

Pakistan's Energy Sector Challenges and the implementable actions in near- and long-term



Quarterly

Meeting

Network for Clean

Energy Transition in

Pakistan: Research and

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Network for Clean Energy Transition (NCET) in Pakistan: Research and Advocacy

Network for Clean Energy Transition in Pakistan: Research and Advocacy is a first-of-its-kind initiative in Pakistan to address the critical dimensions of the energy transition for achieving SDG-7. The network currently holds over **100 Public Sector, Private Sector, CSOs, Academia, NGOs, and Journalists working together for the energy and climate action of Pakistan**. Sustainable Development Policy Institute (SDPI), Islamabad holds the Secretariat of network, and together with our Esteemed partners, we aim to accelerate the debate on the subject, in Pakistan, and take bold actions to seek a way forward for technology transfer and the implementation of best practices from across the world.

SECTION-1 CURRENT CHALLENGES FOR PAKISTAN'S ENERGY SECTOR

High Dependence on Imported Fossil Fuels

From 81 Mtoe of total primary energy supplies in 2020-21, **fossil fuels constitute the major share of approximately 86%**. Secondly, a significant share of these resources is imported (34.5 Mtoe or 43%) at a high cost, making country vulnerable to external shocks. In 2022, the **oil bill of Pakistan increased by almost 96%** to reach \$17.03 billion between July-August 2022. Resultantly, the trade deficit of Pakistan in May 2022 has reached almost **\$4.1 billion**. On the other hand, this dependence on fossil fuels has also majorly contributed to the environmental degradation, leading to **heat waves** and increased energy demand during the summer season. Through combustion of fossil fuels in different energy sectors, Pakistan emitted approximately **226 million tons of CO₂ in 2021**.

Constantly Increasing Circular Debt

Energy sector of Pakistan is under an immense financial burden resulting from constantly increasing circular debt. From PKR 1.1 trillion in 2018, the circular debt has increased to **PKR 2.2 trillion in 2022** and is expected to reach **PKR 4 trillion by 2025** under business as usual. The major reason behind this is the system inefficiency, DISCOs receivables, high T&D losses, power theft, untargeted subsidies, and constantly increasing **capacity payments** (due to TAKE or PAY contract basis) which are expected to reach **PKR 1.4 billion by 2023**.

Unbudgeted and Untargeted Subsidies

During FY-2020, the **unbudgeted tariff differential subsidies** from the government of Pakistan was approximately PKR 135 billion. Following this, the first half of 2021 also has several support schemes that remained unbudgeted, amounting to PKR 65 billion. In FY 2021-22, **PKR 682 billion were earmarked** in the federal budget, however, the **actual subsidies went beyond PKR 1515 billion**, with power sector contributing to the major chunk. On the second front, the existing framework of **untargeted subsidies is leading to inefficient utilization** of energy resources and not contributing to the socio-economic uplift of the communities.

Low Energy Access and High Cost of Grid Expansion

As of 2022, **around 50 million population and 40,000 villages** in Pakistan are living without access to reliable electricity. Secondly, almost **52% of the population does not have access to clean cooking fuel** and technologies. However, for both power as well as gas supplies, it is **not financially feasible to expand supply networks (grids and pipelines)** in the far-fetched areas, particularly in Balochistan and mountain regions.

Energy Demand Management

Most policy and regulatory interventions in Pakistan target the energy supply side, while limited policy attention has been given to energy demand management techniques. This has led to wasteful use of energy in all key demand sectors (Residential, Industrial, Commercial, and Transport) leading to following key issues

- *Increased Air Conditioning and Refrigeration load during Summers:* In 2022, the **disparity between summer and winter load in Pakistan exceeded 15,000 MW** (around 30,000 MW in peak summer and 12,000 MW in winter). The larger chunk of capacity is therefore kept idle during the larger portion of the year.
- *Inefficient construction techniques:* Despite efficient construction materials available, the major reliance is still on **conventional construction techniques** that do not comply with Pakistan's Building Energy codes.
- *Active and Passive Energy Conservation Techniques:* Residential as well as commercial sectors especially have limited capacity and understanding of applying **passive and active energy conservation** techniques that could potentially lead to significant energy savings and electricity bill reductions.
- *Nonconventional biomass use:* Almost 33.3% of Pakistan's energy supplies are coming from traditional use of biomass resources in rural areas. This inefficient use not only contributes to environmental emissions (open burning), but it is also a major health hazard for rural communities.

Unaligned Policy Goals & Institutional Miscoordination

While Pakistan has undergone a well-documented shift in the policy reforms, the goals prescribed under different regulatory measures appear to be misaligned and have also triggered a debate within government institutions as well. This has resulted in an unfriendly regulatory environment for both local and international investors. Some of these key areas include:

- Pakistan's Alternate and Renewable Energy Policy 2019 has prescribed a goal of achieving **30% energy generation through Solar, Wind, and Bagasse by 2030** (on least cost basis), while Pakistan's Indicative Generation Capacity Expansion Plan 2021 has limited **the share of these sources below 20% by 2030** owing to committed power sector projects.
- The committed energy sector projects under the **IGCEP provide a little room for a competitive market regime** under recently implemented bilateral model i.e., Competitive Trading Bilateral Contracts Market (CTBCM).
- **Regulatory and penetration targets for Electric Vehicles** vary significantly under Pakistan's National Electric Vehicle Policy 2019 and two- and three-wheeler policy of Engineering Development Board (EDB) and AIDEP 2021-26.
- Energy Efficiency targets prescribed under NEECA's strategic Plan 2023 are not currently a part of Pakistan's Nationally Determined Contributions. **Energy efficiency is currently not a part of Pakistan's Climate Change Agenda.**

Challenges for Local Technology Production

Current technology outlook of Pakistan is majorly dominated with Imported technologies on both supply side (such as Solar PVs, Turbines, etc.) as well as demand side (technologies deployed within households, Industrial technologies, etc.). While the local solutions do exist, their growth has been hampered due to following:

- **High Fuel and Power Cost:** Manufacturing as well as fuel cost in Pakistan for such producers is comparatively very high than countries from which these products are imported, eventually making the local products very expensive.
- **Discontinuous Power Supply:** Large scale manufacturing units require long-hour un-interrupted supply for proper functioning of their machinery (even up to 24 hours in many cases) and since this smooth supply is not provided, it eventually results in equipment failure and low-productivity.
- **Material:**
- **Industry Academia Linkage:** Academia in Pakistan is coming up with very innovative technology solutions as well as financial models, however, there is a

distrust as well as knowledge/capacity gap between both stakeholders for a collaborative working.

Security Threats and Project Development and Regulatory Delays

Currently, Pakistan's has a vast solar potential across Balochistan, however, due to **regional security issues**, any local or foreign investments in the region **require sovereign guarantees**. This has limited the required development for off-take of renewable energy resources.

Secondly, the private sector is facing the challenges of **delayed regulatory approvals**, payment delays due to **pricing adjustments**, mainly resulting from the multi-window operations.

Decarbonization Challenges and Targets beyond the Power Sector

While the power sector contributes to around 30% emissions from the energy sector, most targets for decarbonization of energy sector are mainly revolving around it. No **decarbonization measures are taken for the Industrial Sector** while the targets for E-mobility have a well-known disagreement between different stakeholders. Some of these challenges are coming from:

- Absence of an Emission Accounting Mechanism for the corporate sector.
- Absence of a sub-sectoral GHG inventory.

SECTION-II: KEY IMPLEMENTABLE ACTIONS AND THE WAY FORWARD FOR PAKISTAN IN SHORT AND LONG-TERM

Policy instruments to Support the Renewable Energy Generation

Given that the cost of renewable energy technologies is constantly decreasing and as per the latest tariffs of NEPRA, solar and wind are the cheapest source of electricity generation, a rapid off-take of these technologies would require policy and regulatory support through following:

- Developing **Renewable Energy Portfolio Standards (REPS)** & Renewable Energy Generation Standards (REGS).
- Implementation of **Renewable Energy based Auction** to reduce the cost of electricity.

Policy Alignment and Consistency

Policy landscape needs to transition from a reactive approach, addressing short-term solutions to a bottom-up approach with long-term goals and consistent policy targets having consensus of all relevant stakeholders. Key implementable actions in this regard include:

- Upcoming iterations of **IGCEP to be aligned with ARE Policy** goals.
- Social and environmental cost of large hydro power to be incorporated in the least-cost planning process.
- Consensus of all relevant agencies (MoE, NEPRA, PPIB, AEDB, NTDC, and CPPA) on **implementation mechanism of CTBCM**.
- MoCC and EDB to form a **consensus on penetration targets for Electric vehicles** and provide regulatory measures (with a consensus) which can then be approved under the upcoming financial bills.
- Energy efficiency measures and goals of Industrial decarbonization to be incorporated in Pakistan's Updated NDCs.

Integrated Energy Planning (IEP)

For an inclusive energy planning process, there is a need to develop an integrated energy plan prescribing the whole energy value chain (from supply of all energy sources to energy consumption in all sectors and subsectors) with inputs from all key stakeholders. This would require the following:

1. Publicly available **data repositories** for supply and demand sectors.

2. An **optimized plan** based on **Energy, Economic and Climate modeling**, not only for policy makers, but also for the private sector & corporates to base their decision making on a sound analysis.

Fast Tracking the Rural Support through Decentralized Energy Systems

While extending the national grid in far fetched areas is not financially feasible, there is a need to further expand the energy access through decentralized energy systems which may include the following:

- Upscaling of the **community driven Mini and Micro Grids** in rural areas with limited or no access to electricity. Extensive work in this area has been already carried out by PPAF, AKRSP around Solar and Mini Hydro grids. Similar models can be used to upscale them further.
- With growing energy demand and existing issues in energy management, there is a need to transition from a **centralized to decentralized power system** through extensive use of mini & micro grids.
- **Public Private Partnerships** to be upscaled for rapid electrification through decentralized energy models.
- To ensure provision of electricity and clean cooking to the rural communities, we need to **mobilize the window of regional cooperation**. This includes development of regional on/off-grid VRE solutions, regional electricity trade, transmission lines through **cross-border trade programs, and developing regional power markets and exchanges**.

Circular Debt Management Plan

To control constantly growing circular debt, there is a need to develop a Management Plan (or improve upon the existing one) under ministry of energy that focuses on the following key points:

1. All subsidies should be allocated within the budget i.e., **budgeted subsidies**.
2. Controlling electricity theft by strictly penalizing such cases and build capacity of the enforcement teams to ensure maximum recoveries.
3. Transition to a more **targeted subsidy model** for both electricity and petroleum products. This may include provision of these subsidies to direct households based on their yearly consumption and socio-economic profiles.
4. For power sector subsidies, there is a need to bring institutional reforms in the DISCOs through either corporatization or privatization. **DISCOs can also be made more localized** to get more flexibility to get into power generation where they can reduce the basket price.

Localization of Technology through R&D

To off-take local production and technological maturity within the country, there is an essential need for following interventions:

1. Provide an **enabling environment and financing opportunities** for the clean energy startups through concessional finance & low-interest payments.
2. Establishing **technology transfer units** within the country, aimed at promoting local solutions through knowledge and technology sharing from other countries.
3. Designing a common platform that **correlates the work of Academia with Industrial requirements**.

Energy Efficiency and Conservation in the Building Sector

Given that a unit of energy saved is much cheaper than a unit of energy produced, energy efficiency must be rapidly off taken in energy planning process of Pakistan. This mainly includes:

1. Energy efficiency **standards and labelling schemes** for major energy consuming devices in the building sector¹.
2. Ensuring the **compliance** of all new buildings and housing societies with **Pakistan's building energy codes**.
3. Special provision and demand management techniques to be included for controlling the air conditioning and cooling load during the winters.
4. Energy efficiency construction materials such as **AAC blocks and Rat traps** to be deployed in new buildings.

Energy Efficiency and Conservation in the Informal Industrial Sector

The major chunk of losses as well as emissions in the Industrial sector are coming from the informal SME sector which needs to be critically addressed through following:

1. NEECA and AEDB along with SMEDA should work in sync to address the issues of **industrial SMEs as a special sector**. SMEDA can initiate identifying and classifying businesses on technology and process.
2. **Develop internal benchmarks for different Industrial subsectors** in the country to analyze where that sector currently stands. These classified and identified subsectors may form special technical cells within their associations that could work jointly with Academia and other R&D organizations to bring technical solutions.

¹ Transition towards LEDs can serve as the successful case study in Pakistan.

3. Cooperation between AEDB and NEECA should focus on **incentivizing those SMEs that want to install solar solutions** to encourage them to first think about energy audits and energy optimization. This will help reduce consumption before the need for a higher investment in the energy supply.
4. **Spatial Guaranteed mechanism** could be developed in collaboration with SBP to support renewable financing for SMEs. SBP must also ensure the enforcement of its Green Banking Guidelines so that the commercial banking sector can effectively contribute to lending soft credits to the SMEs.
5. Development and implementation of a scheme to provide **support to ESCOs in conducting investment grade energy audits**.
6. Under the legal framework of NEECA's Act 2016, obligate industries to save energy, conduct energy audits, adopt Energy Management System (EnMS) and report on their energy performance

Decarbonization of the Corporate Sector

With the increasing decarbonization trend across the global corporate sector, Pakistan must incorporate these practices in its processes. To mobilize this demand for the corporate sector, following key interventions can be taken:

1. To generate financing and demand for clean energy from the corporate sector, we need to implement the **policy and regulatory tools such as Carbon Taxation, Tax rebates, ESG reporting**, and power wheeling mechanisms.
2. Develop a **structured accounting mechanism** for carbon emissions at a national level, which must define how companies can evaluate and document themselves.
3. For production facilities, MoCC **can develop a GHG inventory** with data available for each sector (Textile, Cement, etc.) that can provide a quantification of their emissions per unit of their productions.
4. Along with renewable energy adoption, the Industrial sector must develop its **capacity around energy storage devices**. This would also cater for an upcoming challenge of handling solar waste after 25 years.
5. Along with progress in EE and clean fuels, Pakistan must **tap into the voluntary carbon credit market** while it is being deployed across the globe to incentivize interventions that reduce global GHG emissions.