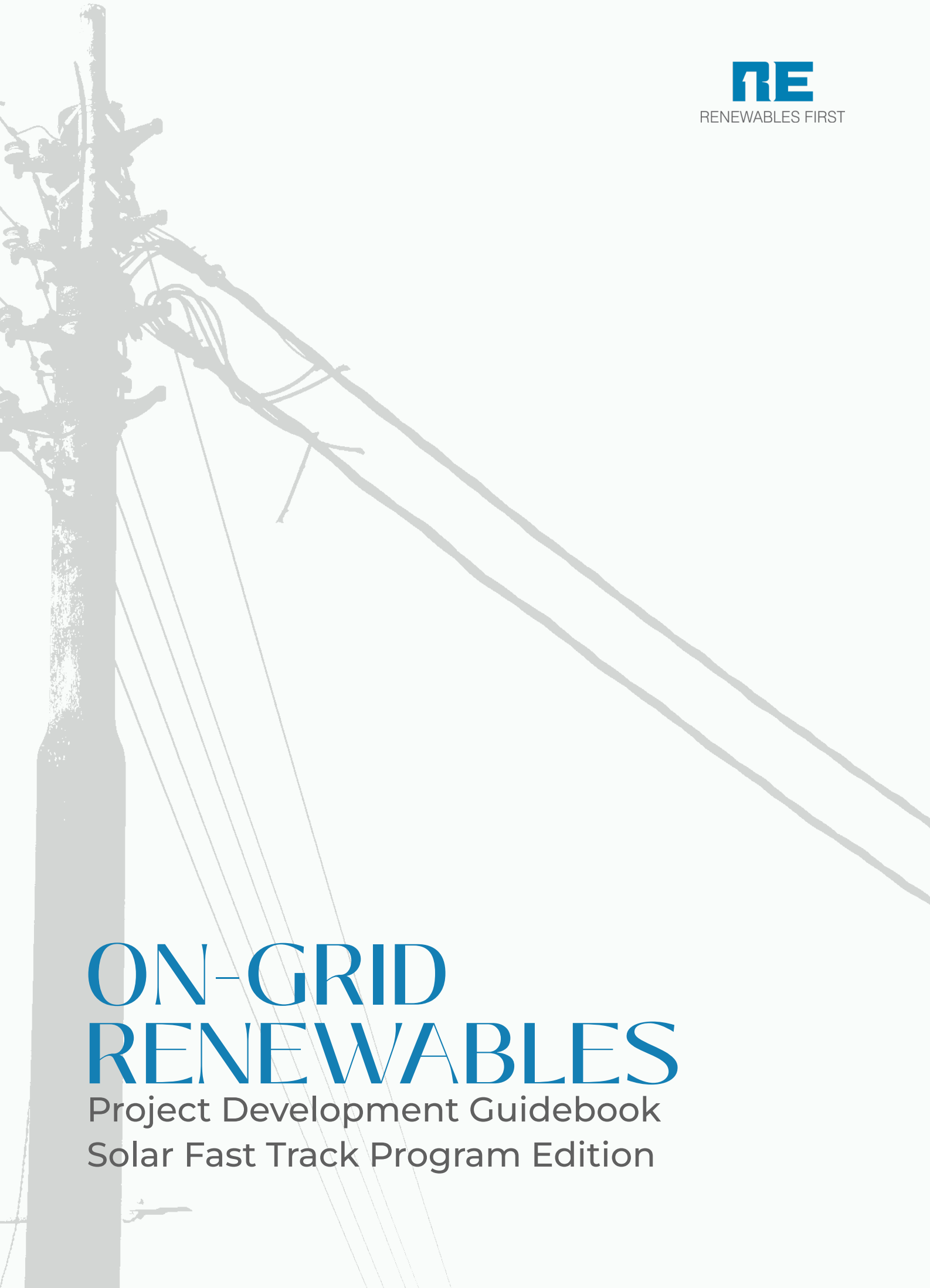
RENEWABLES FIRST



ON-GRID RENEWABLES

Project Development Guidebook
Solar Fast Track Program Edition

Disclaimer

The report (herein referred to as “the guidebook”) has been prepared by Renewables First. It is the first edition of the report with subsequent editions set to be published every year.

The guidebook is prepared by data collected from various sources including the notified polices, official documents, and third-party research. While utmost care has been exercised to verify the accuracy of these data, we do not make any representation or warranty, express or implied, nor assert completeness of data an information provided in the guidebook. Renewables First is not legally bound to the guidebook in any form and does not assume any liability or responsibility for any financial or other loss resulting from the use of data an information contained in it. The opinions expressed by authors do not necessarily represent the views of Renewables First or any of its affiliates or sponsors. Any errors or omissions are responsibility of the authors and may be amended and updated in subsequent versions.

About Renewables First

Renewables First is a think-and-do tank for energy and environment. RF’s work focuses critical energy and natural resource issues with the aim to make energy & climate transitions just and inclusive.

Global energy transition is underway, and trends indicate a rapid shift towards sustainable energy practices in the next two decades. These practices require a highly specialized knowledge in diverse domains such as distributed generation, renewable integration, competitive power procurement and environmental protection while keeping people and communities at the centre of the transformation. Dealing with these challenging areas is at the core of our philosophy.

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Contents

List of Abbreviations

AEDB	Alternative Energy Development Board
ARE	Alternative and Renewable Energy
AREP	Alternative and Renewable Energy Project
BOOT	Build Own Operate and Transfer
C&F Value	Cost and Freight Value
CA	Connection Agreement
CCI	Council of Common Interest
CCoE	Cabinet Committee on Energy
COD	Commercial Operations Date
CPPA-G	Central Power Purchasing Authority Guarantee Limited
CTBCM	Competitive Trading and Bilateral Contracts Market
CYREPP	Current Year Renewable Energy Procurement Plan
DFI	Development Finance Institution
DIF	Diffused Horizontal Irradiance
EMC	Electromagnetic Compatibility
EOI	Expression of Interest
EPA	Energy Purchase Agreement
EPC	Engineering Procurement and Construction
ESMAP	Energy Sector Management Assistance Program
FBR	Federal Board of Revenue
FDI	Foreign Direct Investment
FFCEL	Fauji Foundation Company Energy Limited
FY	Fiscal Year
GENCOs	Generation Companies
GHI	Global Horizontal Irradiance
GWh	Gigawatt hour
IA	Implementation Agreement
IAA	Independent Auction Administrator
IEC	International Electro-technical Commission
IEEE	Institute of Electrical and Electronics Engineers
IGCEP	Indicative Generation Capacity Expansion Plan
IPP	Independent Power Producers
ISO	Independent System Operator
K-ELECTRIC	Karachi Electric
KP	Khyber Pakhtunkhwa
KP-BOIT	Khyber Pakhtunkhwa Board of Investment and Trade
LES	Localized Energy Systems
LOCA	Letter of Conditional Award
LOI	Letter of Intent
LOS	Letter of Support

MO	Market Operator
MoE	Ministry of Energy
MoE PD	Ministry of Energy Power Division
MSW	Municipal Solid Waste
MW	Megawatt
NBP	National Bank of Pakistan
NDC	Nationally Determined Contributions
NEPRA	National Electric Power Regulatory Authority
NGC	National Grid Company
NPCC	National Power Control Centre
NREL	National Renewable Energy Laboratory
NTDC	National Transmission and Dispatch Company
OD	On Demand
PAEC	Pakistan Atomic Energy Commission
PBIT	Punjab Board of Investment and Trade
PEDO	Pakhtunkhwa Energy Development Organization
PGC	Provincial Grid Company
PPDB	Punjab Power Development Board
PPIB	Private Power Infrastructure Board
PPMC	Power Planning and Monitoring Company
PV	Photovoltaic
RE	Renewable Energy
RFO	Residual Furnace Oil
RFP	Request for Proposal
RLNG	Regassified Liquefied Natural Gas
SBP	State Bank of Pakistan
SCED	Security-Constrained Economic Dispatch
SECP	Securities and Exchange Commission of Pakistan
SED	Sindh Energy Department
SEHC	Sindh Energy Holding Company
SID	Sindh Investment Department
SOI Report	State of Industrial Report
SPT	Special Purpose Trader
SPV	Special Purpose Vehicle
STDC	Sindh Transmission and Dispatch Company
TNO	Transmission Network Operator
TSO	Transmission System Operator
TT	Telegraphic Transfer
VRE	Variable Renewable Energy
WAIPA	World Association of Investment Promotion Agencies
WAPDA	Water and Power Development Authority

Context

Starting in 2023, Pakistan will undertake its first round of competitive bidding on the upcoming 'Solar Fast Track' program which seeks to induct 10,000 MW of solar power. The program consists of: i) 600 MW utility-scale projects at high voltage network with a cumulative capacity of up to 6000 MW., ii) Projects of up to 4 MW on 11 KV medium voltage level., and iii) Solarization of government-owned buildings through net-metering. The scheme will open up tremendous investment opportunities for the developers.

To facilitate investors in taking advantage of this window of opportunity, Renewables First has taken the initiative of developing an investor's guidebook that includes the complete project development process of the upcoming competitive bidding rounds in Pakistan. The manual presents a background of all related technical and regulatory procedures required to set up a renewable energy plant in Pakistan through the auctions model. It describes in detail the bidding procedures, tariff structures, required bonds of submission as well as all eligibility criteria, fees/charges and timelines for setting up the project.

This guidebook lists the procedure for the development of solar projects under the category 'Substitution of Expensive Imported Fossil Fuels with Solar Photovoltaic (PV) Energy' under Framework Guidelines – Fast Track Solar PV Initiatives 2022. Renewables First envisions this document to be organic and regularly updated to list procedures for solar procurement under various policy initiatives and programs. Future procurements under different categories of framework guidelines Alternative and Renewable Energy (ARE) policy 2019, and other initiatives will be included in subsequent editions of this document.

Renewable Energy Landscape of Pakistan

Resource Potential

Solar

Pakistan has tremendous potential for solar power generation. According to the Energy Sector Management Assistance Program (ESMAP) Solar Resource report of March 2017, the Western region of Pakistan tops the Global Horizontal Irradiance (GHI) chart with average annual values exceeding 2330 kWh/m2 (average daily total of 6.4 kWh/m2). Higher up in the Northern areas, the GHI score tends to fluctuate from 1750 to 1300 kWh/m2 with daily averages of 4.8 kWh/m2 to 3.6 kWh/m21 In Pakistan, the annual average of PV output lies between 1240 kWh/kWp and 2100 kWh/kWp, with greater values recorded in the Baluchistan province. However, terrain shading in the mountainous regions up North reduce PV output significantly by 20% or more.

The higher altitude and lower air temperature of sites in Baluchistan Province make them the best locations for PV-based generation and exhibit serious GHI potential due to lesser volume of aerosols present in the atmosphere. These factors not only improve the efficiency of a Solar PV system but also reduce the number of PV modules required to produce the same power. Even cities like Hyderabad & Turbat have fairly decent potential.

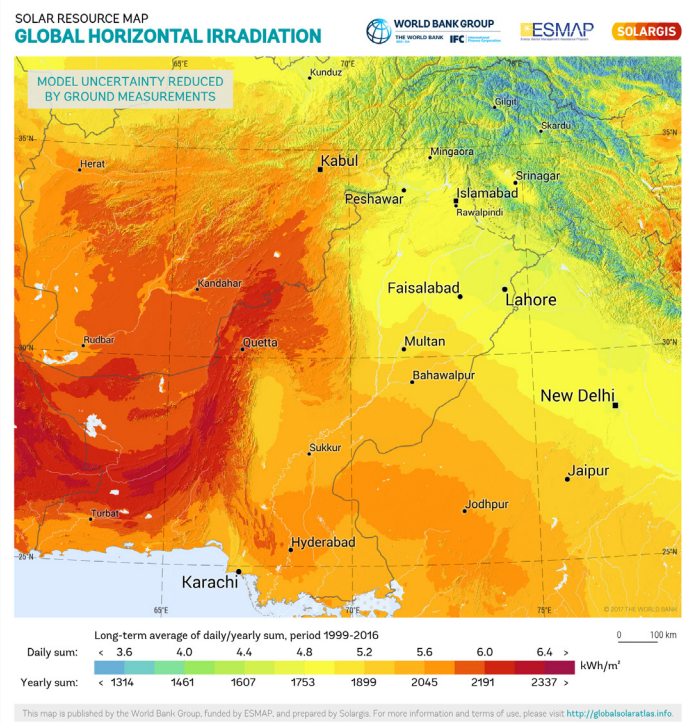


Figure 1- Solar GHI level- Source Solargis ESMAP Report

Wind

The National Renewable Energy Laboratory (NREL),USA, in a survey report estimated Pakistan's wind power potential to be 346 GW.[2] The research – "A Research on Electricity Generation from Wind Corridors of Pakistan (Two Provinces): A Technical Proposal for Remote Zones" finds the total wind potential of 88.460 GW and 146.145 GW in Sindh and Baluchistan, respectively. The Gharo-Jhimpir wind corridor in Sindh carries a potential of 11 GW alone.

As of June 2022, the country's total installed wind power capacity is stated at 1838 MW.[3] Various prominent local and foreign developers like FFCEL, General Electric, China Three Gorges, Gold Wind, Vestas, Zorlu and more have set up wind power plants in the Gharo-Jhimpir wind corridor. The latest Indicative Generation Capacity Expansion Plan (IGCEP) 2022-2031 plans a total of 4,928 MW of installed wind capacity by 2031 through the upcoming auction scheme in Pakistan.[4]

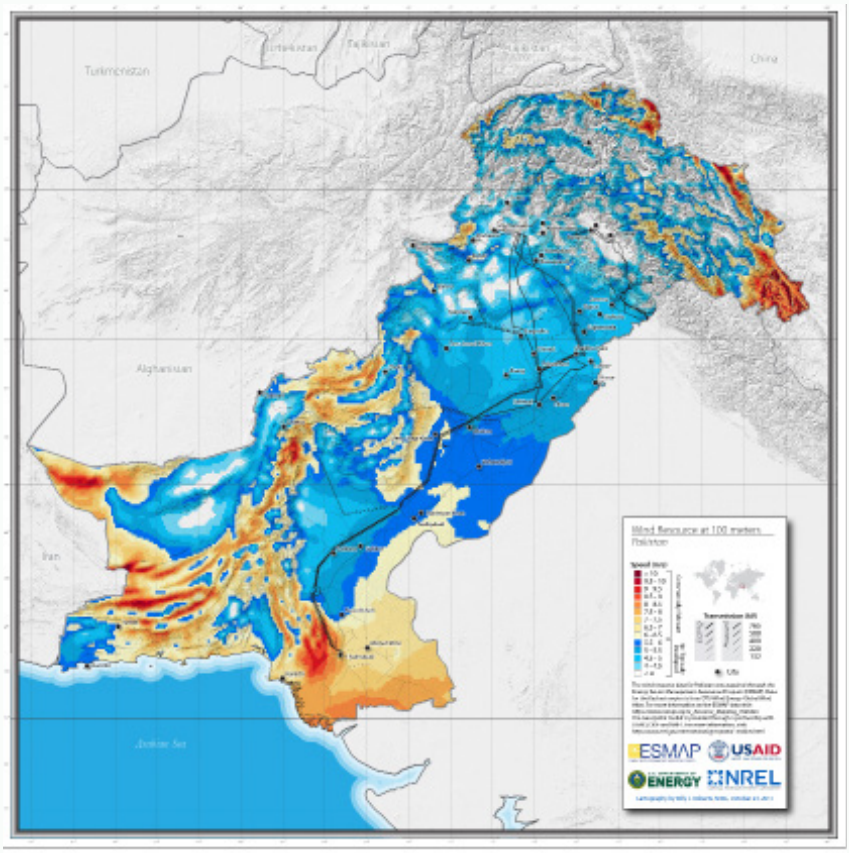


Figure 2- Wind resource in Pakistan

Consistently declining equipment costs clubbed with efficient procurement schemes have ensured a rapid decline in levelized wind tariffs up to 3.5 US cents/kWh and are expected to go down further through an intelligently designed auctions regime. There is ample potential available in Pakistan for replacing expensive and dirty fossil fuel generation with cleaner, cheaper, and more efficient technologies like the wind; a major step towards decarbonizing the energy sector of the country.

Biomass Potential in Pakistan

According to the National Electric Power Regulatory Authority (NEPRA)'s State of Industrial (SOI) Report 2022, the total installed capacity for Bagasse connected with the Central Power Purchasing Agency Guarantee (CPPA-G) system was 369 MW in Pakistan. The total generation for FY 2020-2021 from these plants was 826.05 GWh. This is 115.49 GWh more than the previous year. A biomass atlas prepared by the World Bank under ESMAP in June 2016 boasts impressive figures for Biomass generation potential in Pakistan. The 84 sugar mills in the country have the combined potential for generating 1,844 MW from their annual waste generated of up to 17.1 million tons. Pakistan could export valuable quantum energy through combined generation from bagasse and livestock bio waste, with a collective energy yield estimated at 10,759 GWh annually. Out of this, 4,944 GWh is set to come from Bagasse alone. Municipal Solid Waste (MSW) can also be used for bioenergy generation. Using the anaerobic digesters, Pakistan can potentially convert MSW as an alternative to fossil gas.

Sector Profile

The electricity sector of Pakistan has two generation baskets in the country; CPPA-G Limited and K-Electric producing electricity from Independent Power Producers (IPPs), State-owned Generation Companies (GENCOs) and large hydel power plants by Water and Power Development Authority (WAPDA). As of June 2022, the cumulative installed capacity of the country is 43,775 MW, while the dependable capacity remains 40,532 MW. This is 12,279 MW higher than the peak demand during the same financial year.[3]

The country has tremendous potential for solar and wind power generation, with maximum solar irradiance levels[1] of 2337 kWh/m^2 and a theoretical wind potential[2] of 346 GW. Sindh and Balochistan offer one of the best sites for renewable energy development in the world. However, the share of solar, wind and bagasse for FY 2021-2022 remained 630 MW, 1838 MW and 369 MW respectively comprising of only 6.48% of the total installed capacity respectively. The total electricity

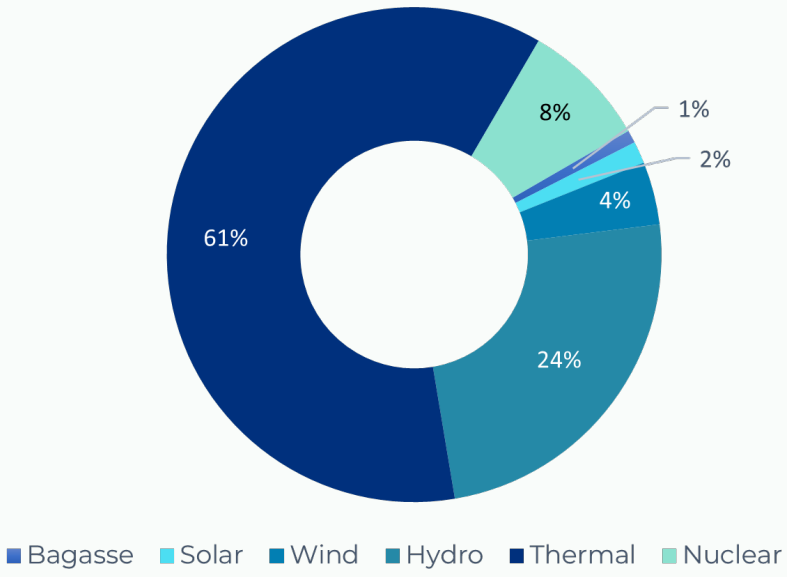


Figure 3 - Current Electricity Mix

generation in the country for FY2021-2022 stood at 153,874.20 GWh of which renewables (solar, wind and bagasse) accounted for 6,432 GWh, while hydel based generation was recorded at 35,546 GWh. Pakistan also imported 514.36 GWh of electricity from Iran.

For the year 2021-22, total electricity consumption in the country stood at 124,630 GWh, out of which domestic consumption accounted for 60,410 GWh, commercial consumption for 9,233 GWh, industrial consumption for 33,958 GWh and agriculture consumption for 11,033 GWh, while 9,996 GWh had been consumed by other categories. Major share of electricity consumption in Pakistan comes from the domestic sector i.e., 49%, while the industrial and agriculture sectors make up 28% and 9%.

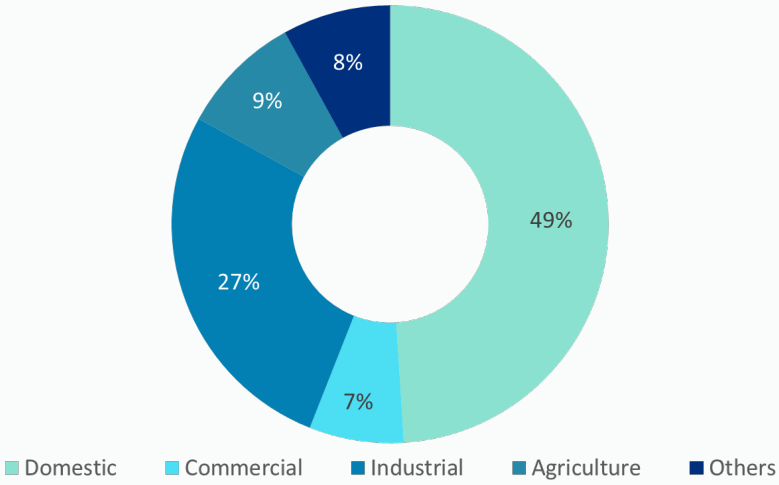
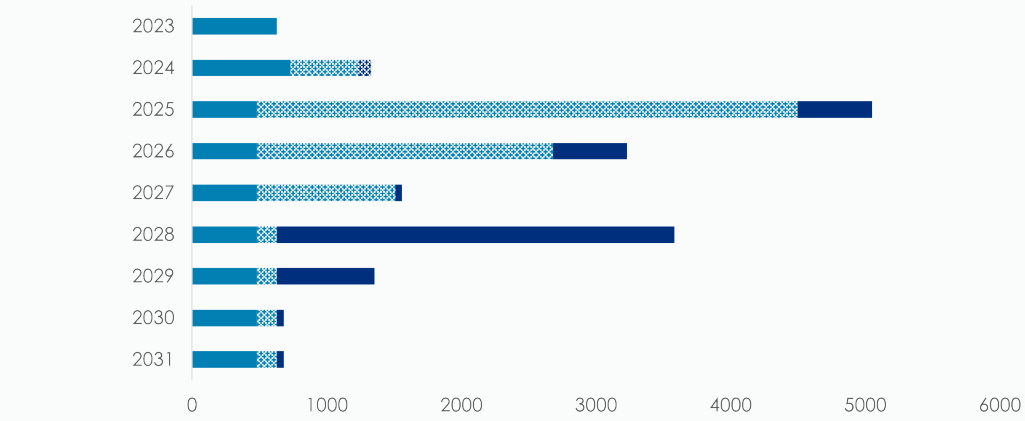


Figure 4 - Sector wise Electricity Consumption in Pakistan

A total of 12 Wind power projects having cumulative capacity of 600 MW and a 100 MW solar plant were also added in FY 2021-2022. During FY 2021-2022, 9 licenses were issued to solar generators of cumulative capacity of 34.74 MW while 7,032 licenses of total capacity of 243.43 MW were issued for net-metering systems.[3]

Future Capacity Additions in the Renewable Energy Sector

The IGCEP 2022-2031[4] sets the roadmap for Pakistan's drift towards clean and affordable electricity. The document forecasts retiring 8,021 MW of thermal capacity and adding 8,350 MWp of Solar PV (utility solar & feeder based/DG), 4,928 MW of wind and 3,544 MW of hydro by 2031 under the base case scenario. It also plans adding 4,320 MW of net-metering solar by the same timeline with annual additions of 480 MW. For the base case procurement, the IGCEP has forecasted a requirement of $52.93 billion additional investment by 2031.



	2031	2030	2029	2028	2027	2026	2025	2024	2023
Solar Committed	480	480	480	480	480	480	480	730	630
Solar Candidate	150	150	150	150	1030	2200	4020	500	0
Wind Committed	0	0	0	0	0	0	0	100	0
Wind Candidate	50	50	726	2953	50	550	550	0	0

Solar Committed Solar Candidate Wind Committed Wind Candidate

Figure 5 - IGCEP 2022-2031 Capacity Additions

VRE projects have been divided into 3 categories as per Cabinet Committee on Energy's (CCoE) decision on April 4, 2019.[5]

- Category 1 projects (LOS issued by AEDB) consist of 4 solar PV projects of 31.5 MW and 15 Bagasse projects of 489.5 MW.
- Category 2 projects have LOI issued, tariff approved and respective generation licenses granted. These are 450 MW of solar PV and 608.3 MW of wind.
- Category 3 projects (LOI issued by AEDB) has 110 projects with a total capacity of 6,707 MW comprising 31 wind projects (2,139 MW), 72 solar PV projects (4,343.5 MW), and seven bagasse projects (224.5 MW)

Both the above-mentioned categories will proceed as per RE Policy 2006. Category 3 Projects will be deployed using Competitive Bidding as per the decision of Cabinet Committee on Energy dated April 4th, 2019.[6]

Solar Fast Track Program

Government of Pakistan unveiled a Solar Fast Track program in September 2022 aimed at capacity addition of 10,000 MW Solar projects including 6,000 MW of utility scale solar procured through competitive bidding. These large-scale projects shall be procured under competitive bidding regime on a Build, Own, Operate and Transfer (BOOT) basis. Remaining

4,000 MW includes; i) Solar projects at existing 11 kV feeders with surplus distribution capacity procured through auctions, and ii) Solarization of Government buildings.

Salient Features	
◇ Single-stage, two-envelope bidding	◇ Exemption on all import related duties and taxes
◇ Straight-line tariff	◇ Existing EPA & IA will be used
◇ 70% $ Indexation of tariff	◇ COD - within 20 months of EPA signing
◇ Benchmark tariff by NEPRA	◇ Term - 25 years on BOOT basis
◇ Gauranteed purchase of power	◇ 15% income tax
◇ Land & interconnection to be provided by GOP	◇ Payment gauranteed on 60th day after invoice through bank debit

Strategies, Policies & Regulations

More than a decade ago, the Renewable Energy Policy 2006[7] did lay the cornerstone for Pakistan's journey towards cheap, reliable and renewable sources for fulfilling its energy needs, however several factors like political instability, global recession of 2008 and law and order situation barred the policy from materializing into concrete projects. Despite the challenges, the initial significant result of the policy occurred in 2011 when a local developer, FFC Energy Limited (FFCEL) established Pakistan's first wind power plant in Jhimpir Sindh. This marked the beginning of the country's first wind corridor.[8]

The renewable energy portfolio in the country has been on the rise since then; although more gradually than the rising demand profile. To fast-track this implementation, the Council of Common Interest (CCI) approved and notified the Alternative and Renewable Energy Policy 2019[9] in late October 2020. The policy shaped the roadmap for all future procurements in Pakistan's energy sector mainly through the competitive bidding model stressing the need to increase RE share to 30% by 2030, promote local content creation and reducing imports. There exists a compelling need and opportunity for the investors to participate in a nascent but growing market for residential, industrial and agriculture sectors and tap into various solutions such as on-grid, off-grid and hybrid technologies.

Policies & Guiding Documents	Theme
RE Policy 2006	◇ The 2006 RE Policy encompassed wind, solar and small hydro (<50 MW), and provided the first roadmap for RE development in the country. ◇ Also introduced requirements of letter of intent (LOI), Implementation Agreements (IA) which contained Sovereign guarantee of the Government of Pakistan to attract investment in IPP mode.w
ARE Policy 2019	◇ Competitive bidding mode of procurement for renewable energy projects deemed mandatory, except for new technology and strategic projects. ◇ Local content and indigenization to be promoted.
IGCEP 2022 - 2031	◇ Set target of 8,350 MW of solar and 4,928 MW of wind procurement by 2031. ◇ Also included 4,320 MW of net-metering with 480 MW of additions annually. ◇ Looks to reduce reliance on imported fuels by enhanced share of renewables.
National Electricity Policy 2021	◇ Setting up goals for power sector: Access to affordable energy, energy security, and sustainability. ◇ Policy is focused on power expansion on a competitive, least cost and transparent basis. ◇ Focused on renewable energy and local fuels.
Variable Renewable Energy (VRE) Competitive Bidding Study	◇ Explains various auctions designs and their pros and cons. ◇ Discussed at length the optimum design for Pakistan for Sub-station & Park based theme. ◇ Describes the entire project development process in detail.
VRE Integration and Planning Study	◇ Optimize energy mix over the next 10 to 20 years when considering economic, technical, and environmental factors. ◇ Assessing the grid capacity to integrate VREs, hydro, and other technologies. ◇ Assessing the capital investments, changes in operation, and planning decisions needed to achieve an optimal energy mix
VRE Locational Study	◇ The World Bank's locational study identified key areas for VRE deployment across Pakistan ◇ This data set proved critical for the authorities to develop a thorough road map for implementing RE projects in the country

For more details on Renewable Energy Policies and Relevant Documents, refer to Annexure II.

Key Stakeholders

The power sector in Pakistan is headed by the Ministry of Energy Power Division (MoE PD) with multiple entities serving under different ministries for the development and implementation of power policies. These include the Alternative Energy Development Board (AEDB), Private Power & Infrastructure Board (PPIB), Power Planning & Monitoring Company (PPMC), Pakistan Atomic Energy Commission (PAEC) and the Water & Power Development Authority (WAPDA). To regulate these entities for smooth operations, the National Electric Power Regulatory Authority (NEPRA) serves as the chief regulator, setting rules, standards and regulations, determining tariffs and settling of disputes etc. Key stakeholders involved in power sector are listed below.[5] *(For more details on key stakeholders, refer to Annex I).*

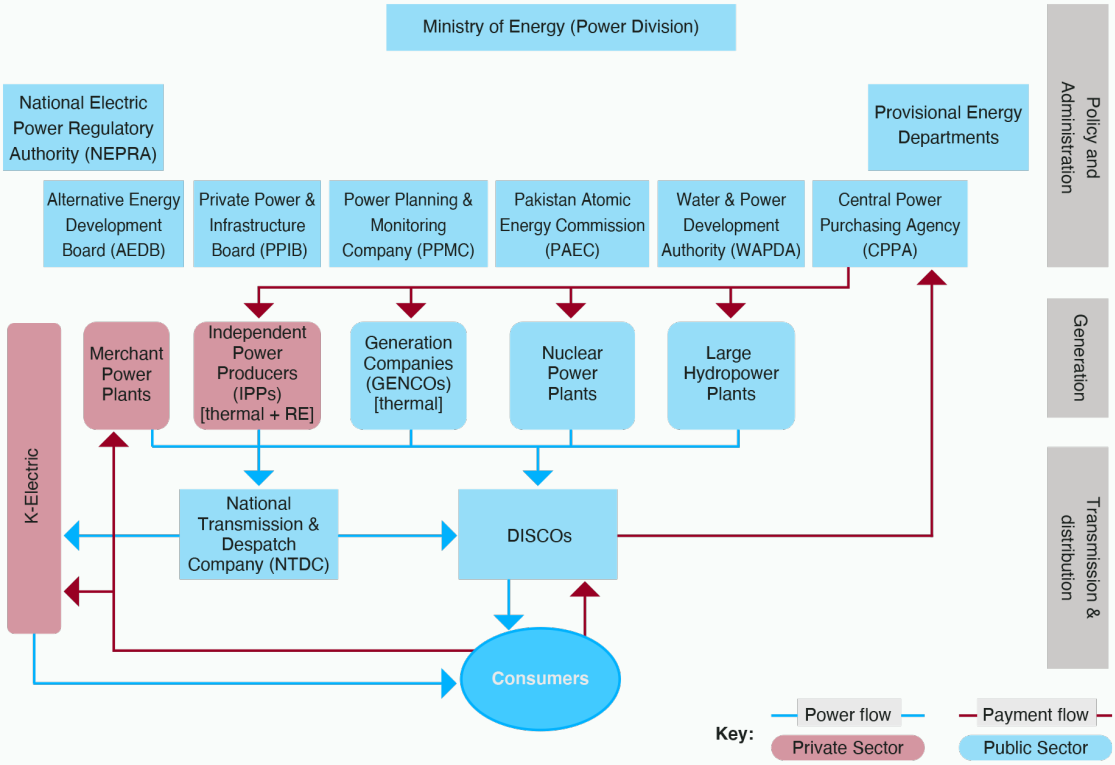


Figure 7 - Power Sector Organogram

Renewable Energy Project Financing

For FY 2021-2022, the net foreign direct investment (FDI) in the power sector was recorded at $737.6 million which is $174.1 million less than $911.7 million for FY 2020-2021.[10] In FY 2021-2022, an alarming 57% of the investments were directed towards coal power. Ensuring ease of business for renewable energy investors could very well channel this investment towards renewable energy projects ultimately steering Pakistan towards least cost generation alternatives.

The intended capacity additions as per ARE policy, IGCEP, and Solar Fast track program will prove to be vital for Pakistan, in achieving its subscribed targets of 50% emission reduction by 2030 in the submitted Nationally Determined Contributions (NDCs) of 2021. These NDCs estimate a required budget of $ 101 billion in energy transition only, to reach the set milestones.[11] The renewable energy financing scheme by State Bank of Pakistan (SBP) is one of the key initiatives to divert investment towards renewable energy sector.

State Bank of Pakistan Renewable Energy Financing Scheme

In a bid to accelerate renewable energy uptake in the country, the State Bank of Pakistan (SBP) introduced Renewable Energy Financing Scheme[12] as part of their Green Banking initiative of 2016. The scheme was set for renewable energy investment entities looking to develop both small- and large-scale renewable energy projects in Pakistan including solar, wind, hydro, biogas, bio-fuels, bagasse cogeneration, and geothermal power projects. The SBP financing scheme for renewable energy projects is a valuable concessionary finance scheme for the investors to benefit from. The funds are channeled through private sector local banks and Development Finance Institutions (DFIs) and have till date disbursed a total of Rs 53 billion for 717 RE projects of 1082 MW.[13] The salient features are presented below:

Scheme	Features
Scope	◇ RE power projects of 1 MW – 50 MW ◇ RE based generation solutions (net-metering) up to 1 MW ◇ All entities certified by AEDB Certification Regulation 2018 for developing Solar & Wind projects on lease or for selling power to grid
Grant of Refinance	◇ Refinancing provided on markup basis in line with Section 17 (2) (d) read with Section 22 of SBP Act 1956 ◇ Banks/DFIs allowed to disburse funds after submission of required documents to SBP
Refinance Limits	◇ Refinance limits will be allotted yearly starting from July 1st to June 30th ◇ SBP will monitor the limits periodically, any unutilized limit to be allotted to other bank/DFI

The scheme has been divided into 3 categories described below:

Category I – For Sponsors				
Eligibility Criteria	Plant Capacity 1-50 MW	Plant Type Utility Scale / Captive Use	Financing Cap Rs. 6 billion	Coverage 100% (1-20) MW 50% (21-50 MW)
Financing Terms	Rate of Refinance 3%	End User Rate 6% (3% spread)	Deb Repayment Quarterly/ bi-annually	Tenure <= 12 years (2 years grace period)
Other Terms	◇ Banks/DFIs may form a consortium for financing within the applicable limit of Rs 6 billion ◇ For the funds not financed by the SBP, the banks/DFIs will ensure availability of finance to avoid delays ◇ Firm equity commitment from the sponsors to be made in the manner suitable to the bank/DFI ◇ Captive power projects already availing other refinancing facilities of SBP are not eligible for this scheme ◇ Disbursements by banks/DFIs will not be made to the borrower directly; rather handed over to the manufacturers/contractors/suppliers associated with the construction and related activities of the project ◇ All contracts/agreements between contractors/sponsors to be made on arm's length basis to avoid conflict of interest ◇ Advance payment of 20% of cost & freight (C&F) value/ex-factory price/EPC contract from the scheme allowed ◇ Any advance in excess of 20% shall also be eligible for refinance as well as the last payment to the contractor/supplier			

Category II – For Domestic, Agricultural, Industrial and Commercial Borrowers				
Eligibility Criteria	Plant Capacity Up to 1 MW	Plant Type Net-metering or Stand-alone system	Financing Cap Rs 400 million	Coverage 100 %
Financing Term	Rate of Refinance 2%	End User Rate 6% (spread 4%)	Debt Repayment Monthly/quarterly/ bi-annually	Tenure <= 10 years (3 months grace period)

Other Terms

- Disbursements by banks/DFIs will not be made to the borrower directly; rather handed over to the manufacturers/contractors/suppliers associated with the construction and related activities of the project
- All contracts/agreements between contractors/sponsors to be made on arm's length basis to avoid conflict of interest
- Advance payment of 20% of cost & freight (C&F) value/ex-factory price/EPC contract from the scheme allowed
- Any advance in excess of 20% shall also be eligible for refinance after project completion
- Once the complete information from the borrower has been submitted, the bank/ DFI shall evaluate and finalize the application within one month from the date of receipt of submission

Eligibility Criteria

Category III – For Investor or EPC Contractor

Plant Capacity	Plant Type	Financing Cap	Coverage
Up to 5 MW	Sale of electricity or leasing or renting or selling on deferred payment of equipment	Rs 2 billion	100 %

Financing Terms

Rate of Refinance	End User Rate	Debt Repayment	Tenure
3%	6% (Spread 3%)	Monthly/quarterly/ bi-annually	10 years (6-month grace period)

Other Terms and Conditions

- The RE-IE shall, on quarterly basis, submit Asset Health Report to the financing bank/DFI
- The banks/DFIs shall not take more than one month in evaluating an application for financing under this Category of the Scheme from the date of receipt of complete information from the borrower
- In case of government entities/ departments being ultimate owners/ users as clients of RE-IEs, SBP may examine requests for relaxing maximum limit of 5 MW for a single project/ solution

Financing Mechanisms

Transaction Process

The financial closing for the renewable projects goes through a typical project financing process including creating an SPV, arranging for debt finance and equity partners, engaging with financial and legal advisors, negotiation agreements and execution of the project.

The investor identifies a project based on the govt's needs and locates a bank/lender depending upon the requirement of local and foreign component of financing. Banks/ DFIs evaluate the financial record and worth of the investor to ensure there is appropriate working capital available with the investor to cover risks. All project terms and conditions including penalties, liabilities are decided and signed in the Indicative Term Sheet. The investor will conduct and pay all the required due diligence; technical, financial and legal and include these costs in the total project CAPEX before being awarded LOS as the timeline allowed for financial close post LOS is very short. Financial close is achieved after signing all project agreements.

In Pakistan, various financial institutions play important roles in financing the energy transition. Some of the key roles include:

Commercial banks - These institutions can provide loans and other forms of financing to companies and individuals looking to invest in renewable energy projects. They can also offer technical assistance and advice on how to structure these transactions. Several commercial banks in Pakistan are active players in the renewable energy space.

Development finance institutions: These institutions can provide long-term financing and risk mitigation to renewable energy projects, especially for small and medium-sized enterprises. They can also act as a catalyst for private sector investment in renewable energy by providing guarantees and other forms of risk mitigation. IFC has been the most active player among DFIs with an investment of USD 320 million in 2019, in wind farms. Other notable active DFIs include Asian Development Bank (ADB) and DEG, FMO, British International Investment and Proparco.

Insurance companies: They offer insurance products to renewable energy project developers and operators to help mitigate the risks associated with their projects. Insurance also helps increase the availability of financing for renewable energy projects by reducing the perceived risks for potential investors.

Overall, these financial institutions have played a key role in supporting the growth of the renewable energy sector in Pakistan. They have provided funding for a range of renewable energy projects and have helped increase the availability of financing for renewable energy projects in the country.

Factcheck - Tariff

Till date, Pakistan had been inducting renewable energy projects on up-front and cost-plus models of tariff determination. Renewable energy projects in Pakistan follow a typical transaction structure for Upfront Tariffs:

For Wind:	
Levelized Tariff *(Latest)*	3.6 – 4 ¢/kWh
Debt: Equity Ratios	75 : 25 or 80 : 20
Return on Equity	12 - 14 %
Debt component	50% Local and 50% Foreign
Construction period	15 – 24 months
Debt Repayment period	10 -14 years
Plant Capacity Factor	37 – 43 %
Source: NEPRA	

For Solar:	
Levelized Tariff *(Latest)*	4 ¢/kWh
Debt: Equity Ratios	75 : 25 or 80 : 20
Return on Equity	14%
Debt component	50% Local and 50% Foreign
Construction period	10 – 18 months
Debt Repayment period	14 years
Plant Capacity Factor	22.97%
Source: NEPRA	

Taxation and Duties

Under the Solar Fast Track Program, the projects are exempted from Sales Tax, Special Sales Tax as well as the import duties. However, for the machinery import through Karachi, the Sindh Infrastructure Development Cess levied and collected @ 1.20% to 1.25% on total value of Goods (as assessed by the Custom Authorities) of a consignment of goods entering through ports from outside the country through Air or Sea.

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Framework Guidelines Fast Track Solar PV Initiatives 2022

Replacement of Fossil Fuels

Project Fees, Bonds & Guarantees

- USD 500 Registration fee
- USD/MW 500 Bid processing fee (Max USD 50,000)
- USD/MW 10,000 Bid bond
- USD/MW 20,000 Performance guarantee
- USD/MW 800 Project processing fee (Min USD 20,000 and Max $USD 400,000)
- USD/MW 500/MW Financial Close (FC) charges (Min USD 10,000 and Max USD 200,000)

Timelines

Activity	Timeframe
Publication of RFP	Day 0
Issuance of RFP to eligible bidders (last date for issuance of RFP)	15
Pre-bid meetings	20
Deadline for submission of bids	60
Opening of Envelope-I (Technical)	61
Evaluation of technical bids	65
Announcement of technically qualified bidders	65
Opening of Envelope-II (Financial)	66
Evaluation of Envelope II (Financial) & Issuance of Letter of Conditional Award (LOCA)	76
Application for Generation License (GL) and Tariff approval	83
Approval of Tariff by NEPRA and notification	90
Submission of performance guarantee, payment of project processing fee, and fulfillment of other conditions of LOCA	115
Issuance of Letter-of-Support (LoS)	120
Post LoS Activities	**Days (From date of LoS)**
Execution of project agreements	10
Financial Closing (FC)	90
Commercial Operation Date (COD)	600

Evaluation Committee

AEDB representatives	3 members
Purchaser representatives	2 members
NTDC representatives	1 member
Independent member by MoE	1 member

Disclaimer: The information is sourced from Draft RFPs available by January 2023. For updated information, please refer to latest availble regulations by NEPRA

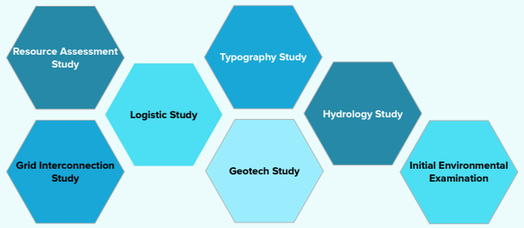
RFP to Bid Submission (8 weeks)

Request For Proposal (RFP)

RFP Package

AEDB will issue RFP package including the LOCA, LoS, Implementation Agreement (IA), Energy Purchase Agreement (EPA), Site Lease Agreement (SLA) and Connection Agreement (CA).

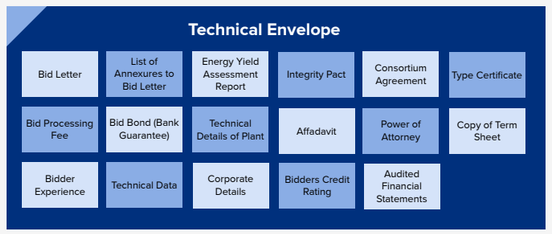
Following studies will also be attached with the package:



Bidding

Single Stage Two Envelop Process

Bid Documents



Submission of Bid (Technical + Financial) → Technical Evaluation (Responsiveness Test) → Financial Evaluation → Successful Bidder Announcement (AEDB Website)

- *The evaluation will be conducted on the final Tariff quoted based on the least cost criteria.*
- *A pre-bid meeting will be held to answer the questions of the bidders.*
- *Clarifications may be requested not later than fifteen (15) days before the deadline. It shall be addressed to aedb.bidding@gmail.com with a copy sent to CEO AEDB simultaneously at ceo@aedb.org .*

A Bidder deemed by AEDB to be a Technically Non-Qualified Bidder may make a representation before the Redress Committee challenging its technical non-qualification within seven (07) days of its declaration as a Technically Non-Qualified Bidder

LOCA to successful bidder (2 weeks)

LoS issued (6 weeks) → Financial Close (13 weeks) → COD (72 weeks)

Letter of Support (LoS)

Obtaining LoS for Project Development

Generation Licence (GL) and Tariff approval

Fulfillment of LOCA conditions
- Payment of performance guarantee (Irrevocable, unconditional, without recourse, on demand bank guarantee)
- Payment of project processing fee
- Fulfillment of other conditions specified in RFP

Issuance of LoS

Post LoS Activities

Commissioning

Execution of Project Agreements
- Implementation Agreement (IA)
- Energy Purchase Agreement (EPA)
- Site Lease Agreement (SLA)

Financial Close (FC)
- Consents required for FC:
  1) SBP - Conduct foreign transactions as per IA
  2) NEPRA - Ensure compliance with Generation, Transmission and Distribution of Electric Power Act, 1997
  3) M/o Commerce and FBR - Licence and permissions required for import of parts
  4) Provincial Gov - Site lease provisions if required

Key Technical Requirements

- Bidder can be an individual or a consortium
- Offered plant must be compliant with Grid code and DISCO's/NTDC system.
- Cumulative power projects experience in last 15 years must be greater than or equal to 15 percent of capacity of offered plant.
- Only experience of commissioned projects or underconstruction projects (30 MW and above), is considered.
- Developer must have past experience of working as:

  1) Lead project developer or;
  2) An EPC Contractor or ;
  3) Direct/Indirect owner of at least twenty percent of an existing project company which has successfully commissioned a power project or construction has started thereon.

Technical Parameters

- Monocrystalline panels with minimum single axis tracking - (IEC Standard 61215 / 61730)
- Module size ≥ 530 Wp
- Panel Efficiency ≥ 20.5 percent
- Inverter: As per latest IEC/equivalent Standards
- Power factor: 0.95 lagging/leading
- Interconnection with grid at 220 kV

Key Financial Requirements

- In case of consortium, Lead bidder to hold at least 25 percent of equity in Special Purpose Vehicle (SPV) until COD. 100 percent equity shall be retained by consortium.
- Any bid equal to or above the Benchmark Tariff shall be disqualified.
- Net Worth of Bidder must be greater than 150 percent of equity contribution based on Benchmark Tariff
- In case of consortium, Net Worth of every member must be greater than equity contribution
- In case of company or business entity, annual financial statements of 3 years audited by reputable firm accepted by AEDB must be provided.
- Consolidated financial statements are required where bidder is a holding company.
- Financial information for any affiliates, parent or associated company must be provided.
- 2 Bank credit references with rating of 'A' or credit rating of A awarded by a reputable rating agency
- Copy of term sheet signed by the lender/sponsor indicating all information of total debt, key conditions of debt, financial

Project Development

Following process underlines the steps to develop on-grid renewable energy projects under the Solar Fast Track Program:

Publication of RFP

AEDB will publish the complete RFP package including the letter of conditional award (LOCA), letter of support (LOS), and project agreements i.e., Implementation Agreement (IA), Energy Purchase Agreement (EPA), site lease agreement and a connection agreement. The following studies conducted will also be attached with the package:

- Resource Assessment Study
- Logistics Study
- Geotech Study
- Topography Study
- Hydrology Study
- Initial Environmental Examination Study
- Grid Interconnection Study

Investors must conduct their own due diligence, as the risk associated with the resources will lie solely with them. Participants will be required to meet the necessary technical and financial eligibility criteria in order to enter the program. The completion date (COD) must be achieved within 20 months from the date of signature of the Environmental Performance Agreement (EPA) and Implementation Agreement (IA).

Technical Requirements

- In case of a consortium, the members will appoint a lead bidder through power of attorney and the bid will also be signed by authorized personnel on behalf of the bidder.
- Any bidders, contractors, equipment suppliers will not have nationality of any country proscribed by Pakistan.
- The bidder or either member of a consortium must have experience of 15% of offered project size. At least 30 MW of above of commissioned or under construction projects will count.

- The bidder must have experience of one of the following roles: lead developer, engineering, procurement and construction (EPC) contractor, or direct or indirect ownership of at least 20% of a current, commissioned or under construction power project of 30 MW or above to qualify.
- Plant & equipment must be compliant with grid code and be compatible with NTDC/ DISCOs system.
- Power factor = greater than or equal to 0.95 lagging & leading to be always maintained.
- Operating frequency to be compliant with grid code.
- The solar PV panels shall be monocrystalline bi-facial with minimum single axis tracking system with size of each PV module more than 530 W and minimum total efficiency of 20.5 %.
- The inverters must conform to the latest edition of IEC/ equivalent Standards as specified below:
- Efficiency Measurements: IE.C61683
- Environmental Testing: IEC 60068 -2/IEC 62093
- EM Compatibility (EMC): IEC 61000-6-2, IEC 6 1000-6-4 & other relevant parts of JEC 61000
- Electrical safety: IEC 62103/IEC 62109-1&2
- Anti-Islanding Protection: IEEE 1547/IEC 621 16/UL 1741
- All equipment including solar panels, inverters must satisfy IEC standards and have certification from an international body.
- Information of all equipment such as type, make and other details must be provided and an affidavit of compliance to be submitted.
- The facility shall be connected to 220 KV voltage level.

Financial Requirements

- The lead bidder will hold and retain at least 25% equity while together the total equity of all consortium members must be 100 % of project's special purpose vehicle (SPV), from Bid submission to COD.
- The net worth of each bidder (in case of consortium each member) must not be less than 150% of the equity contribution of project cost stated in technical eligibility criteria.
- In case of company or business entity: Annual financial statements of 3 years audited by reputable firm accepted by AEDB. Consolidated financial statements in case the bidder is a holding company. Financial information for any affiliates, parent or associated

company is mandatory.

- In case of individual bidder, similar net worth duly audited by a reputable firm including details of cash, liquid assets, deposits, government securities, shares & property owned.
- Credit references from 2 banks of credit rating of 'A' or above certified by chief credit officer indicating time of dealing, type & amount of credit and facilities provided, present status of amounts under each credit or facility and proof of no default during the time dealt with the bank. 'OR'
- Long term credit rating of 'A' or above awarded by a reputable credit rating agency acceptable to AEDB.
- The bidder shall provide a copy of term sheet signed by the lender/sponsor indicating all information of total debt, key conditions of debt, financial closing and any break or termination clauses within.

Bid Evaluation Committee and Evaluation Criteria

The Evaluation Committee shall include the following officials:

- 3 representatives duly appointed by AEDB;
- 1 representative duly appointed by the purchaser;
- 1 representative duly appointed by NTDC;
- 1 representative of duly appointed by the relevant provincial energy department where the site is located; and
- 1 independent member duly appointed by the Ministry of Energy, power division

For Envelope I - Technical:

The contents of the technical envelope shall be evaluated against all the technical documents and requirements mentioned in the RFP and the responsiveness tests mentioned in the purchased RFP.

All bids compliant of the requirements mentioned above shall be declared as technically qualified bids. In-case a bid is disqualified the bidder will be able to challenge the disqualification before a Redress Committee within 07 days of disqualification.

For Envelope II – Financial:

The envelope II shall be submitted only by the technically qualified bidders, and only such

bidders will be allowed to attend the proceedings.

The financial envelope will be opened and evaluated in accordance with the requirements provided in the RFP and the final energy price/tariff shall be evaluated against the provided tariff structure. Any bid not compliant with the tariff structure will be declared invalid and the bidder disqualified.

Registration of Bidders & Submission of Technical & Financial Envelopes

- AEDB issues RFP to bidders after registration for US $ 500.
- Developers and authority engage in pre-bid consultations within 15 days of RFP deadline. Time, date & location of meeting will be notified by AEDB.
- Developers may also write to aedb.bidding@gmail.com, CC to: ceo@aedb.org.
- In case of any modification after consultations AEDB will upload notification on its website.
- The developers will then submit documents for qualifying for financial evaluation:
    - Bid letter.
    - Annex to bid letter.
    - Bid processing fee $500/MW with upper cap of US $ 50,000.
    - Bid bond $10,000/MW valid for 60 days after the bid validity period.
    - Affidavit of compliance.
    - Power of attorney vetted by Pakistani officials.
    - Integrity pact.
    - Consortium agreement if applicable.
    - Bidder's experience of power projects.
    - Technical plant & equipment data.
    - Energy yield assessment report of the plant.
    - Brochures and technical details of the power plant.
    - Copy of term sheet certified by lenders' agent/arranger.

- Equipment type Certificate.
- Corporate details (per NEPRA Regulations).
- Bidder's credit rating/ financial statement data.
- Audited financial statements.

AEDB will then open the technical envelope and announce technically qualified bidders.

Financial Envelope Evaluation & Letter of Conditional Award (LOCA)

- Tendering authority opens up Envelope II containing bidder's confirmation on tariff requirements (tariff structure and costs provided in RFP) and final energy price quoted in PKR and within 4 decimal places.
- The bidding will be reverse auction with the announced benchmark tariff by NEPRA to serve as the ceiling tariff.
- Any bid equal to or greater than the benchmark tariff will be disqualified. Any bid not in compliance with the provided tariff structure shall also be considered invalid.
- The bids will be ranked in ascending order and the lowest tariff shall be declared the winner.
- AEDB shall then issue the successful bidder a letter of conditional award (LOCA).

Tariff Approval & Generation License

- An evaluation committee will prepare and submit bid report to NEPRA containing proof that bidding process was transparent and compliant with standards & regulations of NEPRA, details of bidders, winning tariff and explaining reason for rejection.
- Developer will then submit an application for tariff approval & generation license with NEPRA within 7 days of acquiring LOCA.
- NEPRA will approve tariff one week after the application is submitted and notify the Federal Government.
- The developer will post a performance guarantee of US $ 20,000/MW and a project processing fee of US $800/MW (min US $ 20,000 – max US $ 400,000).
- The developer is required to deposit the mentioned fees and fulfill LOCA requirements (mentioned in technical and financial envelopes) before issuance of LOS.

Letter Of Support (LOS)

- The successful bidder will then be awarded a Letter of Support (LOS) from the authority.
- Developer will set up a private SPV.
- NEPRA will issue generation license.

Financial Closure to Commercial Operation Date (COD)

- Successful bidder will now sign project agreements.
- Bid winner will now sign a connection agreement with relevant NTDC/K-electric or DISCO. All connection information will be provided by the authorities such as:
- Connection specifications including absorption capacity, availability and information, technical operational specifications, details of any interconnection infrastructure required to be built by bidder from project to connection point including timelines and associated costs, all findings from the technical feasibility studies conducted earlier and penalties in case of agreement violation from bidder & relevant authority.
- Developer will be awarded and required to sign a site lease agreement with the Provincial Authority.
- The successful bidder will now sign the Energy Purchase Agreement (EPA) provided by AEDB.
- Last of all the developer will be required to sign an Implementation Agreement (IA) with the AEDB with terms and conditions as mentioned in the agreement provided by AEDB.
- Financial closure will be done 3 months from the date of acquiring LOS while the COD of plant will have to be achieved within 600 days of signing the EPA.
- Developer will submit charges of US $ 500/MW (min US $ 10,000, max US $ 200,000) on or before financial closing date.

Tariff Structure:

$$\textbf{Tariff (Rev)} = \{\textbf{Tariff (Ref)} \times 0.70 \times \frac{\textbf{ER (Ref)}}{\textbf{ER (Ref)}}\} + [\textbf{Tariff (Ref)} \times 0.30]$$

Tariff (Rev)	Revised Tariff as adjusted at or about and after the COD throughout the Term
Tariff (Ref)	◇ Reference Tariff quoted by the Bidder in the Bid
ER(Rev)	◇ The revised TT & OD selling rate of US Dollar as notified by the ◇ National Bank of Pakistan (NBP) on the preceding day of the ◇ COD and thereafter of each Quarter
ER(Ref)	◇ The reference TT & OD selling Rate

- Except indexation at COD and thereafter on each Quarter on account of exchange rate variations as per formula given above, no other indexation or adjustment will be permitted in the Bid Tariff.
- Quarterly indexation shall be automatic and will not require the approval of NEPRA.
- The electricity delivered (if any) during the ore-COD period shall be free.
- The Bid Tariff of the Successful Bidder will be incorporated in the EPA following its approval by NEPRA.
- The solar resource risk li he exclusively borne by the Bidder. Subject to the terms of the EPA the Purchaser will purchase the entire electricity generated by the Complex.
- In situations where the Purchaser is unable to off-take electricity due to constraints in Purchaser Interconnection Facilities or the grid., the Project will be compensated for the energy not off-taken at the Energy Price in accordance with the terms of the EPA.

Bid Preparation:

Bidders are required to prepare their Bids in two envelopes i.e. Envelope I (Technical) and Envelope II (Financial) as required below, and submit eight (8) sets of each (one original and seven copies), separately packed and marked. Each page of the original set of Envelope I and Envelope II is to be numbered, signed and sealed by an authorized representative of the Bidder identified in the Bid Letter. Each pack of original and photocopied Envelope I and Envelope II must also indicate the name, registration number and address of the Bidder.

Bids shall be submitted in hard copy packages. Any bid submitted by facsimile, electronic mail, telex, or telegram shall not be accepted.

Deadline for Receipt of Bids

Bid must be delivered as stipulated above on or before 1200 hours PST on the set deadline as per RFP. Any Bid received in AEDB after the deadline shall act be entertained. (Even if dispatched before the deadline).

Bid Validity Period

The Bid shall remain valid, and open for acceptance by AEDB for a period of not less than one hundred and eighty (180) days from the Deadline to receipt of Bids (as may be extended pursuant to the terms of this RFP, including clause 4.4(h) of Section B, the Bid Validity Period). Any Bid stated to be valid for a shorter period than the Bid Validity Period be deemed non-responsive and shall be rejected by AEDB.

Opening of Bids

- Envelope-I (Technical) will he opened at AEDB head office, at 1300 hours on the deadline in the presence of the Bidders who may opt to attend the Bid opening. Only one representative per Bidder is allowed to attend the Bid opening.

- Envelope-II (Financial) of only the Technically Qualified Bidders will be opened in the presence of the Bidders who may opt to attend at a date and time intimated by AEDB after evaluation of Envelope-I. Only one representative per Bidder is allowed to attend the Bid opening.

Implementation Schedule – RFP – COD

Schedule	Days
AEDB publishes RFP	D0 (Day zero)
RFP issued to eligible bidders (last date for issuance of RFP)	15
Pre-bid meeting(s) for consultations on RFP	20
Deadline for submission of bids	60
Opening of Envelope I (technical)	61
Evaluation of technical bids	65
Announcement of technically qualified bidders	65
Opening of Envelope II (financial) of technically qualified bidders and commencement of evaluation of Envelope II (financial)	66
Evaluation of Envelope II (financial), issuance of LOCA to the successful bidder, and submission of AEDB's bid evaluation report to NEPRA pursuant to the NEPRA regulations	76
Application to NEPRA by the successful bidder for generation license and tariff approval	83
Approval of tariff by NEPRA and intimation to GOP for notification	90
Submission of performance guarantee, payment of project processing fee, and fulfillment of other conditions of LOCA	115
Letter of support (LOS)	120
Post LOS Activities	**Days**
Execution of project agreements (from date of LOS)	10
Financial closing (from date of LOS)	90
Commercial operation date (COD) (from date of EPA Signing)	600

Annexures

Annex I - Overview of Power Sector Institutions

Stakeholder Name	Contact	Stakeholder Relevance
NEPRA	Gul-Hassan Bhutto (Advisor CTBCM) +92 300 3214517 bhutto.gulhassan@nepra.org.pk	Responsible for developing and notifying Competitive Bidding Rules and Regulations, Approving Tariffs and issuing Generation licenses
AEDB	051-9222360-61 support@aedb.org	Will conduct the entire bidding process, issue RFP and liaison with investor for private land acquisition.
PAKHTUNKHWA ENERGY DEPARTMENT	Nasir Gul Afridi (Manager Land Purchase) 091-9217820 nasir.gul@pedo.pk	Responsible for public land identification & allocation, devising land policy.
SINDH ENERGY DEPARTMENT	021-99207134/32/33 info@sindhenergy.gov.pk	Responsible for public land identification & allocation devising land policy.
PUNJAB POWER DEVELOPMENT BOARD	Mansoor Elahi - Section Officer (General) / Public Information Officer 042 - 99268017, 99268019 sogen.energy@punjab.gov.pk	Responsible for public land identification & allocation devising land policy.
PUNJAB BOARD OF INVESTMENT AND TRADE	Tulha Tariq Assistant Manager (Projects and Policy Research)	Serves as a liaison among investor and state institutions for taxation, land acquisition and registration, updated investment procedures and policies.
STATE BANK OF PAKISTAN (SBP)	Islamabad Office	Issues concessionary finance scheme for renewable energy projects of 1 – 50 MW; a vital instrument for accelerating RE uptake in the country

National Electric Power Regulatory Authority (NEPRA)

Under the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997, NEPRA has been appointed as the exclusive regulator in Pakistan's power sector. NEPRA's main responsibilities include operating a reliable, cost-effective and a commercially viable electricity setup in the country. Moreover, NEPRA will also issue licenses for generation, transmission, distribution, market operations, system operations, prepare and implement grid codes for standardization and monitor for any violation.

Moreover, as Pakistan switches to a competitive trading and bilateral contracts market (CTBCM) from 2023, the authority will ensure timely approval for all power sector investment and expansion plans, market codes as well as all kinds of tariffs for wholesale and retail markets. For CTBCM NEPRA has issued certain guidelines, defining eligibility criteria for consumers/generators/suppliers/retailers/traders, grid codes etc. The authority will provide a regulatory oversight for the entire auctions process, including approval of tender package, documents, taxation & indexation, the bidding and the end consumer tariff and finally, granting license.[14]

National Transmission & Dispatch Company (NTDC)

The National Transmission and Distribution Company (NTDC) is the only National Grid Company (NGC) in Pakistan stretching its transmission network across the entire country except the geographical jurisdiction of Karachi Electric (KE).[15] It connects generators with urban and rural load centers all across Pakistan (including Karachi). This widespread transmission network helps transmit power from:

- Hydroelectric Power Plants (mainly in the North),
- Thermal Units of Public (GENCOs) and Private Sectors (IPPs) (mainly in the South)

NTDC handles O&M of 500/220kV mesh, planning, designing, deploying any new 500/220kV voltage lines as required along with reinforcing/upgrading of the existing infrastructure. The National Power Control Centre in Islamabad is the official system operator for NTDC jurisdiction except K Electric responsible for ensuring a transparent, non-discriminatory, security constrained economic dispatch (SCED) for reliable supply of electricity. However, for the CTBCM scheme however the authorities are contemplating to convert NPCC into an Independent System Operator (ISO) changing the NTDCs TNO role to TSO.

Alternative Energy Development Board (AEDB)

Formed in May of 2003, the Alternative Energy Development Board (AEDB) is a federal government agency tasked with the development of Renewable Energy policies, portfolio, technologies and related infrastructure in Pakistan to accelerate the country's renewable energy transition.[16] Since 2006 the Ministry of Water & Power has assumed administrative control of the institution. Based on IGCEP, AEDB may initiate ARE projects on its own or facilitate any through public private partnerships as witnessed already in recent years after careful and thorough evaluation of all technical, socio-economic and financial details in line with national goals and public welfare. The authority may or may not conduct feasibility and ARE resource studies to identify potential areas for future ARE capacity lock in across Pakistan.

Furthermore, AEDB may assist the relevant parties in acquiring licenses for generation from NEPRA, getting tariff petitions approved and act as intermediary between land owners and developers for private land acquisition. AEDB regularly indulges in consultatory engagements with all national and international energy bodies for advancement and induction of up to date ARE technologies, regulations and procedures. Off-grid electrification is also another key area of focus for the federal agency and it has frequent collaboration with the respective provincial authorities in this regard. Over the years the AEDB has developed certain standard documents notably among those are: 'The Energy Purchase Agreement (EPA)' and the 'Implementation Agreement (IA)'.

With the commencement of the CTBCM scheme, AEDB is expected to serve as Independent Auction Administrator (IAA) for solar and wind projects. AEDB is currently the chief architect of the entire competitive auction design process from determining the pre-qualification stages, Request for Proposal (RFP), and documentation requirements to setting the financial closure terms and conditions including compliance bonds. Its role include:

- To design blue prints, prepare policies and roadmap to make practical and effective use of available alternative and renewable energy resources to achieve the set targets of the Federal Government.
- To approve & induct ARE projects and products in compliance with national and international standards.
- Assume the role of a one window facility, overseeing deployment and promotion of wind, solar, small-hydel, fuel cells, tidal, ocean, biogas, biomass etc. based projects in Pakistan.

Based on procurement plans of IGCEP the IAA will decide size of energy parcels; prepare and approve RFP and the complete project tender; decide the auction timelines; approval of the current year renewable energy procurement plan (CYREPP); grant incentives/concessions

to the developers and the subsequent government guarantee through the Implementation Agreement (IA).[5]

Private Power Infrastructure Board (PPIB)

To attract and facilitate private sector investment in Pakistan's power sector, Government deployed another one window entity in 1994 namely the 'Private Power Infrastructure Board' granting the organization a statutory status in 2012 under the 'Private Power and Infrastructure Board Act 2012 (Act VI of 2012)'. After an amendment to the act in November 2015, its role was extended to incorporate projects under the independent power producers' (IPPs) scheme and govern IPP transactions. In CTBCM scheme both AEDB and PPIB will be merged to act as IAA.[17]

Central Power Purchasing Agency Guarantee Limited (CPPA-G)

The Central Power Purchasing Agency Guarantee Limited (CPPA-G) was founded in 2015 under the Companies Ordinance, 1984 and assumed the role of market operator in compliance with Rule-5 of the NEPRA Market Operator (Registration, Standards and Procedure) Rules, 2015 (the "Market Rules"). Prior to competitive markets it also procured power for DISCOs and to some extent for K-Electric.[18]

Ever since the commencement of CTBCM from May 31st, 2022, with reference to application no LAM-01 submitted by CPPA-G on Oct 14, 2021 via letter (No. CPPA G/2021/CEO/1153-56) NEPRA has approved the high level design of CTBCM[19] and granted Market Operator License no MOL/01/2022 to CPPA-G under its Section 23A and 23B of the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 and approved the new commercial code.[20]

In the CTBCM scheme the off-taker role of CPPA will be discontinued. The authority will now comprise of two sub entities; i) Market Operator (MO), ii) Special Purpose Trader (SPT). As market operator and market participant cannot be under one entity therefore the authorities have registered the market operator as a separate legal entity in order to avoid conflict of interest in the future.

CPPA-G as Market Operator

The CPPA-G being the MO will be mainly responsible for ensuring smooth transition of Pakistan's power market from the current single buyer regime to a competitive market. The goal however is not just to switch from one model to another but also to enhance system

efficiency by introducing transparent and fair competition through wholesale (phase I) and later retail (phase II) markets. The transmission and distribution wire businesses will remain regulated under the respective jurisdictions of NTDC (transmission), K-Electric (T&D) and DISCOs (distribution) and continue to function as natural monopolies.

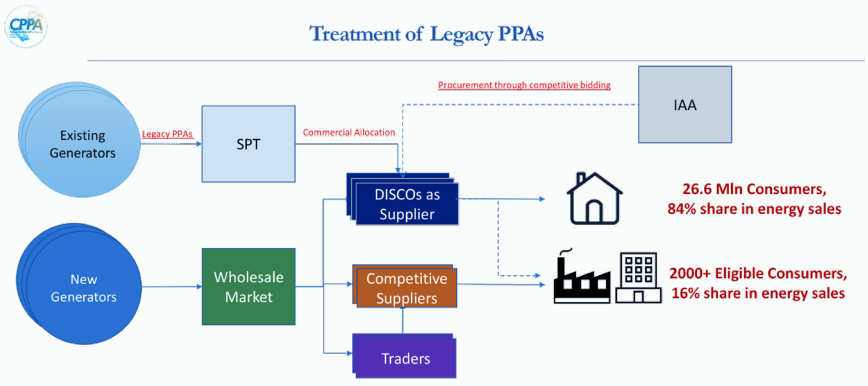
The main tasks of the MO defined in commercial code will be:

- "Enrolment of market participants and service providers.
- Registration of contracts & review of compliance with the commercial code.
- Registration of the trading points where commercial transactions may take place among market participants.
- Registration of metering points, other than trading points, which are necessary for proper implementation of this code.
- Calculation of firm capacity of generation units and issuing of firm capacity certificates.
- Determination of prices for the capacity to be used in the balancing mechanism for capacity.
- Administering a settlement system for the capacity and energy balancing mechanisms to clear differences between actual and contracted quantities.
- administering a payment system for the imbalances of market participants and other market charges, including the verification and registration of security covers and
- administer dispute resolution procedures in accordance to this code".

Inter alia the Market Operator will oversee all market related developments and propose any required modifications in commercial code to NEPRA.

CPPA-G as Special Purpose Trader

The special purpose trader will take up administration function of legacy contracts of CPPA-G which will not be signing any new contracts with DISCOs/K-Electric. All legacy contracts will be dealt on the same terms and conditions as agreed before.



Provincial Energy Departments & Board of Investments

In compliance with Article 157.2 of the Constitution of Pakistan the 'ARE Policy 2019' allows the provinces:

"To develop their own power generation projects, lay transmission lines, distribute electricity, and even set their own tariffs, if the power generated is for use within the boundary of the relevant province and the 'ARE project' (AREP) is not connected to the national grid."[9]

Under this scheme the provinces are eligible to induct 'ARE' projects within their jurisdiction provided the facility is not connected to national grid. As of 2022 Sindh, KP and Punjab have registered and obtained a provincial grid company (PGC) license.

Under the Competitive Trading & Bilateral Contracts Market, the provincial energy departments will be responsible for facilitating the process through land acquisitions only. A member from each department will be part of the steering committee however provinces will not be publishing the tender package directly.

Pakhtunkhwa Energy Development Organization

Started as "Small Hydel Development Organization" in 1986, it focused on development of small hydel stations of up to 5 MW for off-grid load centers in the then N.W.F.P, now known as Khyber Pakhtunkhwa Province.[21] Renamed multiple times over the course of years, finally after the passage of PEDO Act 2014 it was renamed as "Pakhtunkhwa Energy Development Organization" (PEDO).

PEDO will be mainly responsible for facilitating land acquisition for developers, participating in the renewable energy auctions under the following rules.[22]

- **For Public Lands**:

If the land is needed for a Govt department, the acquiring party will inform the collector according to the rules prescribed in the official land document above. An additional cost of 15% would be charged from the party.

If the land is to be acquired for a private company, the collector will initiate proceedings and an additional 25% would be added to the land cost as compulsory acquisition charges.

- **For Private Land**:

Both Govt department or a private party looking to acquire private land, will identify the

land and contact the collector's office who will conduct the entire process and connect the parties with the land owner for striking a deal after negotiations.

Contact:
Nasir Gul Afridi - Manager Land Purchase PEDO
091-9217820
nasir.gul@pedo.pk

Punjab Power Development Board

The Punjab Power Development Board functions with the aim of enabling an investor friendly environment, to promote power generation development by exploiting hydel, thermal and renewable potential in the province of Punjab. The provincial authority maintains consistent and frequent coordination with the Federal Government, to explore any potential opportunities in this regard.[23]

PPDB will be responsible for allocation of public lands in CTBCM model and along with AEDB, facilitate investors for any private land acquisition deal.

For public lands, the Punjab authority will advertise the property before allocation to a developer. In case of a lease, any required work on the land will not be undertaken by the province and will be shouldered by the developer.

Contact:
Mr. Mansoor Elahi - Section Officer (General) / Public Information Officer
042-99268017,99268019
sogen.energy@punjab.gov.pk

Sindh Energy Department

The Sindh Energy Department was created with the aim and purpose of exploring the renewable, hydel and thermal energy potential and subsequently deploy power plants in Sindh.[24] It's feature modus operandi includes policy making, legislation and planning of energy projects and their related matters across the entire province.

The SED has also acquired a provincial grid company license and formed the 'Sindh Transmission and Dispatch Company Limited' since Jan 2015. It functions as a subsidiary of Sindh Energy Holding Company (Pvt) Ltd and is registered with the Securities and Exchange Commission of Pakistan (SECP). The STDC has been actively facilitating IPP's for ARE project deployment since its inception.

Sindh Government will determine rates of lease and allocate public lands to the successful bidder for 30 years max after which the authority will decide whether extension is to be granted or not.

For private lands the developer can get in touch land owner themselves or AEDB can assist in the private land acquisition. For land policy details please see the Annexure II.

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Punjab Board of Investment & Trade (PBIT)

Incorporated under Section 42 of the Companies Act, 2017 (erstwhile Companies Ordinance of 1984), Punjab Board of Investment & Trade (PBIT) facilitates interested parties looking to invest in energy and other sectors of the Punjab province. They offer a diverse set of services which include assisting investors to timely secure opportunities while also liaising multiple parties interested in joint ventures. PBIT is the Punjab Government's main support wing actively involved in marketing and promotion of Punjab's investment outlook worldwide.[25] Therefore, it is strongly advised for all current and new investors to maintain frequent communication with PBIT officials for timely assistance on existing and future public/ private sector projects, updated investment procedures and guidelines, existing policies or amendments, available financing, property registration and all taxation and import duty exemption related queries. The provincial board of investment has the privilege of serving as the director of South Asia at the World Association of Investment Promotion Agencies (WAIPA) and remains a valued member of the steering committee.

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Sindh Investment Department

The Sindh Investment Department (SID) is a multi-role provincial agency, tasked with

promoting socioeconomic development through engaging with Pakistani and foreign investors seeking investment portfolios in the province of Sindh. The agency is responsible for assisting investors throughout the deployment and operation of all public and private sector projects. It also serves as the chief focal body for facilitating any joint or public private partnership ventures between Sindh Government and investors.[26]

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KP Board of Investment and Trade (KP-BOIT)

The KP-BOIT helps generate and promote economic activity in the province of Khyber Pakhtunkhwa, and is committed to achieving its goal of facilitating any local/foreign investors willing to explore and materialize potential opportunities in energy and other areas of KP. It works with the KP Government to create an enabling environment for flourishing trade activities in the province to help the Government realize its ambitious policy objectives.[27]

Roles and Responsibilities:

- Coordinating with Govt agencies and connecting them with potential investors.
- Identifying sectors and sub-sectors for investments, conduct and prepare any required feasibility studies/reports etc.
- Arranges local and international seminars, conferences intended to improve KP's investment climate worldwide and attract relevant parties.

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Steering Committee

The steering committee will function as a subset of AEDB, and will be responsible for preparing the tender package & the RFP, coordinating with the provinces to identify land blocks and build related infrastructure that the provincial projects under CTBCM will require. The committee will also prepare a tentative CYREPP for the upcoming fiscal year, along with the complete contract documents such as expression of interest (EOI), RFP, and related project agreements. It will also undertake all the necessary technical modifications pertaining to the intended capacity to be tendered as well as connection points.[5]

The steering committee will include the following personnel:

- An additional secretary of Ministry of Energy's power division (voting member).
- A joint secretary of Ministry of Energy's power division (voting member).
- The CEO of AEDB (voting member).
- Four provincial energy secretaries (all 4 are voting members).
- The Managing Director, NTDC (non-voting participant).
- The CEO of the market operator (non-voting participant).
- The CEO of the independent system operator (ISO) also a non-voting personnel.

Annexure II - Renewable Energy Policies and Relevant Documents

RE Policy 2006

- The 2006 RE Policy encompassed wind, solar and small hydro (<50 MW), and provided the first roadmap for RE development in the country.[7]
- Published by the AEDB, the RE 2006 policy looked to induct RE technologies, create financial incentives to encourage IPPs to invest in the sector, facilitate RE investors through guaranteed offtake by CPPA and promote net metering and billing. However, the high cost of solar and wind technologies and lack of available data posed serious challenges to the policy and hence saw several unnecessary delays in project deployment irking the investors and the authorities.
- The requirements of Letter of Intent (LOI), Letter of Support (LOS) and Implementation Agreement (IA) which included sovereign guarantees from the Government were introduced to attract investment in IPP mode. However multiple LOIs being issued at both federal and provincial level proved to be one of the major causes of project delays hampering timely capacity lock-in for the country.
- Carbon credit system was also a welcome addition to the policy.
- Off-grid power generation was deregulated which incentivized investment in residential solar generation system.
- Import duties and sales tax on machine and related equipment were also relaxed to ensure ease of doing business.

ARE Policy 2019

To increase renewable energy portfolio in Pakistan's on-grid energy mix and encourage investment in RE technologies, the authorities introduced 'ARE Policy 2019'[9] after approval from Council of Common Interest (CCI) in 2020. Key highlights of the policy were:

- The Policy will apply on all RE projects initiated from March 2018 onwards.
- All procurement plans and volumes will be solely based on the issued indicative generation capacity expansion plan (IGCEP) and updated annually.
- The policy aims to achieve renewables-based generation capacity of 20 percent by 2025 and 30 percent by 2030.
- ARE projects will ensure a concomitant reduction in tariffs and therefore be able to replace expensive fossil-based power plants in the future.

- Mode of procurement for RE projects will be entirely the 'competitive bidding' round however special considerations for G2G and "unsolicited proposals" will be made after Government approval.
- All tariffs will be determined in Pakistani Rupee only with and up-front and cost-plus schemes will be discontinued. Indexations for foreign currency will be done by NEPRA to facilitate international bidders.
- Take-or-pay contracts will be replaced with take-and-pay agreements.
- Provinces will be allowed to deploy ARE projects on their own from inception, tariff determination to COD provided they are not connected to the national grid.
- Local content development will also be promoted where possible and those components of AREP's which can be manufactured locally will not be allowed to import in order to boost local industry. Duty exemptions on machinery import will also be squashed as well as on power plants above 25 MW.
- The authorities will develop support functions for the promotion of micro-grids, localized energy systems (LES), wheeling, off-grid and net-metering solutions for RE projects.
- A comprehensive policy framework will be developed for promoting small scale AREPs.
- AEDB will also introduce pedagogic platforms for skill development and capacity building of workers and related staff personnel.
- AEDB will work in close coordination with Provinces to increase effective engagement on all project related function like preparing tender packages, documentation and site identifications etc.

NEPRA Competitive Bidding Regulations 2017

For tariff approval through competitive bidding, NEPRA issued the following regulations dated May 02, 2017.[28]

The regulations stipulated roles of all relevant agencies involved in the process including the requirements for developers willing to participate. It includes details of Pre-qualification requirements, RFP published, bidding documents, bonds and fee, complete timelines for bidding as well as provisions for bid acceptance, rejection criteria, bid evaluation and benchmark tariffs. The regulations also lay down any required feasibility, resource and grid interconnection studies during the procedure and the subsequent schemes that will be adopted for auctions. Procedures and timelines for tariff applications, generation licenses and all project agreements like Implementation Agreements and Energy Purchase Agreements are also defined. There are new procurement rules under formulation by the authorities and will likely replace these once approved by NEPRA.

Sindh Land Grant Policy for RE Projects 2015

The Sindh Government under the Colonization Act of 1912 issued the following regulations for grant of land for RE projects including solar, wind, bio-fuels, hydro power and waste to energy (municipal and agricultural waste). The lease will be for 30 years.[29] A few important policy features:

- "Under the provision of the Act, the Government of Sindh may lease the land for 30 years to the Energy Department of Sindh, a company, an individual or a consortium of organization at the market rates for no less than:
    - RS 3000 per acre per annum for first 10 years.
    - RS 5000 per acre per annum for next 10 years.
    - RS 8000 per acre per annum for further 10 years.

- No person shall be eligible for the land under these conditions, without the approval of the Sindh Government.
- The land will be granted for a maximum period of 30 years and may be extended for another 30 years by the Sindh Government.
- The District Collector will determine the market price of the land after considering:
    - Price of land transferred in the same locality for a similar purpose within the last 12 months.
    - The valuation table notified by the Board of Revenue Sindh under the Stamp Act 1899 for the purpose of levy of stamp duty at the time of registration of a sale deed in respect of sale of similar land.
    - Such other modes as deemed fit to provide a fair basis for price assessment.

- Proposed market price shall be considered by a "Scrutiny Committee" comprising of:
    - Senior Member, Board of Revenue, Sindh - Chairman
    - Secretary, Land Utilization Department, Govt of Sindh – Member
    - Secretary, Energy Department, Govt of Sindh - Member
    - Secretary Finance Department, Govt of Sindh - Member
    - Commissioner of the concerned Division - Member

- Collector of the concerned District. – Member

- If the land is granted to Energy Department, Govt. of Sindh, the said department may carry out technical survey and may sub-lease the same to the project developer (SPV) keeping in view the requirement of such project.

- After approval of Government and acceptance of offer of lease, a lease deed will be executed on payment of all the fees or charges including lease money of first 10 years and all formalities are completed. The fee or charges for the next 10 years shall be paid 3 months prior to the expiry of previous lease period.

- Terms and conditions for grant of lease of land shall include the following: -

    - The grantee shall have exclusive possession and leasehold rights over the leased land for establishment of renewable energy projects for installation, maintenance and operation. This will include repairing, replacing, removing all or any part or element of the power plant.

    - Grantee shall have the right to construct, install, operate, maintain, repair replace and remove all or any part or any element of the plant.

    - Government shall not permit any other activity on leased land except the use for production of other renewable energy resources as recommended by the energy department, government of Sindh without harming or obstructing the operation and maintenance of the plant, impeding or decreasing the output or efficiency of the plant. The grantee shall pay the additional development charges as assessed by the energy department, for multi-purpose use of land for production of renewable energy.

    - The grantee shall be liable to abide by all the international design codes and environmental guidelines while designing the renewable energy projects.

    - Grantee will be entitled to quite use and enjoyment of the leased land without interference so long as the grantee is not in default under terms of statement of condition.

    - Government will not engage in any activity that would harm or obstruct the operation and maintenance of the plant, impede or decrease the output or efficiency of plant.

    - The Grantee will contribute towards improvement in the livelihood of local population within their ear marked area, in terms of supporting activities and inputs which can enhance quality of their livelihood. There shall be definite preference to locals, for semi-skilled and unskilled jobs in project area.

    - The grantee shall submit annual report regarding provision of jobs to eligible local persons to the Energy Department, Government of Sindh.

    - The grantee shall arrange technical trainings and capacity building of the local candidates in order to enable them to join the renewable energy industry.

    - Upon recommendation of the energy department, Government of Sindh the

grantee will be entitled to create security interests on the leased land in favor of its lenders. The government may enter into and execute direct agreement with lenders of the grantee in relation to such security interests.

- Grantee shall not be entitled to sublet, transfer, or transfer possession of the leased land without the approval of the Government of Sindh on the recommendation of the energy department.

- Land shall only be granted for specific purpose of deploying renewable energy projects and any required technical documents will need to be submitted by the grantee". (For full policy please refer to Sindh Energy Department website).

Khyber Pakhtunkhwa Land Act and Rules 2020

The KP Land Act 2020 define the required rules and regulations for acquiring public lands for project development.[22] Important points are mentioned below:

- "Application for public acquisition --- The Acquiring Party shall submit an application to the Collector concerned for the acquisition of land under the Act, given full justification of the public purpose involved and the area required by it, with full details of all other area owned by it in the same locality.

- Procedure on application --- On receipt of the application under rule (3), the Collector shall examine its feasibility taking into consideration the genuineness of the public purpose involved, the requirements of the Acquiring Department and suitability of the area proposed for acquisition keeping in view its alternate uses, if any.

- Procedure for issuance of notification under section 4 of the Act --- (1) Where after the examination of feasibility under rule 4, the Collector, is of the view that the land may be acquired for the Acquiring Party, he shall issue a notification under section 4 of the Act stating clearly the name of the revenue estate or locality, tehsil, details of the dimensions and boundaries of square of rectangles, field numbers and the approximate area to be acquired.

- After the issue of a notification under section 4 of the Act, the Collector shall take immediate necessary steps to have the area surveyed and submit his report to the Commissioner not later than fifteen (15) days from the date of publication of the notification under section 4 of the Act.

- Procedure for issuance of notification under section 5 of the Act --- (1) Where the land is to be acquired for a public purpose, the Commissioner shall issue a notification under section 5 of the Act, not later than fifteen (15) days from the date of the publication of the notification under section 4 of the Act.

- Declaration under section 6 of the Act --- After notification under section 5 of the Act, the

Commissioner shall, within thirty (30) days, issue declaration under section 6 of the Act.

- Additional value in case of compulsory acquisition --- (1) In assessing the cost of land, fifteen percent (15%) of the value of the land shall be added on account of compulsory acquisition charges where the land is needed for a public purpose and in case of acquisition for a company the value to be added shall be twenty five percent (25%).

- In calculating the taxes and fee over the transfer of land in favor of the acquiring department, regard shall be had to section 51 of the Act."

For Private Land:

- "For private land acquisition the concerned party will write to collector who will initiate procedure and make sure the acquiring party has all the required permissions from the head of the acquiring company.

- Committee --- The acquisition of land through private negotiations, the cost of land and determination of compensation in private negotiations and the subsequent auction of acquired land under PART-II and V of these rules, if any, shall be approved by a 6-member committee including collector, additional deputy commissioner, revenue officer, member of acquiring party and one other.

- The acquiring company to identify land --- The identification of land shall be the responsibility of the acquiring company to whom the collector shall provide the revenue documents of such land.

- The agreement between the acquiring company and the land owner shall be reduced to writing on a stamp paper duly attested by at least two witnesses, the notary public and certified by the collector.

- Notification under section 4 of the Act --- The collector shall, if the private negotiations between land owners and acquiring company are successful, issue notification under section 4 of the Act and shall thereupon start surveying the land and shall send the survey report to the Commissioner within seven (7) days.

- Delivery of possession --- The collector shall deliver possession of the land to the acquiring company where after it shall be the responsibility of the Acquiring Department to retain its possession over the acquired land.

- The collector will then disburse payments to the land owner through the revenue officer".

Variable Renewable Energy (VRE) Locational Study

The World Bank's locational study identified key areas for VRE deployment across Pakistan. This data set proved critical for the authorities to develop a thorough road map for implementing RE projects in the country.[30] The study highlighted the need to upgrade and expand transmission infrastructure in Pakistan. In order to achieve the stated policy

ambitions of increasing RE generation share to 20 percent in 2025 and 30 percent by 2030 Pakistan will need to deploy large scale solar & wind Parks and the existing transmission network is incapable of handling those.

- Punjab has very good solar resources and a grid infrastructure which is already well developed. It also has many load centers, so the generated power can be consumed close to its sources, reducing losses. A challenge in Punjab is land availability, as in some areas the development of new solar power plants must compete with agriculture for land, which is very extensive in central and upper Punjab. However, suitable barren land is extensively available in southern Punjab, which is excellently suited for the development of new solar power plants.

- Sindh has excellent solar resources and two wind corridors (Jhimpir and Gharo). The wind corridors already have some wind parks installed, but there is potential for much more. Sindh also offers large areas with barren land, which is excellently suited for the development of new solar power plants.

- Khyber Pakhtunkhwa (KP) has fewer solar and wind resources than the other provinces. However, there is a limited zone worth exploring for wind power generation, and solar plants of medium size. In addition, KP still has a large untapped potential for hydropower plants; the focus in this province should therefore be on this abundant resource rather than VRE.

- Balochistan has excellent solar resources and large areas of unused land. Additionally, Balochistan has the highest wind resource potential of all the provinces of Pakistan, notably in western Balochistan (near Chaghi). The main challenge in Balochistan is the lack of existing grid infrastructure. Significant investment and effort will be required to develop a grid able to draw upon the abundance of wind. Such investment will be economically profitable, because the resulting per-unit cost for wind power from western Balochistan, including the evacuation infrastructure, will be competitive.

Variable Renewable Energy Competitive Bidding Study

Published in 2022, this study from the World Bank came at just the right time as Pakistan prepares for commencing auction-based mode of procurement. The study entails all essential considerations any authority will need to make while designing bid parameters and will serve as a relevant and important policy guide in the present and future.[5] It talks about each type of biddings from sealed bid tenders, descending clock, to hybrid bidding etc. and the pros and cons of each procedure. The report also sheds valuable light on the respective roles and responsibilities of each power sector institution of Pakistan in the Auction regime. Various stages of the bidding round like Announcement of tenders, floating REOI, RFP and project agreements, bid bonds and fee structures, applicable indexation taxation for foreign investors have been discussed in detail and very valuable recommendations have been shared with the readers. It touches upon advantages and disadvantages of each bidding scheme (substation and park based) and the subsequent implications it will likely have on

Pakistan's policy ambitions.

The VRE bidding study remained a key document for consultation for Renewables First during the course of this guidebook's preparation.

Competitive Trading Bilateral Contract Market (CTBCM)

The high-level design of the CTBCM model was submitted in March 2018 and approved by NEPRA in December 2019. As of June 1st 2022, the CTBCM model has officially kicked off in Pakistan commencing with a 6-month test and trial period approved by the Federal regulator.[19] The CTBCM scheme is expected to be the game changer for Pakistan and will likely drive its power sector into a highly competitive and efficient mode of operations with a better and a robust electricity market. The bilateral contract model ensures lesser interference from the govt authorities with the generators and suppliers coming together to sign contracts on their own terms and conditions while the consumers now having choice of a supplier of their choosing. The increased competition among the market participants will not only scale down electricity rates but also improve quality of service.

Indicative Generation Capacity Expansion Plan 2022–2031

The IGCEP is basically the bedrock of 'ARE Policy 2019', laying out exact on-grid procurement capacities for each year through an annual rolling plan. For the upcoming auctions in Pakistan, AEDB will decide the bid volumes to be tendered according to IGCEP outputs. The IGCEP annual rolling plan will be updated each year based on the prevalent demand-supply scenario in the power sector.[4] For a projected load of 41,338 MW by 2031 the current IGCEP 2022–2031 has proposed an installed capacity of 69,372 MW. For VRE share 8,350 MWp of solar PV (utility solar & feeder based/DG) and 4,928 MW of wind, & 3,544 MW of hydro has been added. Also, the document sets a target of 4,320 MW of solar net-metering by 2031 with 480 MW of annual additions starting July 2022.

Summing up the basic objective of IGCEP 2022 – 2031:

- Considerable deployment of VREs (renewewable and indigenous).
- Utilizing of hydro power.
- Increasing local coal-based power.
- Reducing the basket price of generation with increased induction of hydro power and VREs
- Moving away from imported fuels i.e., Imported Coal, RFO, RLNG etc.

- Carbon emission abatement through REs and hydro.
- Reducing reliance on imported fuels by going for indigenous fuel-based projects.

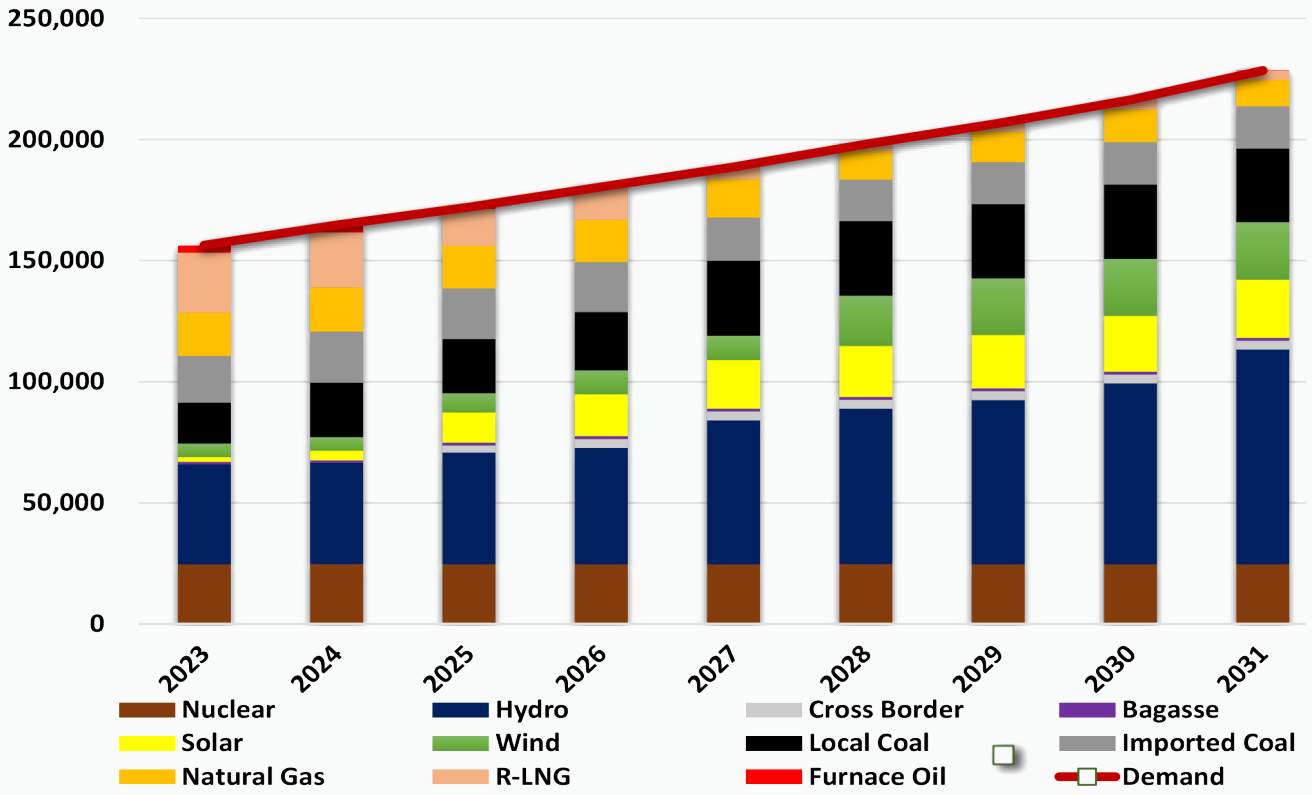

Figure 9 - Installed Capacity vs Peak Demand (MW) FY2022-23 to FY 2030-31

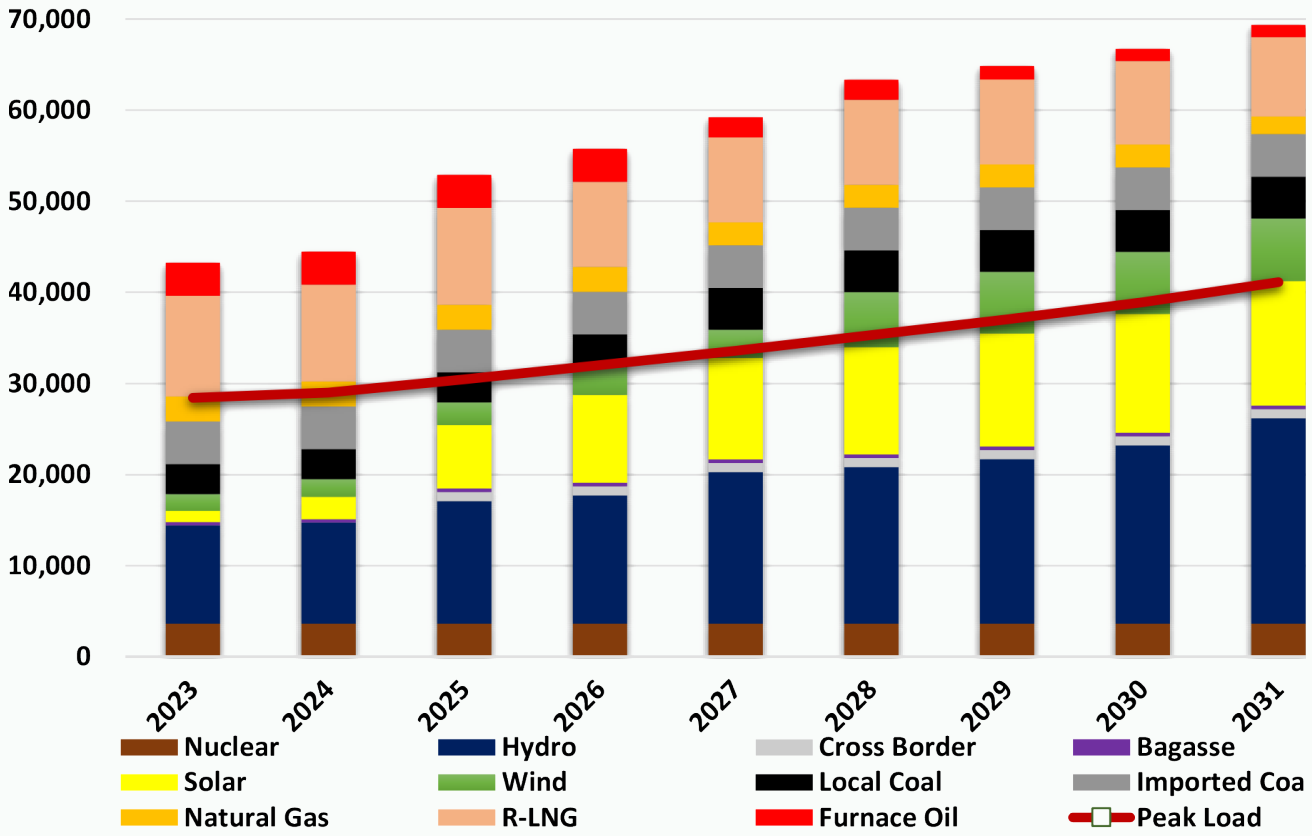

Figure 10 - Annual Energy Generation vs Demand (GWh) FY2022-23 to FY 2030-31

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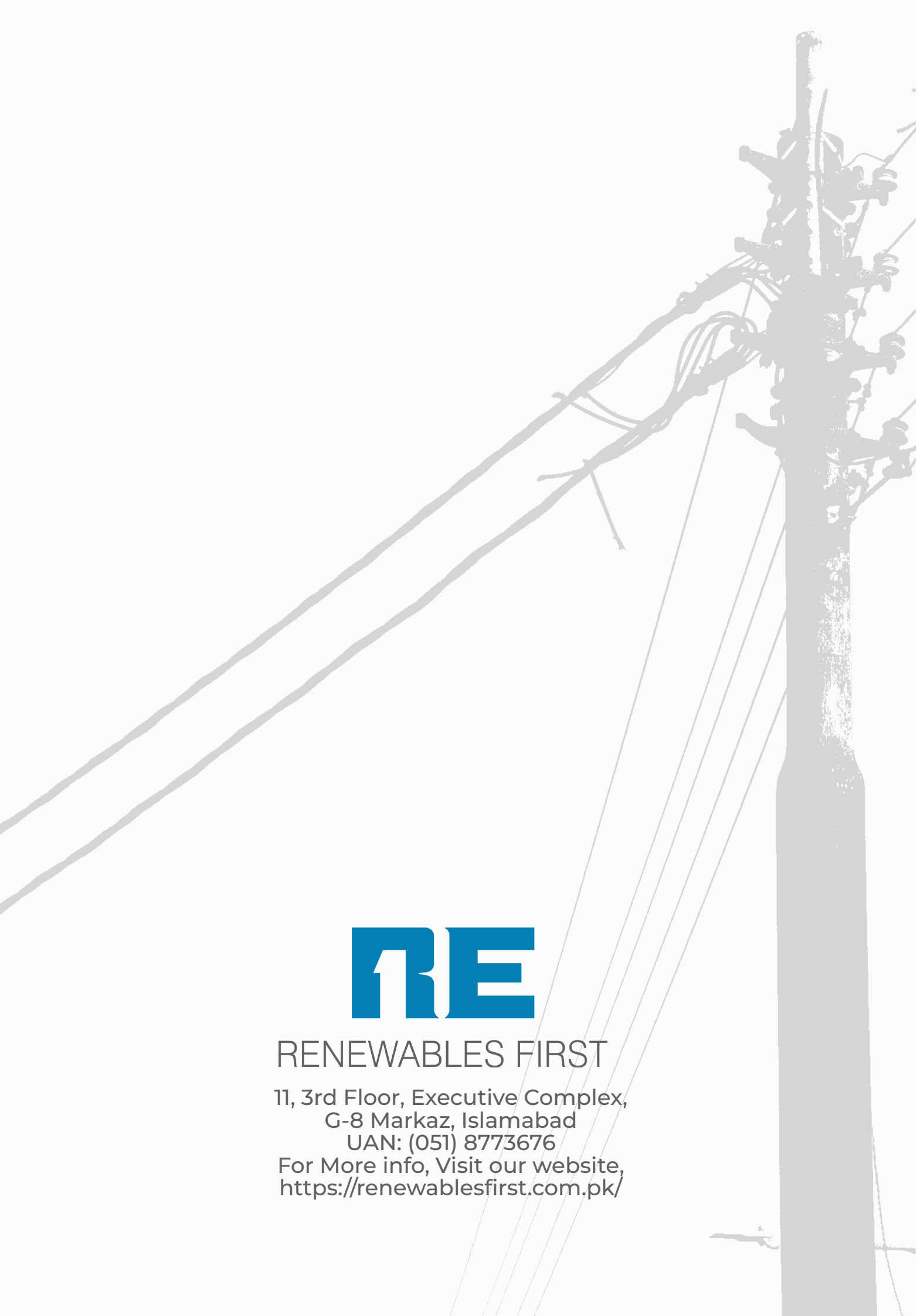

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