<https://www.usaid.gov/sites/default/files/documents/1865/68469.pdf>
18. NREL India VoS study: <https://www.nrel.gov/docs/fy21osti/78442.pdf>
19. Potential Cross-Border Renewable Energy Trading Benefits in SAARC –
<https://www.nrel.gov/docs/fy20osti/76919.pdf>
20. CERC (India) Cross-border Electricity Trading Regulations:
<https://cercind.gov.in/2019/regulation/CBTE-Regulations2019.pdf>
21. Europe Cross-Border PPAs:
<https://www.wbcds.org/contentwbc/download/10878/160801/1>
22. Wheeling charge renewable energy: <https://www.nrel.gov/docs/fy16osti/65660.pdf>
23. Wheeling charge renewable energy India:
https://powermin.gov.in/sites/default/files/Waiver_of_inter_state_transmission_charges_Order_dated_21_June_2021.pdf
24. Designing PPAs : https://www.dena.de/fileadmin/dena/Publikationen/PDFs/2019/dena-REPORT_How_to_use_PPAs_for_cost-efficient_extension_of_re.pdf
25. Designing PPAs: <https://www.nrel.gov/docs/fy16osti/66543.pdf>

26. Alfred, E.K., 2008. Competitive Electricity Markets: The Benefits for Customers and the Environment. NERA Economic Consulting, Boston, Massachusetts.
27. ESCAP, U. and Cooperation, A.P.E., 2018. Integrating South Asia's power grid for a sustainable and low carbon future.
28. Qaiser, I., 2021. A comparison of renewable and sustainable energy sector of the South Asian countries: An application of SWOT methodology. Renewable Energy.
29. Rahman, S.H., Wijayatunga, P.D., Gunatilake, H. and Fernando, P.N., 2011. Energy trade in South Asia: Opportunities and challenges.
30. Rudnick, H. and Velasquez, C., 2018. Taking stock of wholesale power markets in developing countries: A literature review. World Bank Policy Research Working Paper, (8519).
31. Singh, A., Jamasb, T., Nepal, R. and Toman, M., 2015. Cross-border electricity cooperation in South Asia. *World Bank Policy Research Working Paper*, (7328).
32. Acemoglu, D., Kakhbod, A. and Ozdaglar, A., 2017. Competition in electricity markets with renewable energy sources. *The Energy Journal*, 38 (KAPSARC Special Issue).

Annexure – VI: Screenshots during the sessions

Day 1: Nov 08, 2021



Day 2: Nov 09, 2021



Day 3: Nov 10, 2021



Day 4: Nov 11, 2021



Nov 12, 2021

