

# PROJECTS DELAYED, PROJECTS DENIED

a situation paper on

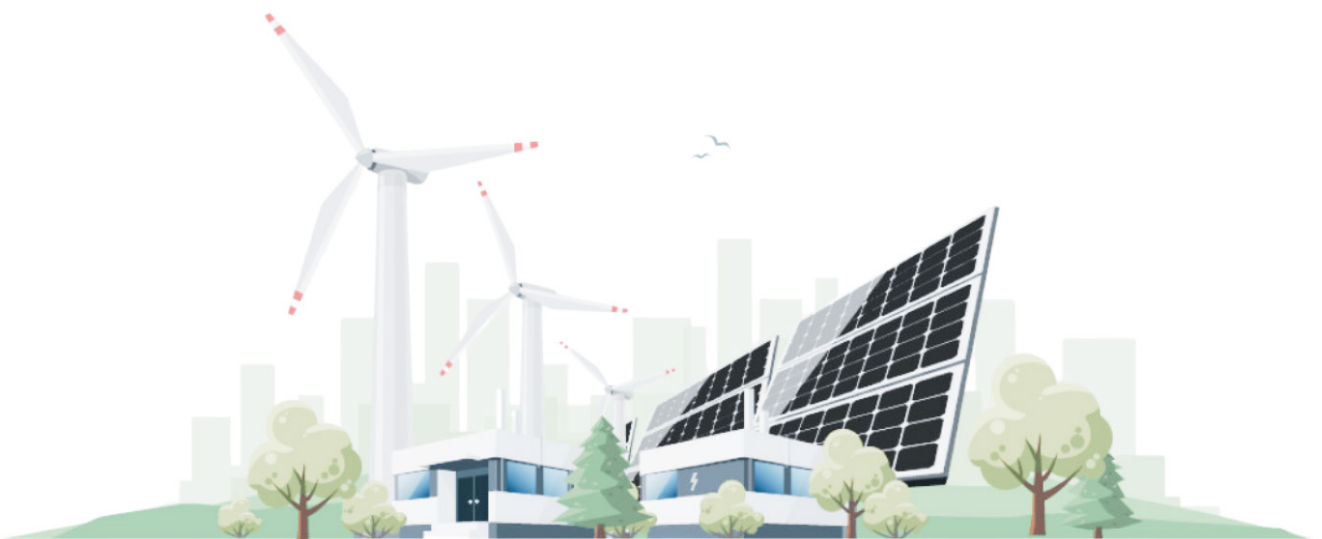
## Variable Renewable Energy Integration in Pakistan's National Grid

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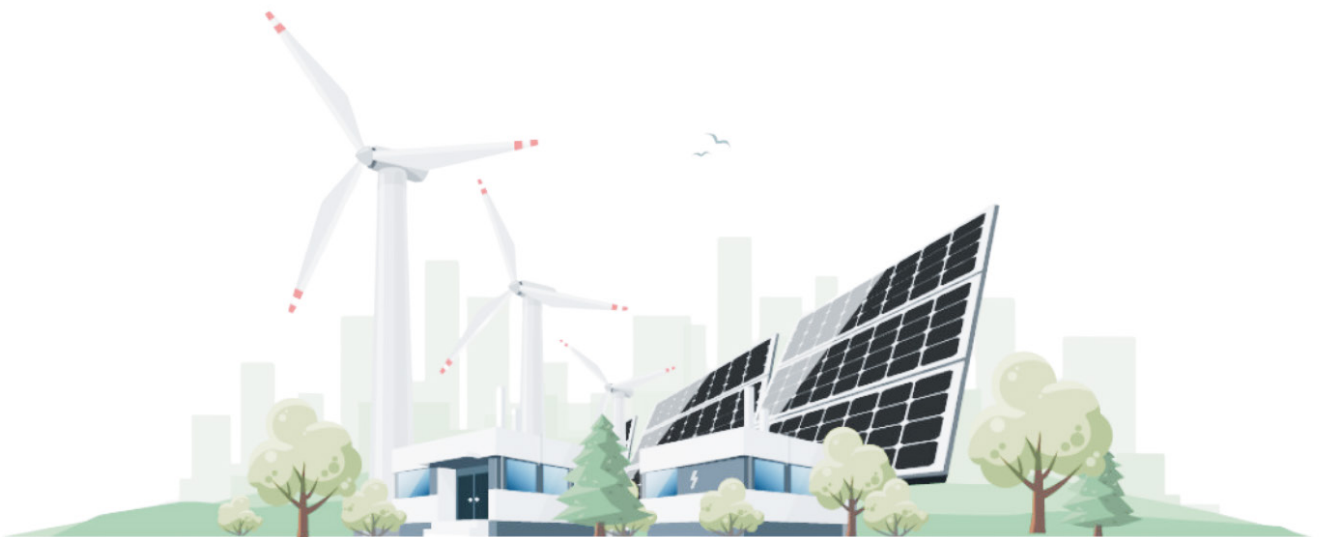
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**Author**

Shaheera Tahir

**Researchers**

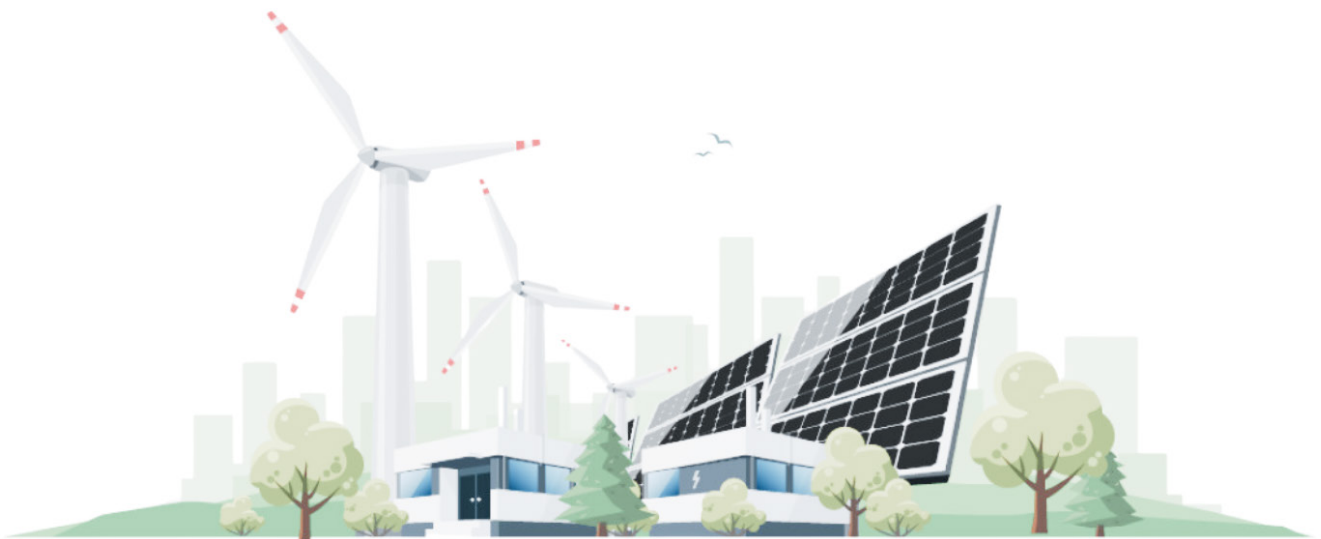
Qurrat Ul Ain and Muqaddas Ashiq

**Designer**

Shafaq Nasir

## Acknowledgment

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# SITUATION OVERVIEW

Utility scale solar and wind power projects development in Pakistan has been very slow. Despite the existence of clear policies and aligned processes, their additions over the years have been inconsistent with no pattern of growth. The Alternate and Renewable Energy (ARE) Policy 2019<sup>1</sup> — a continuation of RE Policy 2006 — sets a target of at least 20% on grid renewable energy (RE) by 2025 and at least 30% by 2030. However, currently, the share of on grid wind and solar has only reached 6% — far short of the set targets.

**Installed Solar and Wind Capacity by Year (MW)**

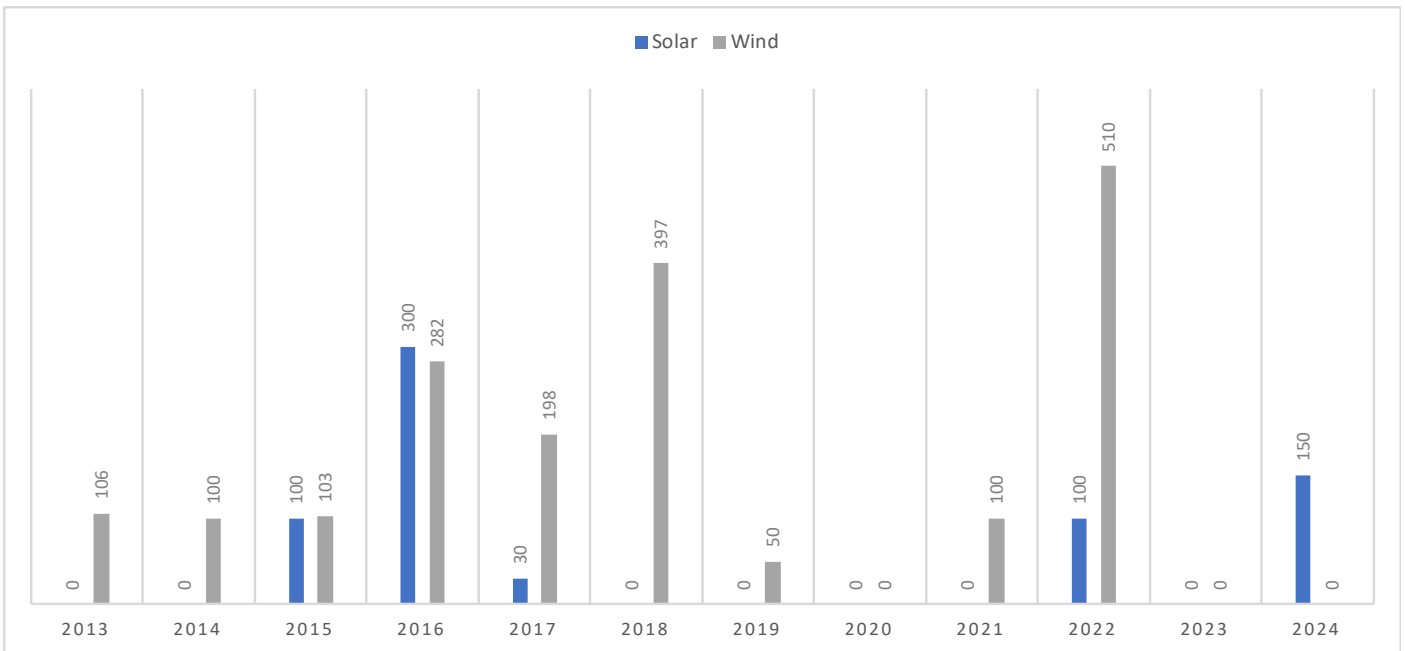


Figure 1: Installed Solar and Wind Capacity by Year [Author’s own research and calculation (source: NEPRA State of Industry reports<sup>2</sup> and IGCEP 2023–34<sup>3</sup> )]

Figure 1 shows the solar and wind power addition in the national grid over the past 10 years since the first wind generation plant started supplying power to the grid. Wind power additions have been centric to the province of Sindh where the Gharo-Jhimpir Wind corridor exists, whereas the solar power additions have majorly been centric in the province of Punjab.

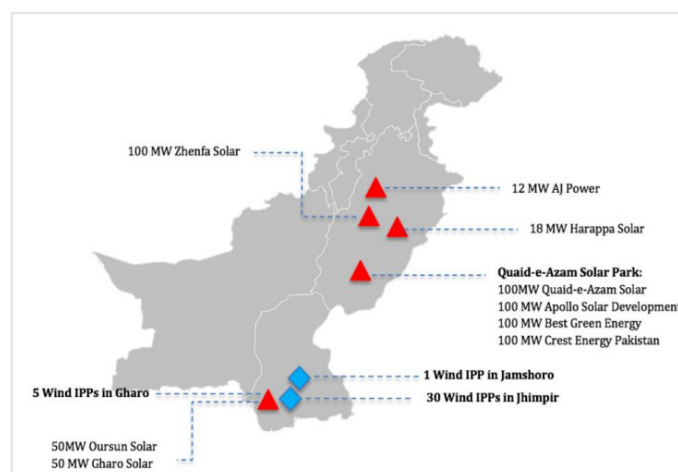
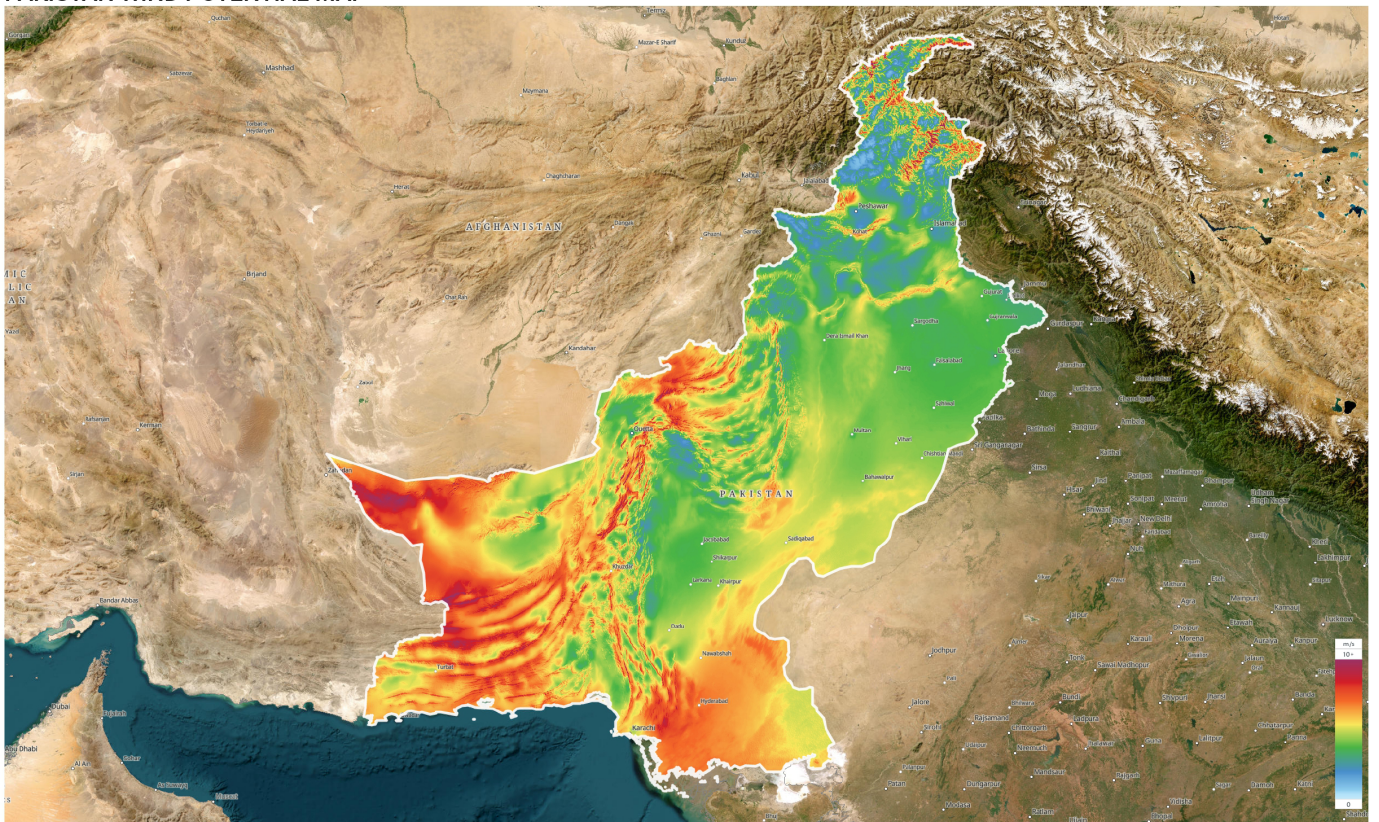


Figure 2: Geographical map of existing solar and wind projects – (Author’s own research and calculation- Source: PPIB Wind and Solar commissioned Plants <sup>4</sup>)

GLOBAL WIND ATLAS  
MEAN WIND SPEED AT 100m  
PAKISTAN WIND POTENTIAL MAP



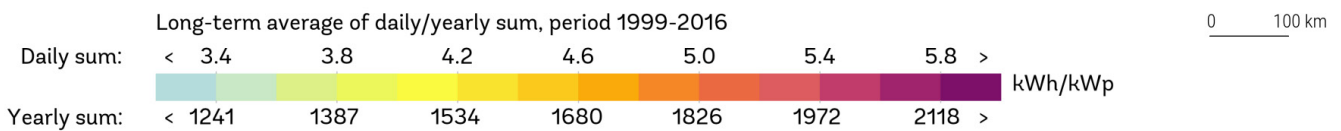
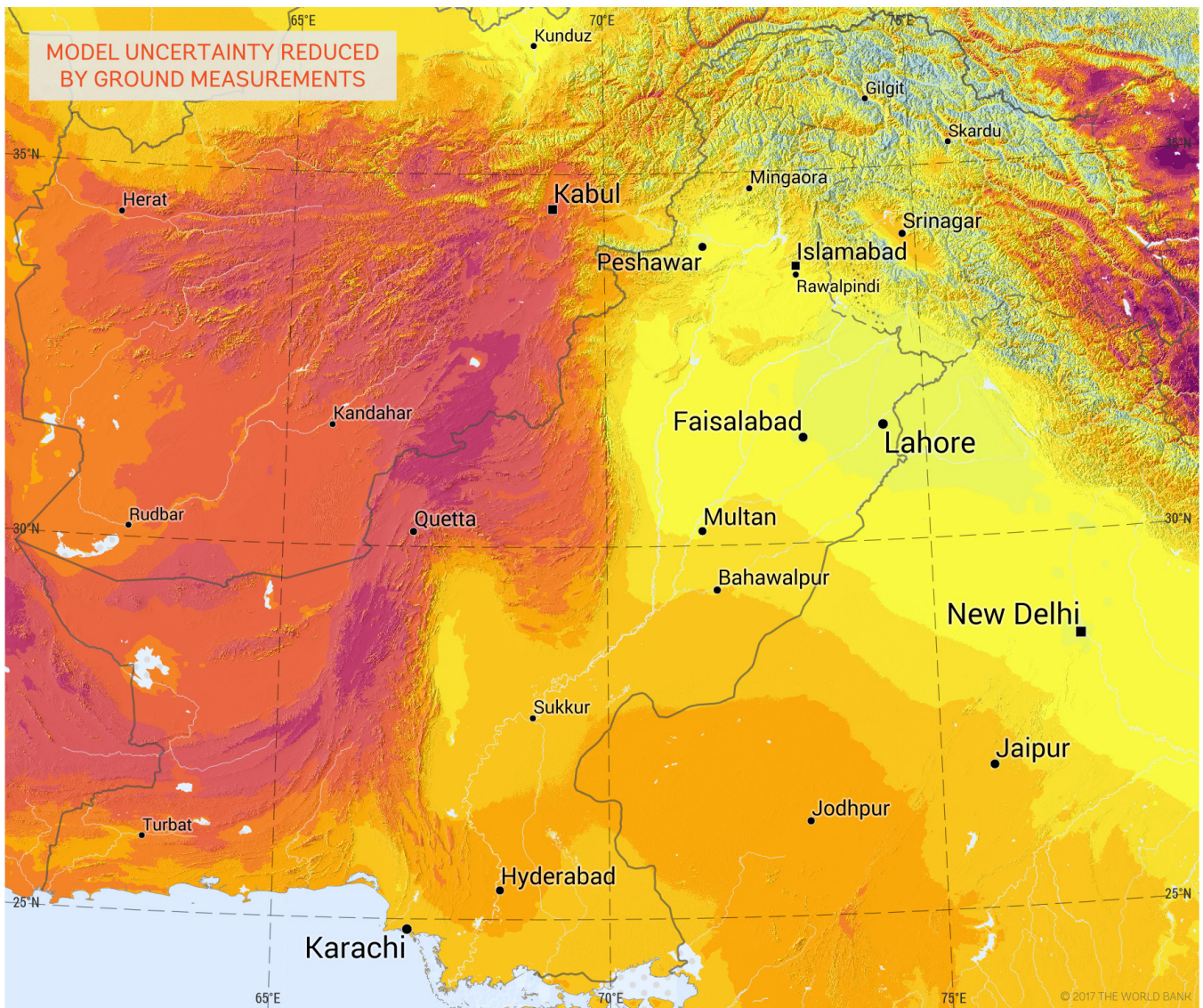
This map is printed using the Global Wind Atlas online application website (v.3.3) owned by the Technical University of Denmark. For more information and terms of use, please visit <https://globalwindatlas.info>

Figure 3: Wind Power Potential Map Pakistan<sup>5</sup>

Wind potential is high all across Pakistan, with majority of potential existing in the provinces of Balochistan and Sindh. However, no utility scale solar and wind power plants exist in Balochistan, and in Sindh only a 100MW solar and 1.8 GW wind power is installed in the past 10 years.



SOLAR RESOURCE MAP  
**PHOTOVOLTAIC POWER POTENTIAL**



This map is published by the World Bank Group, funded by ESMAP, and prepared by Solargis. For more information and terms of use, please visit <http://globalsolaratlas.info>.

Figure 4: Solar Power Potential Map Pakistan<sup>6</sup>

Pakistan has a tremendous solar power potential in all across the provinces. Balochistan which has the highest potential for solar power development, currently has no utility scale solar power plants.

Whereas globally the developments in this domain have been exponential. For onshore wind, the installed capacity share has increased fourfold during the 2010 to 2021 period, from 178 GW to 769 GW. For solar PV, the capacity grew about 21-folds between 2010 and 2021, with over 843 GW installed capacity by the end of 2021<sup>7</sup>. The cost of development of power plants based on these technologies have also experienced steep decline over the past decade.

Between 2010 and 2021<sup>8</sup>, the global weighted average levelized cost of electricity (LCOE) of onshore wind fell by 68%, from USD 0.102/kilowatt hour (kWh) to USD 0.033/kWh. In 2021, the onshore wind LCOE fell by 15%, year-on-year, and to an extent that in 2021, around 69 gigawatts (GW) of the new onshore wind projects commissioned had an LCOE lower than the cheapest new sources of fossil fuel-fired power generation. The global weighted average total installed cost of onshore wind fell 35% between 2010 and 2021, from USD 2042/kilowatt (kW) to USD 1325/kW. The global weighted average LCOE of utility-scale photovoltaic (PV) plants also declined by 88% between 2010 and 2021, from USD 0.417/kilowatt hour (kWh) to USD 0.048/kWh. In 2021, the year-on-year reduction was 13%.

Even though the global cost and technology improvements signal better market conditions for solar and wind, their share remains significantly low in Pakistan’s national grid. The projected shares of on-grid wind and solar power have also been fluctuating in the regular generation planning process. The National Transmission and Dispatch Company (NTDC) — also the system operator — is mandated to create a 10-year indicative generation capacity expansion plan (IGCEP) every year. Each iteration of IGCEP that has become public to date shows a different share of solar and wind for the next ten years. In figure. 5 We see that the ambition for solar and wind power in the energy mix is fluctuating. Projected shares by year 2034 have been reduced to 13.86%<sup>9</sup> from the last IGCEP where the solar and wind planned capacity at least corresponded with the ARE policy 2019 target for 2030. Currently, even by 2034, solar and wind installed capacity does not reach the 30% target.

**Existing vs. Targeted Share of Solar and Wind**

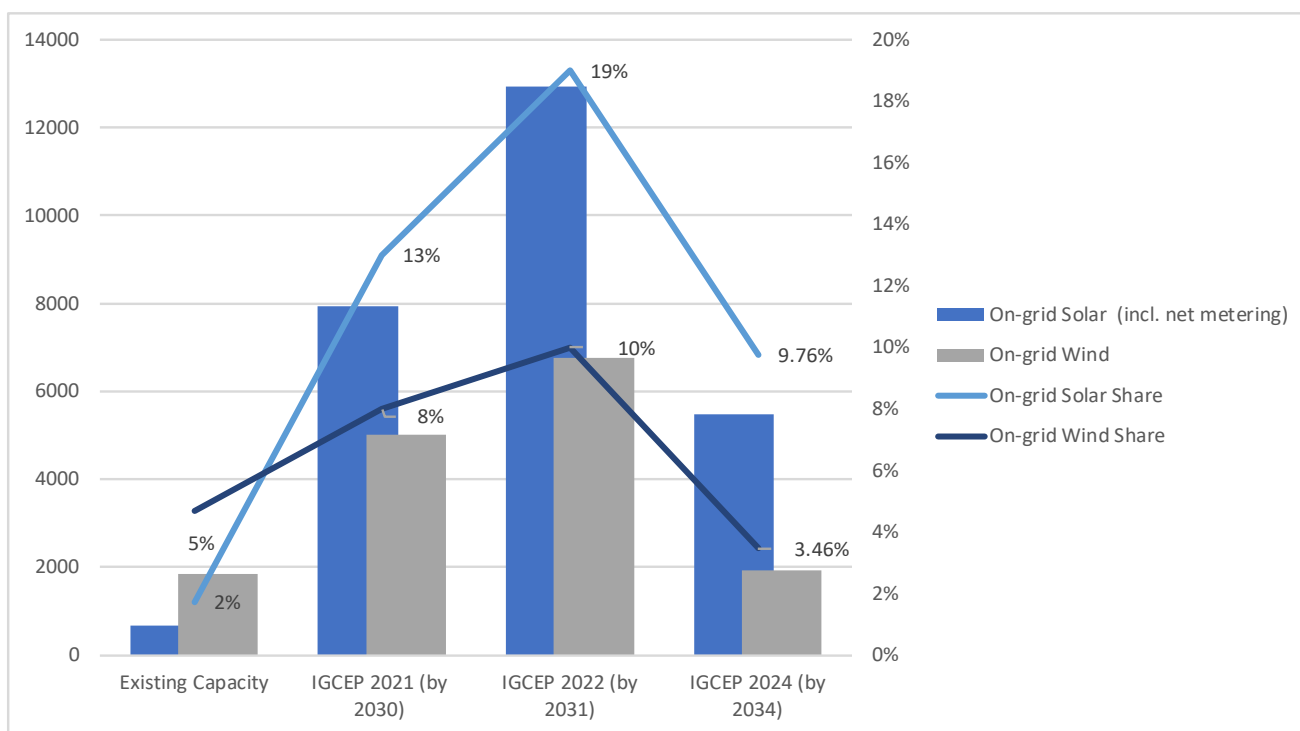


Figure 5: Existing vs. Projected Solar and Wind Shares in Energy Mix

## DID YOU KNOW

Out of 33 solar power projects which received generation licenses over the last decade, only 12 have been able to achieve commercial operations date.

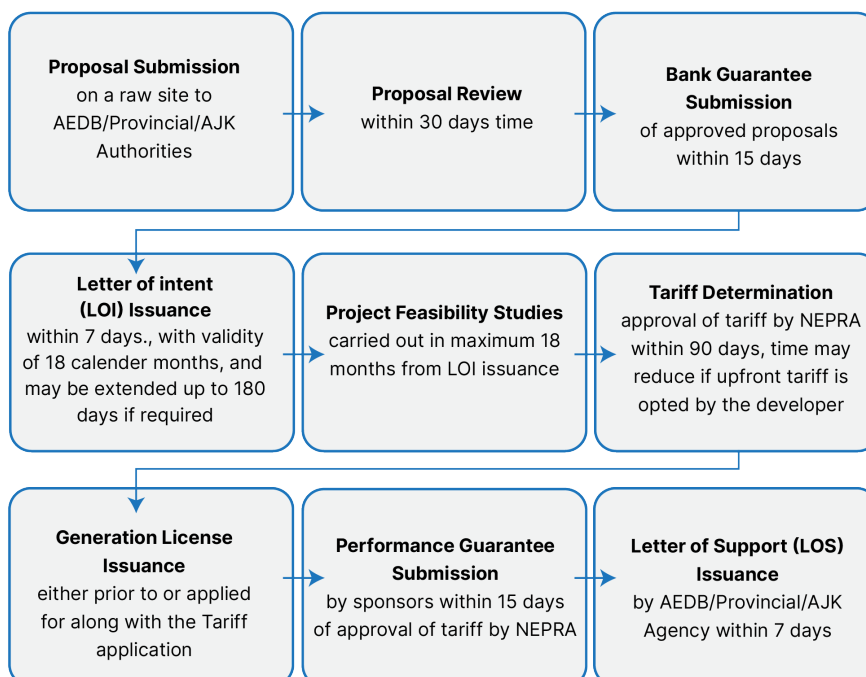
As per the latest IGCEP, in 10 years' time only 100 MW of wind is planned to become part of the national grid and solar quantum has been reduced from about 13 GW in IGCEP 2022 to almost 6 GW in IGCEP 2024 by 2034. This paints a despairing picture of wasted potential of sustainable and affordable energy resources in the future. In the past as well, only a fraction of projects which showed their interest in solar and wind power development have been able to commercially operate. Additionally, the projects which are operational recurrently face issues of power curtailment and transmission constraints.

## UTILITY SCALE RE PROJECT DEVELOPMENT PROCESS

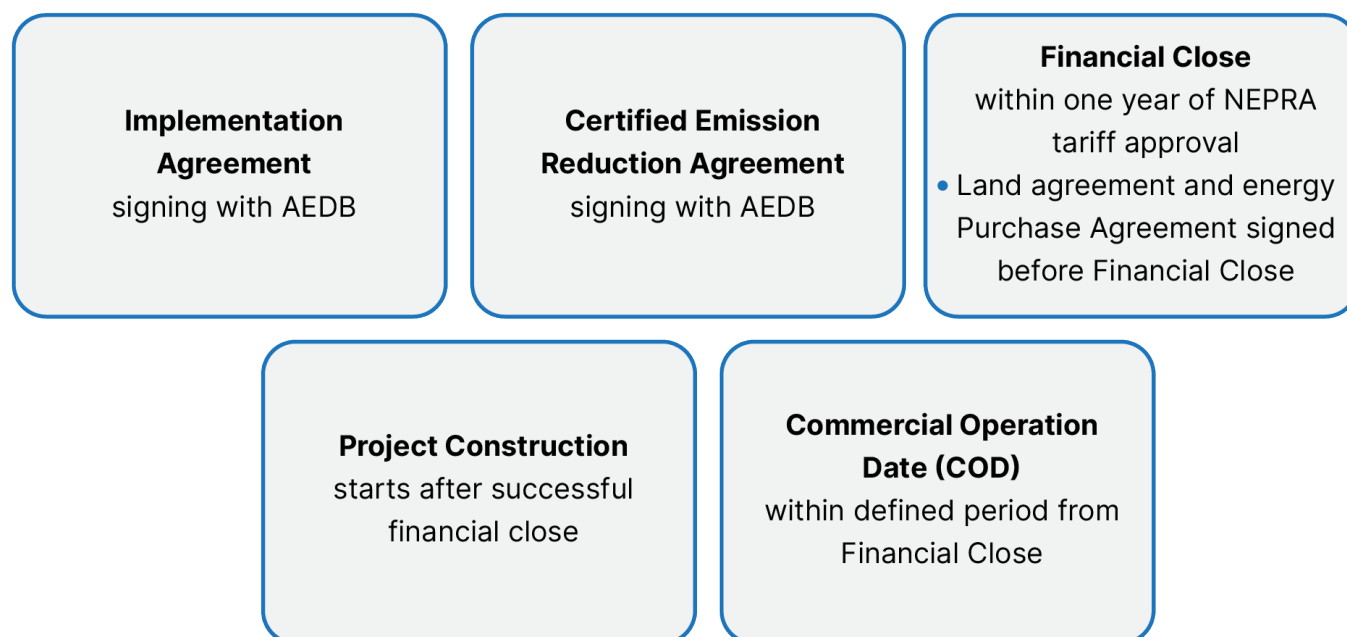
### Prior to ARE Policy 2019

Most solar and wind projects which are operational today have been implemented following the process delineated under the RE Policy 2006. The process defined in the RE Policy 2006 for unsolicited RE projects is listed as under:

#### Process until the issuance of Letter of Support:



### Process Subsequent to LOS Issuance:



## After ARE Policy 2019

In the past cost plus and upfront tariffs were prevalent in the power sector to promote the RE private sector development. The promotional tariff structure was according to the RE Policy 2006 which expired in 2018 and was followed by the new ARE Policy 2019. After introduction of this new policy, the cabinet committee on energy (CCoE) categorized the RE projects in pipeline in order to determine their way forward. These projects were categorized based on their stages of development into three categories. As per the CCoE's decision<sup>10</sup>, the projects under category I and category II will proceed as per RE Policy 2006, and projects under category III along with any future projects will proceed following the competitive bidding process in accordance with the ARE Policy 2019. Moreover, NEPRA also determined a benchmark tariff to facilitate the bidding process. This benchmark tariff would set the ceiling on the tariff that could be awarded to the successful bidders.

Pending RE Projects	Category I (Projects at LOS Stage)	Category II (Projects with LOI and Tariff Determinations)	Category III (Projects at LOI Stage)
<b>Solar</b>	41.52 MW	350 MW	4143.5 MW
<b>Wind</b>	0	759.3 MW	2139 MW

For these category III projects, no round of auction has been conducted so far. However, in contrast to the CCoE's decision, 13 of these category III projects were approved to proceed on cost plus tariff basis in June 2023.<sup>11</sup>

The process of bidding has been only carried out for a new solar project with a capacity of 600MWp to be located at Kot Addu/Muzaffargarh. The request for proposal (RFP) for the project was floated in February 2023 to gauge interest of the national and international investors, but the deadline of the RFP was extended as no bids were received. Despite the deadline extension, no bids were received<sup>12</sup>. The relevant stakeholders provided their comments to the regulator on reducing the size of this first project and dividing it into multiple projects of

smaller size. Following this approach will allow for incorporation of lessons from subsequent bidding rounds. However, the government is continuing with the same project size with certain amendments in the RFP, which are listed below.

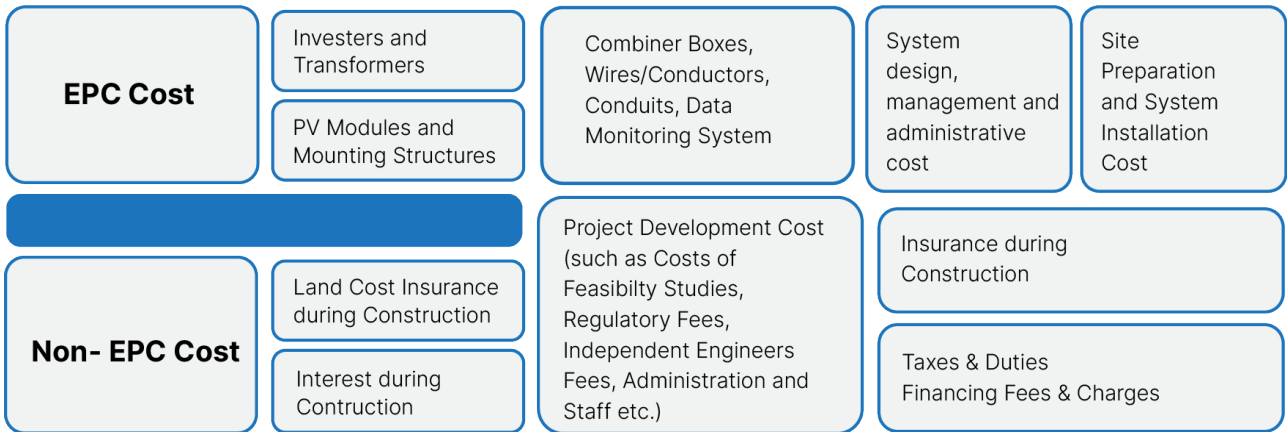
- Conducting competitive bidding with or without benchmark tariff
- Indexation allowed of 80% for forex variation
- Indexation allowed for LIBOR/ SOFR & KIBOR
- Projects are required to achieve FC in 6 months of LoS and achieve COD within 10 to 24 months of financial close depending on the project size

Activity	Timeframe
	Calendar Days from Day zero (D0) <sup>2</sup>
Publication of RFP	D0
Issuance of RFP to eligible Bidders (last date for issuance of RFP)	15
Pre-Bid meeting(s)	20
Deadline for submission of Bids <sup>2</sup>	60
Opening of Envelope 1 (Technical)	61
Evaluation of technical bids	65
Announcement if Technically Qualified Bidders	65
Opening of Envelope II (Financial), issuance of LOCA to the succesful Bidder, and submission of AEDB's bid evaluation report to NEPRA pursuant to the NEPRA Regulations	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 <sup>1</sup>
Application to NEPRA by the succesful Bidder for genetation license and Tariff Approval	83
Approval of Tariff by NEPRA and intimation to GOP for notification <sup>4</sup>	90
Submission of Performance Guarantee, payment of project processing Fee, and fulfillment of other conditions of LOCA	115
Letter of Support	120
<b>Post LOS Activities</b>	<b>Days</b>
Execution of project Agreements (from date of LOS)	10
Financial Closing (from date of LOS)	90
Commercial Operation Date (from date of EPA signing)	600

Figure 6: Bidding and Project Development Schedule

## Cost of On-grid Solar and Wind in Pakistan

The project cost of an on-grid solar and wind power project generally includes costs such as Engineering Procurement and Construction (EPC), and non-EPC costs. EPC costs account for the major chunk — on average 85% for wind projects and 90% for solar projects— of the total project cost. A break up of these costs for solar projects is provided hereunder:



## Tariff Structures for Solar Projects

In order to promote private investment in solar and wind power projects, the government introduced feed-in-tariff/up-front tariff mechanism. In this mechanism, NEPRA determined tariff to pay to the independent power producers covering their costs up to defined benchmarks and providing a return on their equity. And Further guaranteeing them grid access and offtake through long term energy purchase agreements. The terms and conditions also included adjustments for the 90% of foreign portion of the EPC costs at commercial operations date of projects based on any exchange rate variations, and other costs on actual basis. NEPRA determined upfront tariff for different project size brackets and two main geographical demarcations (North and South Region) so the interested developers opted for this upfront tariff depending on the size and location of their projects.

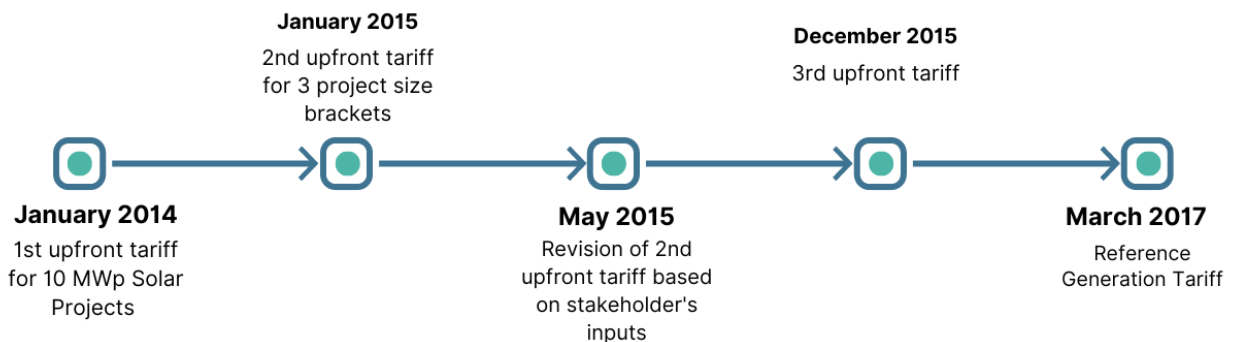


Figure 7: Timeline of approved upfront tariffs for on-grid solar projects

Under the first introduced upfront tariff for Solar, a total of 50 MW of capacity was envisaged to be inducted. The second upfront tariff was introduced for 1 MW to 100 MW projects with no limit on total capacity induction. 400 MW of current installed solar capacity opted for the revised 2nd upfront tariff and is operating in the Quaid-e-Azam Solar power park in Bahawalpur. All the introduced upfront tariffs were valid for a period of six months after their notifications, so any project conceived after June 2016 received tariff on a cost-plus basis. The approved costs under different project heads in the latest revised upfront tariff (dated December 16, 2015) for solar projects is as following:

Description	> 50 MWs 100MW	>20MW<50MW	>1MW<20MW
	USD/MW	USD/MW	USD/MW
EPC Cost	1,071,431	1,092,859	1,114,288
Other Costs			
Land Cost	23,810	23,810	23,810
Project Development Cost	36,658	38,490	40,320
Insurance during construction	10,714	9,107	7,429
<b>CAPEX</b>	<b>1,142,613</b>	<b>1,164,266</b>	<b>1,185,846</b>
<b>Finance Cost:</b>			
Financing Fees & Charges	29,994	30,562	31,128
Interests During Construction	21,334	16,043	10,565
<b>Sub Total</b>	<b>51,327</b>	<b>46,605</b>	<b>41,693</b>
Total Project Cost	1,193,940	1,210,871	1,227,540

Figure 8: Upfront Tariff for Solar Power Plants dated December 16, 2015 (Source: NEPRA Solar Power Generation Tariff)<sup>13</sup>

## Tariff Structures for Wind Projects

The first upfront tariff for wind power projects was introduced in 2006 and was valid till December 2006. It went through few revisions, after which in 2011, another upfront tariff was introduced for wind projects, considering the energy crisis in the country to create an amicable environment for development of alternate generation sources which required no fuel and were quick to install and deliver to the grid. The 2nd upfront tariff expired in December 2012, after which the third upfront tariff was approved in April 2013. Another update of the upfront tariff came in June 2015, after which the NEPRA, in consultation with the stakeholders, moved towards issuing a reference generation tariff to facilitate wind power development through competitive bidding.

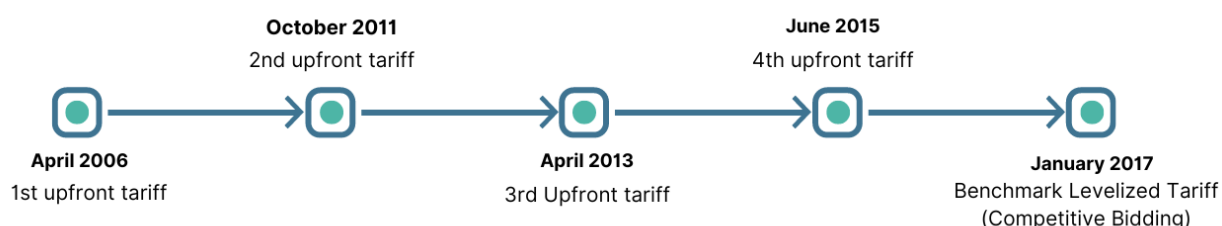


Figure 9: Timeline of approved upfront tariffs for on-grid wind projects

The generation tariff approved in January 2017 for wind projects is as following:

#### BENCHMARK TARIFF ON BOO BASIS

Years	O&M	Insurance	(100% foreign debt)		(100% local debt)	
			Return on Equity	Debt Servicing	Return on Equity	Debt Servicing
1-13	1.1986	0.2523	1.9406	4.7184	1.9944	5.9746
14 to 25	1.1986	0.2523	1.9406	-	1.9944	-
Levelized Tariff	1.1986	0.2523	1.9406	3.6924	1.9944	4.6755

- Benchmark Levelized tariff on 100% foreign financing discounted at 10% per annum works out to US cents 6.7467/kWh. On 100% local financing, Benchmark Levelized Tariff works out to be US cents 7.7342/kWh
- Three months LIBOR of 0.6% has been used
- Three months KIBOR of 6% has been used
- Reference TT & OD selling rate of US dollar of 105/USD has been used

Figure 10: Benchmark Tariff for Wind Power Plants dated January 27, 2017 – Source: NEPRA Wind Power Generation Tariff<sup>14</sup>

Majority of the solar and wind power projects which are operational have opted for upfront or reference generation tariffs. Therefore, the project costs under different categories are dollar denominated, as given in the standardized upfront or reference generation tariffs. However, the true-up costs of these projects at their commercial operations dates have mostly varied because of scale of the projects, exchange rate variations at the time of payments to the international contractors versus the exchange rate in the approved upfront tariff determinations, and differences in the interest rates.

## KEY ISSUES AND CHALLENGES

On a global scale, the development of solar and wind powered based technologies have faced several challenges despite the whole gamut of interested investors, financing instruments and multiple routes. Historically, these challenges entail the overall implementation of solar and wind projects, and availing funding due to lack of long-term commitment for debt, weak or underdeveloped local financial markets, and lack of sector knowledge etc. Few of these key challenges being faced across the region are detailed as below:

Table 1: Barriers of RE Development across Region

<p><b>Sovereign Risk</b></p> <p>Credit rating of each country is based on multiple factors, which primarily include outlook; political, administrative, and institutional stability; economic stability; foreign direct investment (FDI) inflow; government debt; banking sector performance, etc. This helps investors analyze the country's risk; and thus, gaining confidence in their investments. For some countries such as Afghanistan, Bhutan and Nepal, this credit rating is non existing.</p> <p>For Pakistan, the credit rating by agencies such as S&amp;P, Moody's, Fitch, has been fluctuating over the years because of unstable economic and political condition. As a consequence, the investment in solar and wind projects have also jeopardized. The government has repeatedly tried to receive bids for a 600MW solar project in Muzaffargarh but in vain.</p>	<p><b>Institutional Uncertainties</b></p> <p>The presence of multiple decision authorities, lack of coordination among different stakeholders, and inconsistent policy environment creates uncertainty in the market which harms the investors' confidence and constrains financial flow.</p> <p>In Pakistan, there have been multiple instances where uncertainty has resulted in shaken investors' confidence. Early in 2023 customs duties and taxes were reinstated on solar and wind technologies, and later after resistance these taxes were removed. Another example is when on grid RE target was reduced to 10% in 2021 IGCEP in violation of the ARE Policy 2019, increased in 2022 IGCEP to 29% and now again reduced to about 13% in IGCEP 2024.</p>																								
<p><b>Financing Constraints</b></p> <p>Since RE projects size can vary considerably, the available financing options also vary. Generally, for small scale projects the process of availing finance is more cumbersome as the cost of transaction and time invested may effectively be more than the scale of investment itself. Thus, small scale projects face challenges in raising long-term debt, as the funding amount is too small for most domestic banks and financial institutions. Moreover, financing instruments are also very limited. For example, in the SAARC member countries, the domestic bond market is still not mature enough.</p> <p>In Pakistan, for utility scale solar and wind projects, the State Bank introduced a financing scheme which provided concessional interest rate to RE project developers. But small-scale project developers cannot reap benefits of this scheme. Now, this State Bank's RE financing scheme has also expired.</p>	<p><b>Volatile Foreign Exchange Market</b></p> <p>This challenge is associated with the volatility of the foreign exchange market, resulting in foreign-exchange risk. It can become a major setback in attracting international finance into the sector. The cost of capital may increase due to the local currency fluctuation and expectations of the foreign investors.</p> <p>In Pakistan, between 2013 and 2024, the exchange rates have fluctuated exponentially.</p> <div data-bbox="820 1653 1414 2063"> <table border="1"> <caption>Avg. PKR/USD Exchange Rate by Year</caption> <thead> <tr> <th>Year</th> <th>Avg. PKR/USD Exchange Rate</th> </tr> </thead> <tbody> <tr><td>2013</td><td>100</td></tr> <tr><td>2014</td><td>100</td></tr> <tr><td>2015</td><td>100</td></tr> <tr><td>2016</td><td>100</td></tr> <tr><td>2017</td><td>100</td></tr> <tr><td>2018</td><td>120</td></tr> <tr><td>2019</td><td>150</td></tr> <tr><td>2020</td><td>160</td></tr> <tr><td>2021</td><td>160</td></tr> <tr><td>2022</td><td>200</td></tr> <tr><td>2023</td><td>280</td></tr> </tbody> </table> </div>	Year	Avg. PKR/USD Exchange Rate	2013	100	2014	100	2015	100	2016	100	2017	100	2018	120	2019	150	2020	160	2021	160	2022	200	2023	280
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In Pakistan, specifically, political and regulatory barriers, and delays in processes, have inhibited the growth of on-grid RE development. The slow and inconsistent growth of solar and wind power development is a testament to the existing barriers. Many projects have gone down the drain because of the regulatory and institutional delays. Some examples of delayed solar and wind projects, which have faced these barriers are presented in the table:

Table 2: Examples of Delayed RE Projects

### **Asia Energy (Pvt.) Limited<sup>15</sup>**

A project named Asia Energy (Pvt.) Limited intended to build a 30MWp solar power project in Bahawalnagar, Punjab under the RE Policy 2006. Its LOI was issued in 2015 after which it did not receive the necessary approvals of Power Evacuation Consent and Power Acquisition Request from Central Power Purchasing Agency (CPPA-G) and NTDC. As a result, their LOI was extended three times, and now the project falls into category III projects which will be carried out under ARE Policy 2019.

Years of Delay since LOI issuance	9 years
Main Cause	Delay in approval of consents from CPPA-G and NTDC

### **Enertech Bostan Solar (Pvt.) Ltd.<sup>16</sup>**

A project named Enertech Bostan Solar (Pvt.) Limited intended to build a 50MWp solar power project in Bostan, Balochistan under the RE Policy 2006 on a Build Own Operate and Transfer (BOOT) basis. It was issued LOI in 2016. The project company made significant progress in its development milestones over a short period of time. It signed a turn-key EPC contract and O&M contract in November 2018. The company was allocated a land of 250 acres by the Government of Balochistan on sub-lease from Balochistan Energy Company Ltd and the sublease agreement was signed in July, 2019. Despite these project agreements in place and the company anticipating COD by November 2020 (Petitions , 2019), to date the project has not been operational. Currently the project has been pushed under category III projects although it achieved many significant milestones subsequent to LOI issuance. However, the stage of development of the project is still not known.

The project has also faced challenges because of its location. The company settled for fixed tilt PV panels instead of tracking technology, as no local companies for regular maintenance of the latter technology existed, and no foreign companies felt secure in sending their employees to Balochistan. Alternative scenario of installing a tracking technology would have resulted in higher O&M costs, as then equipment would have to be sent to Karachi for fixation where the foreign official would conduct maintenance and then the equipment will be sent back to the plant site.

Years of Delay since LOI issuance	8 years
Main Cause(s)	Delay in reference tariff determination and LOS issuance

### Access Solar Pvt. Limited

A project named Access Solar (Pvt.) Limited intended to build 11.52 MWp solar power project in Pind Dadan Khan, District Jhelum, Punjab under the RE Policy 2006. It was issued LOI in 2011 by AEDB. Its application for upfront solar tariff approved in 2014 but the tariff lapsed because of delay in notification in the federal gazette. It applied again in 2015 but the tariff lapsed again because government did not notify it. Since then, the company has applied many times for valid upfront tariffs and then cost-plus tariff. It received LOS in 2022 and after the ARE Policy 2019, it is now a Category I project. But the project is still not realized.

Years of Delay since LOI issuance	13 years
Main Cause(s)	Delays in gazette notifications, delays in approval of Grid Interconnection studies by IESCO* and as a result CPPA-G also could not finalize Energy Purchase Agreement, Cost escalation of main equipment during the delay period

\*Islamabad Electric Supply Company (IESCO)

### Trans Atlantic Energy (Pvt.) Limited <sup>17</sup>

The project company was incorporated on May 17, 2005 to develop and operate a wind power project. Letter of Intent ("LOI") was issued by AEDB on April 13, 2016 for establishing a 50 MW wind power generation project. On November 21, 2017, the validity of the said LOI was extended till February 03, 2019. TAEPL in its tariff petition had submitted that the feasibility study approval by AEDB is in process. The generation license was issued to the project company on April 18, 2017. The Tariff Determination was issued on November 20, 2018. The petitioner was required to achieve FC by November 19, 2019.

Years of delay since the LOI issuance	8 Years
Main Cause(s)	GOP and AEDB did not proceed with the project by not issuing the LOS due to which the project company could not execute the project agreements. Thereafter, AEDB on November 7, 2019 conveyed the petitioner to submit Performance Guarantee and processing/legal fee for the issuance of LOS, i.e. after lapse of nearly one year. TAEPL submitted that it was left with only nine (9) days to achieve FC including but not limited to negotiations and execution of the IA, EPA and Financing Documents. It stated that provision of nine (09) days for achievement of FC is unprecedented, discriminatory, unreasonable and irrational.

### **Burj Wind Energy (Pvt.) Ltd.<sup>18, 19, 20</sup>**

The project was being installed under RE Policy 2006 under Build-Own and Operate Basis. The Letter of Intent (LOI) was issued by AEDB on October 31, 2012, and was valid till April, 10, 2018. The LOI was extended to July 21, 2018. The Tariff Determination was issued on February 20, 2019 whereby levelized tariff of US Cents 4.8717/kWh (Rs. 5.8460/kWh) was approved. The petitioner was granted Generation License by the Authority on October 8, 2019. In view of the above terms, the petitioner was required to achieve FC by February 19, 2020; failing which it is given that its tariff would have expired.

Years of delay since the LOI issuance	12 Years
Main Cause(s)	Despite fulfilling all the stipulated requirements, the generation license was delayed for more than sixteen months. The Project has been shifted from category II to Category III.

## **CONCLUSION**

On fronts of climate change mitigation, provision of affordable and clean energy, and indigenization of the power sector for energy security, solar and wind energy offers the maximum potential to fulfil these objectives. However, the slow growth of harnessing energy from solar and wind depicts a willful neglect. The neglect originates from inaction towards prevailing causes of delays over the years in terms of accountability as well as absence of remedial actions. Despite the existing delays, and inconsistent economic and political environment, solar and wind energy currently are the cheapest sources of power generation providing a unit of electricity 4 cents/kWh. If the existing barriers and bottlenecks are addressed by the government, these sustainable resources can further displace the expensive power generation fleet. Hence, it is time that the government and the key power sector entities play a responsible role in bringing affordable and sustainable energy to the end consumers, and remove obstacles for the development of solar and wind energy projects.

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