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Policy Research Institute  
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# Utility Scale Renewable Energy Transformation



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# Objective of Brief

The policy brief intends to assess the uptake of utility-scale renewable energy (RE) transition in Pakistan in light of the already available RE policies namely “Policy for Development of Renewable Energy for Power Generation 2006 (RE policy 2006)” and “Alternative and Renewable Energy Policy 2019 (ARE Policy 2019)”. The ARE Policy 2019 is an extension of RE Policy 2006 and sets the target for RE uptake in the national energy mix of at least 20% by 2025 and 30% by 2030. However, the progress is far behind the set targets with the share of current non-hydro RE standing at only 6% of the total installed capacity. This policy brief, therefore, also intends to identify the barriers that restrict the deployment of RE in Pakistan despite the presence of these policies.

In this brief, we first provide the current status of utility-scale RE deployment in the country. We then provide details of existing RE policies and their mandates. The discussion further evolves into impediments facing the RE uptake. We conclude by presenting some recommendations in the form of viable strategies for capturing opportunities for RE uptake and removal of all forms of barriers.

## Methodology

For the purpose of this brief, we have conducted qualitative research carried out using primary and secondary resources. We engaged relevant stakeholders such as federal government officials, private investors, technical and legal experts, and policy think tanks to gather requisite data. As part of the qualitative research, we also conducted a workshop and virtual meetings.

## Section 1: Outlook of RE in Pakistan

The energy mix of Pakistan includes hydropower, coal, oil, gas (natural gas and Liquefied Natural Gas), RE sources (wind and solar), biomass, and nuclear. According to National Energy and Power Regulatory Authority’s (NEPRA) State of Industry Report 2021<sup>1</sup>, Pakistan’s total installed generation capacity is 39,722MW, of which 25,098MW comes from thermal, 9,915MW from hydro, 1,335MW from wind, 530MW from solar, 369MW from bagasse, and 2,612MW from nuclear.

The share of RE in the energy mix of Pakistan has been increasing significantly over the past few years. Twenty six wind power projects and six solar power projects of 1,335MW and 530MW cumulative capacities, respectively, have achieved commercial operation and are supplying electricity to the National Grid<sup>2</sup>. Ten wind power projects and four solar power projects of 510MW and 250MW capacities, respectively, have achieved financial closing and are under construction. Additional five solar power projects of 231.75MW capacity under RE policy 2006 are awaiting financial closing. These projects are termed committed projects in Indicative Generation Capacity Expansion Plan (IGCEP). Figure 1 depicts the evolution of the RE road map year-wise.

Although this seems as a significant increase of RE in the energy mix, it is still not proportional to the available RE potential and global declining cost of RE. Wind energy has a huge potential in Pakistan, especially along the coastal belts of Sindh and Balochistan provinces. Wind data, provided by Pakistan’s Meteorological Department, shows that Pakistan’s coastal belt at 60km (Gharo-Keti Bandar) and 170km long, has an unexploited wind energy potential of 50,000MW<sup>3</sup>.

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1 State of Industry Report 2021 <https://nepra.org.pk/publications/State%20of%20Industry%20Reports/State%20of%20Industry%20Report%202021.pdf>  
2 <http://aedb.org/ae-technologies/wind-power/wind-current-status>  
3 “Energy Scenario in Pakistan” <https://lms.su.edu.pk/download?filename=1588575955-energy-pakistan.pdf&lesson=24571>

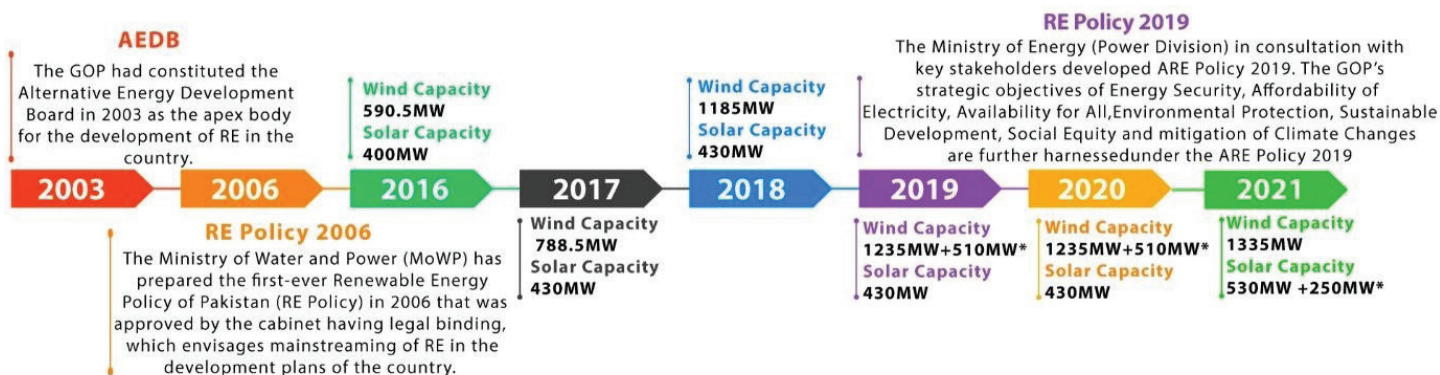


Figure 1: Solar and wind capacity additions followed by RE Policies

Pakistan has an average of 8.5 hours of sunlight daily. But this solar potential is also unutilized in Pakistan. There have been some efforts in the past to install and expand the use of solar energy at a national level. Quaid-e-Azam Solar Park was established in 2014 with a designed capacity to generate 1000MW. However, this project is currently producing only 400MW with plans to enhance its generation capacity.

With the ever-increasing demand for electricity and the accompanying rising costs of electricity in Pakistan, the reliance on RE resources is more than needed now, particularly to keep the various sections of our economy, our industries and local businesses, running and operational. Where off-grid RE solutions will help in self-sustaining most segments of our economy, the on-grid solar and wind resources will help clean our energy mix and reduce basket price of electricity. RE resources can essentially reduce our reliance on energy imports, making our energy sector more energy secure.

## Section 2: RE Policies

To harness power from RE, the Government of Pakistan approved the first RE policy in 2006 to have full participation and collaboration from the private sector. The purpose of the policy was to set out the rules and strategies to exploit RE in Pakistan and attract private sector investment in the power sector. After the expiration of RE policy 2006, a new ARE policy in continuation of the previous policy was approved by the government in 2019. Salient features and implications of both the policies are discussed below:

### 2.1 RE policy 2006

RE policy 2006 established very attractive and liberal incentivized opportunity for private sector investment to promote RE resources. The policy invited investment from the private sector for the four categories:

**Category a:** Independent Power Projects (IPPs) for the supply of power to the grid only

**Category b:** Captive-cum-grid spill-over power projects for self-use and sale to utility

**Category c:** Captive power projects for self or dedicated use;

**Category d:** Isolated grid power projects for small and stand-alone use.

Among all these four categories, only category 'a' requires Letter of Intent (LOI), Letter of Support (LOS), and/or Implementation Agreement (IA) from the government. Remaining three categories will generate electricity for self or dedicate use and sale to utility.

Purchase of electricity for qualified RE projects was made mandatory for National Transmission & Despatch Company (NTDC) and Central Power Purchasing Agency (CPPA). It allowed net metering and billing so that a producer can sell surplus electricity at one time and receive electricity from the grid at another time and settle accounts on a net basis. A simplified and transparent tariff determination process was established under this policy. To incentivize the investor, variability risk was abided by the power purchaser. Investors were financially incentivized by no custom duty or sales tax on equipment and spares intended for initial installation or expansion of the projects. The exemption had been allowed from income tax, including turnover rate tax and withholding tax on imports of machinery and equipment.

Despite all the incentives that this policy aimed to provide, only 1,335MWs of wind and 530MWs of solar have been procured under it. The share of RE merely increased to 6% in the total energy mix of Pakistan in the last 13 years. Figure 2 represents salient features of RE Policy 2006.

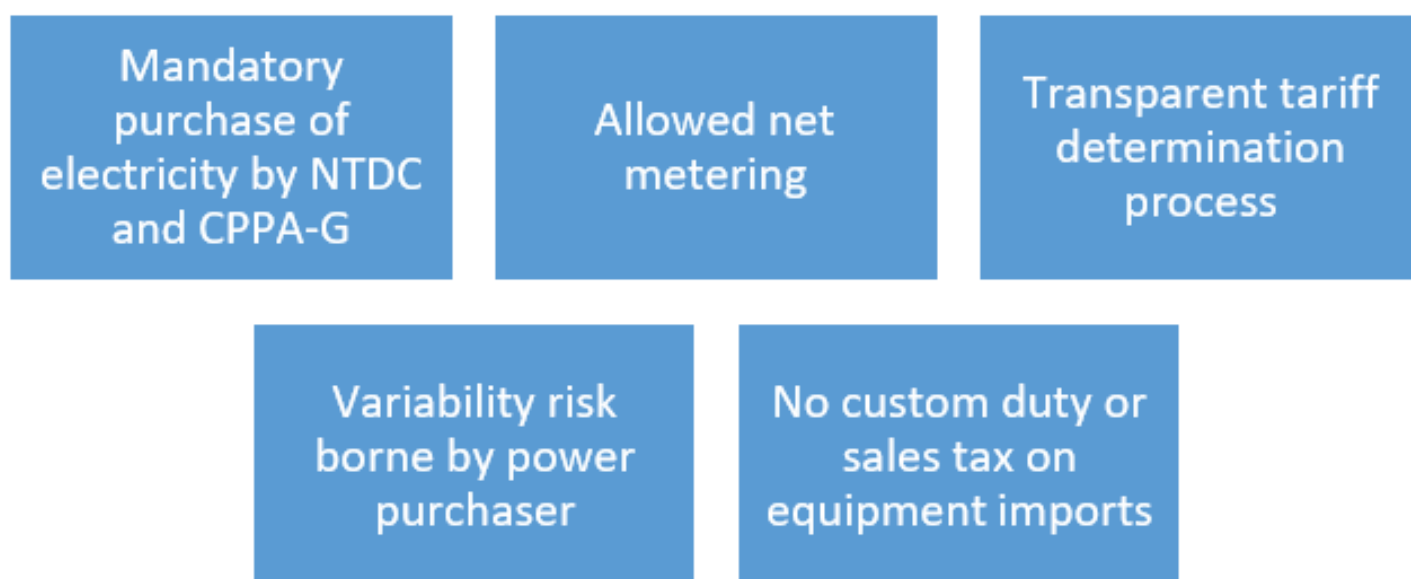


Figure 2: Salient features of RE Policy 2006

## 2.2 ARE Policy 2019

The ARE 2019 policy not only establishes a comprehensive framework for RE generation but also stimulates the use of renewable technology throughout the country. This policy envisages the development of an efficient, sustainable, secure, affordable, competitive, and environment-friendly power market. All this while promoting the indigenization of technology and the development of skilled human resources and local manufacturing capabilities in alternative renewable technologies.

The main objectives of the ARE Policy 2019 are to protect the environment by increasing the share of clean energy in the overall energy mix, provide least-cost on-grid power generation, model a fast track and transparent procurement of ARE projects through auctions, develop and open up the power market, develop local manufacturing of ARE technologies, build a skilled human resource, enable private sector investment and participation in on-grid and off-grid ARE projects, and to ease pressure on the public purse for investments in power system expansion. Figure 3 shows the salient features of ARE Policy 2019.

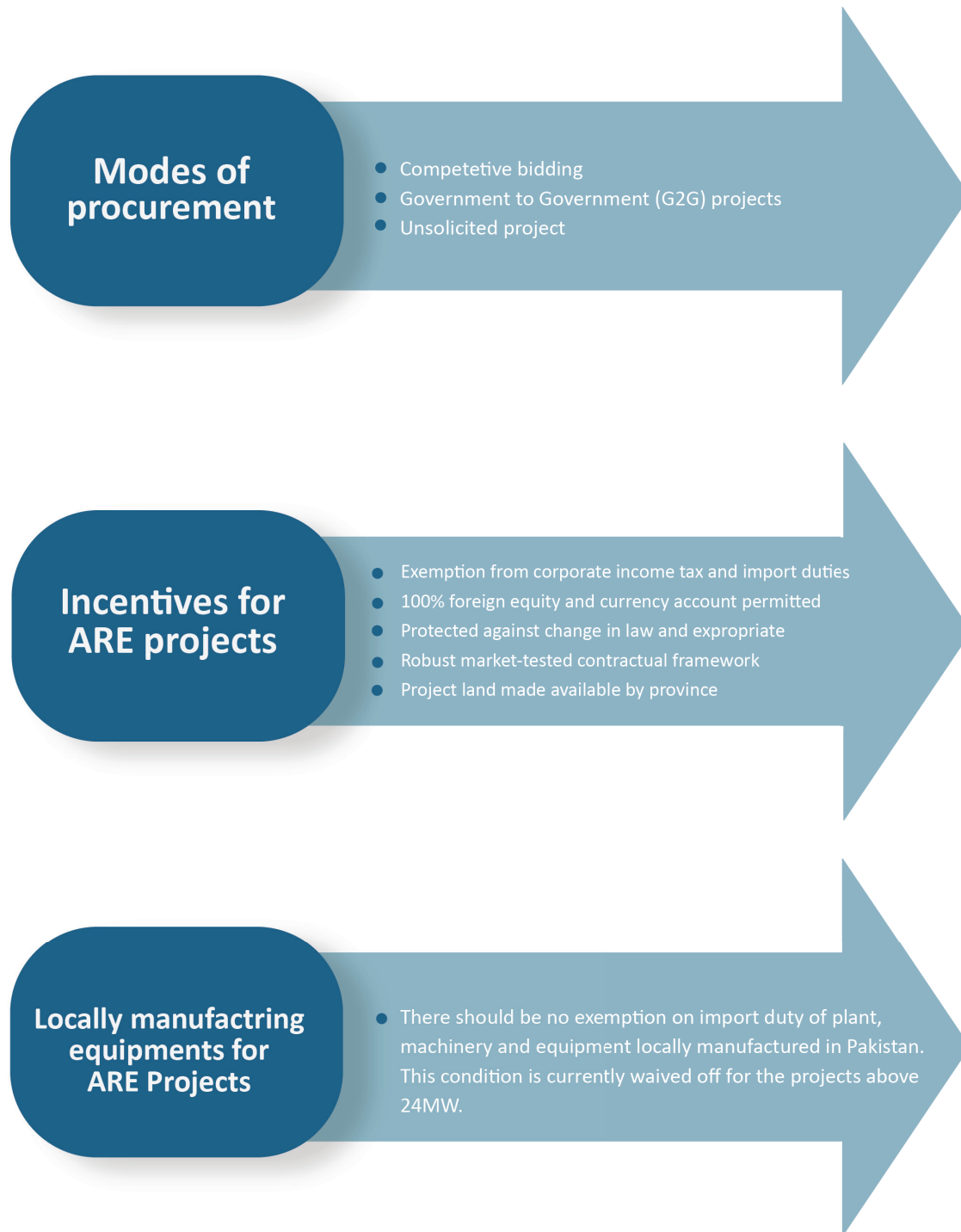


Figure3: Salient features of ARE Policy 2019

# Section 3: Policy impediments

This section aims to analyse the retardants in the deployment of RE and assist policy makers to design a tool that can lead the RE market towards positive growth.

## 3.1 High up-front cost of RE

Although sufficient RE potential is available in Pakistan, RE technologies are still not cost-competitive. Political instability, high-interest rates, dollar indexation, lack of economies of scale, and short loan tenure are some of the blockers to effective cost reduction of RE.

## 3.2 Inconsistencies between regulatory and policy frameworks

Inconsistent policies, indistinct agreements (Energy Purchase agreements, feed-in tariff, or competitive bidding), policies discontinuity, and perverse incentives are the hurdles in policy implementation. Uncertainties and inconsistencies lower the confidence among developers and investors. Because of the policy risk, developers fail to secure project financing through financing institutes. And even if they can secure the debt, the interest rate on the debt is exorbitant.

## 3.3 Delayed implementation of policies

Following the passage of the first RE policy in 2006, the first wind power facility began commercial operation and delivered energy in 2013. Similarly, the first solar power plant attained its commercial operation after nine years of RE policy approval. In 2019, the Cabinet commission on Energy (CCoE) decided that the projects that have been issued an LOI under RE policy 2006 but have not received a tariff from NEPRA will move forward with Competitive Bidding (CP). Upon inquiring, an investor said:

*“We do not foresee competitive bidding, as conditions of bids are still unclear and required grid and transmission infrastructure is not available”.*

There are 31 wind projects and 65 solar projects under RE policy 2006 with cumulative capacities of 2,139 MW and 4143.5MW respectively, who have their LOIs issued by AEDB, Government of Sindh, and Government of Punjab, but are still awaiting Competitive Bidding for closure. Strict and timely implementation of policies is thus required to gain the interest of investors and developers.

## 3.4 Absence of local manufacturing

ARE Policy 2019 aims to promote local manufacturing capabilities in Pakistan. The biggest challenge faced by the local industry is the economy of scale. For example, in the last two decades, only 530MWs of solar energy is procured in Pakistan at the utility-scale level, with no local market for solar and wind equipment in sight. To encourage local industry, the need for technology must be boosted. RE technologies' proportion in the utility and distribution scales must also be increased.

## 3.5 Institutional and administrative complexities

Complicated procurement procedures, hurdles in land acquisition and permission, ambiguity in clearly defined responsibilities, lack of awareness and dedication to RE, and insufficient objective planning guidelines further impede policy implementation.

# Section 4: Strategies to Increase Uptake of RE

## 4.1 Strategic Power Planning

ARE Policy 2019 aims to increase the share of RE in the energy mix, to at least 20% by 2025 and 30% by 2030. Currently, the share of RE is approximately only 6% on the utility-scale. Strategic power planning is required to achieve the targets set by the policy. According to the CCoE's mandate, there are 104 RE projects which have been awarded with LOIs by AEDB with 6,547MW of capacity awaiting competitive bidding since 2019. However, as per IGCEP 2021, no capacity addition is planned till 2023. The coherence among institutions before planning power procurement is thus mandatory.

## 4.2 Curtailment of RE power plants

In 2019, when power demand collapsed, the federal government halted all offtake from wind farms, although, the “must run” condition of RE plants is in their Energy Purchase Agreement (EPA). These plants don't have capacity payments in their EPA, so curtailment of power evacuation means no revenue. Without revenue, the financial viability of the project is doomed. The majority of the projects in the corridor involve foreign investors with foreign lending as well. This discouraging behaviour not only demotivates investors, but also impacts the cost of project. So, the must-run status of RE projects should be protected to encourage RE deployment

## 4.3 Encouragement to the new technologies

The cost-plus projects should be encouraged for new technologies outside the scope of IGCEP. These projects can go on Government to Government (G2G) basis to ensure strategic and economic viability of the country. Recently, Norway and Germany connected their power grids for the first time via a 525kV subsea interconnector. The NordLink project finished trial operations in March 2021 and now carries up to 1.4GW of power between the countries. G2G mode of power procurement to increased welfare have proven efficient.

## 4.4 Effectively overcome intermittency issue

IGCEP 2021 anticipated that in order to meet the demand by 2030, the share of RE should be 2000MW of wind and 1,083MW of solar. In order to mitigate the intermittency of RE, existing plants should be fortified with other RE sources. The projects who do this should be backed and promoted by the government. Declining cost of lithium-ion batteries can also cater the problem of intermittency effectively.

## 4.5 Verra and Gold Standards

The projects certified by Verra and Gold Standards should be preferred in line with the climate commitments<sup>4</sup>

# Section 5: Conclusion

RE transition is important for national resilience, energy security and price stability. About 25% of the country's population does not have access to electricity. This percentage can be reduced by harnessing the abundantly available RE potential. This transition would make Pakistan less dependent on imported fuels through diversified energy supply sources, provide the least cost generation options, and help the country to achieve its climate action goals. Pakistan has already paved its road to increasing the share of RE in the energy mix, but the end goal requires removal of obstacles that are slowing the pace down. Timely implementation of policies, and upgradation of grid and transmission infrastructure will increase the flexibility and resilience of a diversified power system. The brief suggests establishment of an effective governance and institutional system to encourage the uptake of RE by developing enabling policies, strategic power planning and defined targets. Rational and holistic policies and their timely implementation would increase the share of RE in energy mix.

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<sup>4</sup> The Verified Carbon Standard (VCS), or Verra, formerly the Voluntary Carbon Standard, is a standard for certifying carbon emissions reductions. The Gold Standard Certification sets highest benchmarks for positive impacts of climate and other projects and covers several topics as renewable energy, water resources and quality, bio gas and afforestation or re-afforestation