

## Country Assessment Report

### Country/Region name:

Pakistan is situated in South Asia; bordered by Iran, Afghanistan, China and India. It has a population of 225 million and GDP worth \$320 billion, recent economic growth rate was 6% (2018).

Pakistan covers three major geographic areas: the northern highlands, the Indus Rive plain and the Balochistan Plateu. Hence, the geography and climate of the region is extremely diverse.

### Generation and demand: (type, MW, TWh)

<sup>1</sup>Total installed Capacity: 38,029 MW

Total Demand (Residential + Industrial): 25,000 MW

Electricity Generated in 2020: 134,745.70 GWh

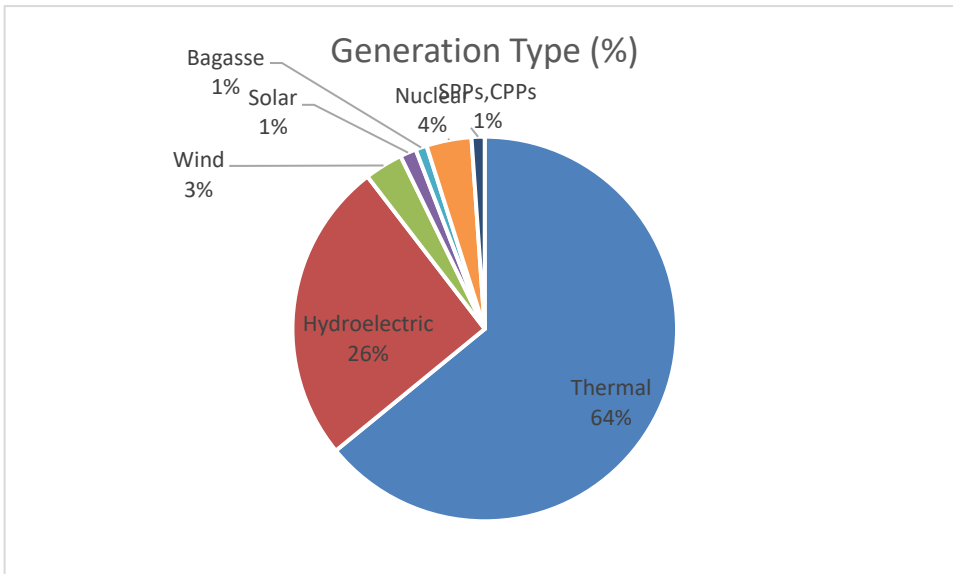
Length of Transmission Lines: 7,238 km (500kV) + 11,281 km (220kV)

Electric Consumption per Capita: 529KWh/Capita

Access to Electricity: 97.5% of households

Breakdown by fuel type:

Generation Type	Generation (MW)	Percentage (%)
Thermal	24817	62.5
Hydroelectric	9861	24.8
Wind	1248	3.1
Solar	530	1.3
Bagasse	369	0.9
Nuclear	1467	3.7
SPPs,CPPs	427	1.1



### RE Market Potential:

Many studies have been conducted that reiterated the immense renewable potential Pakistan holds. Due to the climate and geographical variation across the country, Pakistan has great renewable potential for both solar and wind.

**Solar:** In Pakistan, almost [50% of the days](#) in an year are sunny (Based on results obtained using solar atlas for solar irradiation, there is a high potential for solar throughout the country. The total estimated potential is around [2900 GW](#). Additionally, an analysis conducted by the World Bank reported that utilizing just 0.071% of Pakistan's areas for solar generation would easily meet the country's demand.

Residential rooftop solar and off-grid projects really carry the bulk of online solar projects in Pakistan. There are also 6 government funded solar power projects operational, worth 430 MW) with a total of [22 projects in the pipeline](#) which aim to reach the cumulative capacity of approximately 890.80MW. The list of projects is mentioned below:

Name of Project	Capacity (MW)	Location	Date of Completion
M/S QA Solar PVT Ltd	100	Quaid e Azam Solar Park, Bahawalpur	15 Jul, 2015
M/s Appolo Solar Pakistan Ltd	100	Quaid e Azam Solar Park, Bahawalpur	31 May, 2016
M/s Crest Energy Pakistan Ltd	100	Quaid e Azam Solar Park, Bahawalpur	31 Jul, 2016
M/s Best Green Energy Pakistan Ltd.	100	Quaid e Azam Solar Park, Bahawalpur	31 Jul, 2016
Harappa Solar Pvt Ltd	18	Sahiwal	14 Oct, 2017
AJ Power Pvt. Ltd	12	Pind Dadan Khan	13 Dec, 2017
M/s Access Electric Pvt. Ltd	10	Pind Dadan Khan	In progress
M/s Bukhsh Solar (Pvt.) Ltd	10	Lodhran	In progress
M/s Safe Solar Power Pvt. Ltd	10.28	Bahawalnagar	In progress
M/s Access Solar Pvt. Ltd.	11.52	Pind Dadan Khan	In progress
IPS Solar Park- IPS 22 Pvt. Ltd.	50	Nooriabad, Sindh	In progress
IPS Solar Park- JA 23 Pvt. Ltd.	50	Nooriabad, Sindh	In progress
IPS Solar Park – SB 24 Pvt. Ltd.	50	Nooriabad, Sindh	In progress
R.E. Solar I Pvt. Ltd.	20	Dadu, Sindh	In progress
R.E. Solar II Pvt. Ltd.	20	Dadu, Sindh	In progress
ET Solar (Pvt.) Ltd.	25	Thatta, Sindh	In progress
ACT Solar (Pvt.) Ltd.	50	Thatta, Sindh	In progress
Janpur Energy Limited	12	Sultanabad, Rahim Yar Khan	In progress
Lalpir Solar Limited	12	Mehmood Kot, Muzafargarh	In progress
Siddiqsons Solar Ltd	50	Kalar Kahar, Chakwal	In progress
ET Solar (Pvt.) Ltd.	50	Fateh Jang, Attock	In progress
Asia Petroleum Limited	30	Bahawalnagar, Punjab	In progress

**Wind:** Wind power has been identified as a significant potential source of renewable electricity in Pakistan. Analyzing the data from three provinces (Khyber Pakhtun Khwa, Balochistan and Sindh), a study concluded that the total estimated gross wind power potential was around [346,000 MW](#).

With regards to solar and wind, the World Bank has worked on a "[Variable Renewable Energy Locational Study](#)" that identifies the optimal locations to start with siting of these projects. For these resources, the province of Balochistan is really a focus area since it has great potential for both wind and solar, since it is the country's largest and least densely populated province. In 2019, Pakistan had [1186 MW of operational wind installation](#) that generated more than 1.7 TWh of electricity. Wind currently accounts for almost 6% of renewable electricity in the county but there are several [projects in the pipeline](#) that will boost this percentage in the coming years. Some of the projects are listed below:

S.No	Name of Company	Location of Land
1	FFC Energy Limited	Jhampir
2	Zorlu Enerji Pakistan (Pvt.) Limited	Jhampir
3	Three Gorges Pakistan First Wind Farm (Pvt.) Limited	Jhampir
4	Foundation Wind Energy II (Pvt.) Limited	Gharo
5	Foundation Wind Energy –I Limited	Gharo
6	Sapphire Wind Power Company Limited	Jhampir
7	Metro Power Company Limited	Jhampir
8	Yunus Energy Limited	Jhampir
9	Master Wind Energy Pvt. Limited	Jhampir
10	Act Wind (Pvt.) Ltd. (Tapal Wind Energy Pvt. Limited)	Jhampir
11	Gul Ahmed Wind Power Ltd	Jhampir
12	Tenega Generasi Limited	Gharo
13	Hydro China Dawood Power Pvt. Limited	Gharo
14	Sachal Energy Development Pvt. Limited	Jhampir
15	UEP Wind Power Pvt. Limited	Jhampir
16	Jhampir Wind Power (Pvt.) Limited	Jhampir
17	Hawa Energy Pvt. Limited	Jhampir
18	Hartford Alternative Energy Pvt. Limited	Jhampir
19	Three Gorges Second Wind Farm Pakistan Limited	Jhampir
20	Three Gorges Third Wind Farm Pakistan (Pvt.) Limited	Jhampir
21	Tricon Boston Consulting Corporation Pvt. Limited - A	Jhampir
22	Tricon Boston Consulting Corporation Pvt. Limited - B	Jhampir
23	Tricon Boston Consulting Corporation Pvt. Limited - C	Jhampir
24	Zephyr Power Pvt. Limited	Gharo
25	Burj Wind Energy Pvt. Ltd	Gujju
26	Western Energy Pvt. Ltd	Jhampir
27	Trans Atlantic Energy Pvt. Ltd	Jhampir
28	Shaheen Renewable Energy - 1 Pvt. Ltd	Jhampir

#### **Electrical interconnection and import/export:**

The Pakistan Grid can be broadly categorized into two integrated utilities:

1. Water and Power Development Authority (WAPDA): Predominantly government owned utility and provides electricity to whole of Pakistan except the KE territory.

2. K-Electric Limited (KE): Privately owned utility that provides electricity to the metropolitan city of Karachi.

Recent restructuring unbundled WAPDA into 10 regional distribution companies, 4 government-owned thermal power generation companies and a transmission company (National Transmission and Dispatch Company). The market was also created for Independent Power Producers to

generate electricity and sell to the grid. Hydropower was also kept under government by creating a separate entity – WAPDA Hydroelectric – to manage those assets and generation.

Distribution Companies (DISCOs): The single WAPDA structure was unbundled resulting in 10 distribution companies that buy electricity from WAPDA and other IPPs and are responsible for providing electricity to their designated areas. All DISCOs are owned by the government.

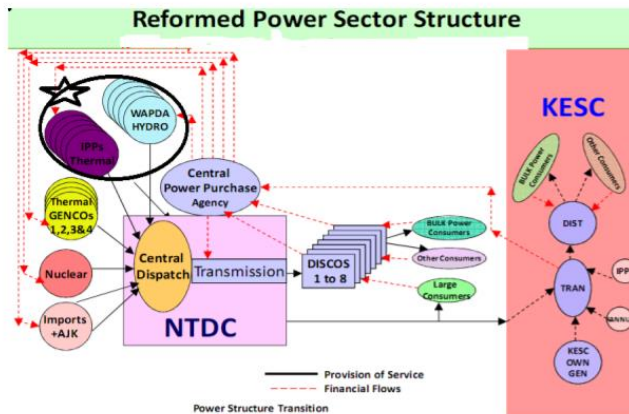


Figure 1. Reformed power structure, source: [10]

**Historical support or development of renewables in the country/region:**

Please refer to the RE Market Potential Section

**Electricity market structure:**

The electric sector in Pakistan follows a single buyer model, where Independent Power Producers (IPPs), government owned generation facilities (GENCOs) and other generation assets such as nuclear and hydropower all sell electricity to WAPDA. The electricity is then bought from WAPDA by the individual distribution companies (DISCOs) to be sold further in their respective constituencies.

Off-grid and rooftop solar PV play a major role in the country’s overall solar landscape. There is also a growing focus on wind power with 1,396.4 MW of projects under construction and with plans to reach 3.5GW.

**Description of renewables support mechanism:**

Please refer to the sections Electricity Market Structure and RE Market Potential

**Responsible government department:** (include key contacts)

- Ministry of Energy, Power Division:** <http://www.mowp.gov.pk/>  
The Federal ministry overlooking other power agencies including AEDB, NTDC, PPIB and CPPA etc. It also manages the circular debt and power projects across the chain in implementation stages.
- Ministry of Climate Change (MoCC):** <http://www.mocc.gov.pk/>  
Federal ministry in charge of MEAs (Multilateral Environmental Agreements) including UNFCCC and Kyoto Protocol, climate financing, and the overarching issues and policies related to climate change in the country.

3. **Water and Power Development Authority (WAPDA):** <http://www.wapda.gov.pk/>  
Government owned vertically integrated public utility maintaining power infrastructure and hydropower projects.
4. **National Electric Power Regulatory Authority (NEPRA):** <http://www.nepra.org.pk/>  
Regulates the power sector by granting generation licenses and setting power tariffs. Also formulates the national electricity plan.
5. **Alternate Energy Development Board (AEDB):** <https://www.aedb.org/>  
Overlooks development of renewable energy policies and facilitates the uptake of RE in the country.
6. **Private Power and Infrastructure Board (PPIB):** <https://www.ppib.gov.pk/>  
Facilitates IPPs throughout the commissioning process to ease private sector investments in the generation sector.

**Existing/Planned energy legislation:** (is there a CPO)

**Below is a list of the main energy legislation in Pakistan:**

1. **Private Power Policy of 1994:** (<https://nepra.org.pk/Policies/Power%20Policy%201994.pdf>)  
Set up as the first ever and largest energy conservation program, this policy aimed to produce 13,000 MW and issued 70 MoUs to Independent Power Producers. This brought a decisive shift in Pakistan's diverse energy sources and spurred the entrance of private players in the generation sector as IPPs to meet the growing energy demand of the country.
2. **Power Generation Policy 2002**  
(<https://nepra.org.pk/Policies/Power%20Policy%202002.pdf>) and 2015  
(<https://nepra.org.pk/Policies/Power%20Policy%202015.pdf>)  
This policy was designed to provide sufficient capacity for power generation at the least cost and avoid capacity shortfalls. It also encouraged the exploitation of indigenous resources and greater participation from local engineering and manufacturing facilities.
3. **Net Metering overall:** <https://www.saarcenergy.org/wp-content/uploads/2020/09/Irfan-Yousuf-Policy-and-Regulatory.pdf>  
Net Metering introduced throughout the country to encourage decentralized residential and commercial solar PV generation in big cities.
4. **Pakistan EV Policy:** <https://theicct.org/blog/staff/pakistan%E2%80%99s-national-electric-vehicle-policy-charging-towards-future>  
Envisages a total of 30% passenger vehicle and heavy-duty fleet transition to EVs by 2030 by incentivizing local EV industry through tax incentive and duty cuts.
5. **Alternate and Renewable Energy Policy 2020:**  
[https://www.aedb.org/images/Draft\\_ARE\\_Policy\\_2019\\_-\\_Version\\_2\\_July\\_21\\_2019.pdf](https://www.aedb.org/images/Draft_ARE_Policy_2019_-_Version_2_July_21_2019.pdf)  
Aims for a 20% renewable generation capacity by 2025 and 30% by 2030 along-with upgradation of the transmission infrastructure and increase in hydel power production.

**Environmental legislation for RE:**

The Alternate and Renewable Energy Policy 2019 aims to have 30% of generation be renewable by 2030. This will require Pakistan to install around 24,000 MW of solar and wind by 2030, up from just over 1,500 MW today.

**Existing/Planned energy certificate systems:** (purpose, extent)

**1. Clean Development Mechanism:**

In Pakistan, alternative and renewable energy (ARE) projects have definite prospects for development as carbon offsetting initiatives. To accelerate and streamline activities related to the REs, the Government of Pakistan has authorized Alternative Energy Development Board (AEDB) to act as a focal body of the federal government with mandate of one window facility for ARE development in the country. The GoP approved Policy for Development of Renewable Energy for Power Generation, 2006, in which it specified constitution of Joint Management Committee (JMC) for sale and management of CERs earn through renewable energy projects. The JMC comprise of power purchaser, power producer and AEDB. The details of the Alternate and Renewable Energy Projects are below:

Projects Registered with CDM				
Sr. No	RE Resource	No. of Projects	Cumulative Capacity	No. of Approved CERs
1	Wind	8	405.9	709,287
2	Biomass	8	190	550,000
3	Small Hydro	1	15	76,000
4	Solar	1	50	33,000
Projects in Process of Registration with CDM				
Sr. No	RE Resource	No. of Projects	Cumulative Capacity	No. of Approved CERs
1	Wind	10	528	929,280
2	Biomass	4	88	254,737
3	Small Hydro	12	116.8	591,787
4	Solar	3	125	82,500

**2. Verra:**

Pakistan currently has 6 projects in the pipeline with Verra. 3 of them have been registered with the other in various stages of the process. More details can be found at:

<https://registry.verra.org/app/search/VCS/All%20Projects>

**3. Gold Standard:**

Pakistan also has 6 projects in the Gold Standard pipeline. 3 of the 6 have been certified with the others in various stages of the process. More details can be found at:

<https://registry.goldstandard.org/projects?q=&page=1&countries=PK>

**Extent of engagement with government:**

The Pakistan Environment Trust (PET) has strong connections with the Ministry of Energy and Power in Pakistan. High profile figures sit on the board of PET who have direct connections with different departments within the ministries.

**Response from Government in relation to attribute tracking systems:**

The Pakistan Environment Trust aims to apprise the relevant government department and eventually obtain their formal approval for the establishment of a national IREC market in Pakistan. At this point in time, the final authority is the Minister of Energy and Power, however other stakeholders will also be brought into the fold for such discussions. Similarly, any official correspondence from the Ministry must go through layers of bureaucratic approvals before being shared externally. PET initially engaged with the Ministry late last year on the IREC market, however, with the sweeping changes taking place in the Ministry over the past few weeks, the process must be started from scratch. Consequently, keeping in mind the IREC demand in Pakistan, PET proposed to move ahead with the establishment of the national market, while continuing to engage with Ministry, with the eventual plan of obtaining official clearance.

**Demand-side market potential or strategic nature of market development:**

One of the areas that PET is working on is registering companies under a Net Zero Initiative. It was noticed that many companies in Pakistan have lately expressed interest in obtaining certificates to offset the emissions from their electricity consumption. The I-REC scheme will come very handy at this stage to meet the demand of those clients.

**Analysis of political disruptions or market risks:****1. In-house manufacturing**

There are currently very few to zero manufacturing sites within the country for equipment that could help with carbon reduction, such as solar panels. This can create a risk since economic policies will play a huge role in how import and exports are taxed and how tariffs change.

**2. Security concerns:**

With the current situation in the region, security concerns could also put projects at a level of risk. This, however, falls under a fairly low risk category since the situation seems to be under control.

**Analysis of regulatory risks including linkages with carbon markets and support systems:**

Changes in regulation: While the current government has placed climate-focused policies on a higher priority, these policies tend to change with administrations and that could be a key risk in implementation of projects with significant carbon reduction.

**Current environmental reporting in energy:****Mechanisms in place to support the reliable verification and issuance of I-RECs:**

As mentioned earlier, there is a good number of projects registered under the different carbon offset mechanisms (CDM, Verra and Gold Standard). For this reason, the concept of reliable verification and issuance is well established given this previous experience.

PET are also well aware about double-counting issues that may arise and the means to avoid this from happening while issuing I-RECs.

**Local organizations of importance and their opinion on local I-REC market development:**

Ministry of Energy and Power  
Ministry of Climate Change  
National Electric Power Regulatory Authority  
Alternate Energy Development Board

**Any other relevant information:**

N/A

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