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In the compilation of this information, the research team relies on secondary information published by the government and credible non-government sources. Additionally, we also rely on public-private dialogues, and interviews with the relevant stakeholders and public-private dialogues. In the coming days, we hope to increase such interaction with stakeholders to better address some of their concerns. These efforts are ultimately envisaged to bring about a smooth clean energy transition in Pakistan with availability and affordability of all types of consumers. The views expressed here by the research team are their own and do not necessarily reflect SDPIs' point-of-view

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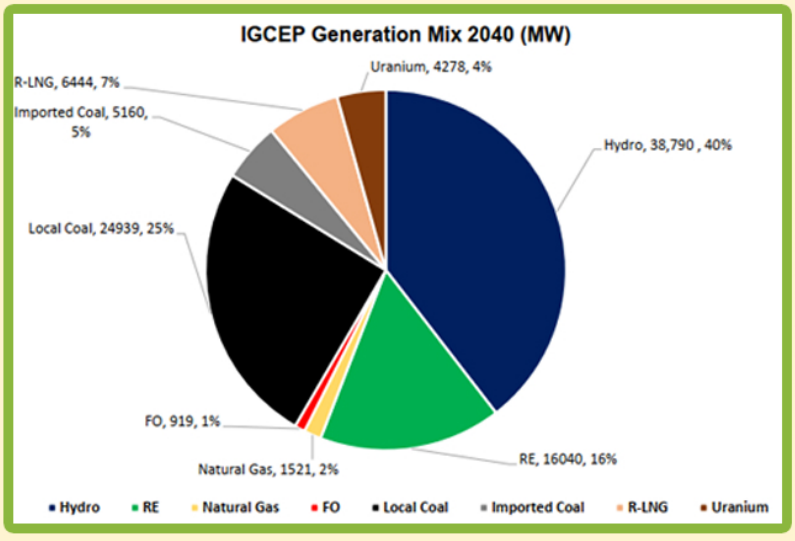
Pakistan's Way Forward towards a Green Economy
Perspectives for a Clean Energy Transition

Pakistan is still relying on thermal resources for fulfilling almost 70% of its energy needs. Now, as of today, Pakistan is not a high emitter of CO2 like India or China. As per the IMF, Pakistan's import bills for 2017-18 was $14.6 billion, which in 2019-20 reached to around $17 Billion. The energy sector of Pakistan was also hit due to a global pandemic (COVID 19). In 2020, the oil market crashed due to some geopolitical reasons and the significant drop in demand due to imposed lockdowns across the world.

Pakistan's NDC expects to reduce 20% emissions below BAU scenario by the year 2030. Government objective is to reduce the reliance on fossil fuels imports, increase renewable energy share, diversify the fuel resources, and increase fuel supply security.

Policy Indicative Generation Capacity Expansion Plan (IGCEP) 2047 is another comprehensive study presented by NTDC, which presents the future electricity demand forecast and a future capacity expansion plan from year 2018 till 2040.



Pakistan's Energy demand & supply:

RENEWABLES 2.4%

Pakistan is increasing the installed capacity. Some plants are under construction and some are yet to come. Energy sector's major focus is towards generation end, but the transmission and distribution sector is being neglected.

HYDROPOWER 30.9%

Hydropower share in a total generation has increased compared with the previous year and thermal power has the largest generation in the current energy mix. The share of electricity consumption in the household is 44.9% being the highest among all sectors.

THERMAL 58.4%

Pakistan is still relying on thermal resources for fulfilling almost 70% of its energy needs. The GHG emissions from this power sector are expected to increase depending on the types of investment the country makes.

NUCLEAR 8.2%

With no need of the fuel, renewable energy has major advantages over polluting and high-cost thermal coal power plants. Many of Pakistan's planned coal-fired power plants will need imported coal as fuel which has got more expensive with the devaluation of the rupee.

Energy Transition in Pakistan so far...

- PAKISTAN IN PARIS AGREEMENT
- China Pakistan Economic Corridor (CPEC)
- Pakistan-Qatar Long-term LNG contract
- Pakistan's Commitment to Sustainable Energy for all (SE4All)
- CENTRAL ASIA-SOUTH ASIA POWER PROJECT
- TURKMENISTAN-AFGHANISTAN -PAKISTAN GAS PIPELINE PROJECT:
- Pakistan-Iran Gas Pipeline Project

POLICY RECOMMENDATIONS AND WAY FORWARD

Increasing the share of renewables in country's energy mix has been the most effective and challenging pathway for improving environment quality and ensuring a sustained economic growth. This requires major policy shifts and reforms necessary to support the clean energy transition in Pakistan. Some diverse approaches for improvement and, the common measures that could be taken are:

• Role of Private sector for enhancing transmission infrastructure

It serves as a feasible solution for grid handling. Renewable development should concise national grid development plans.

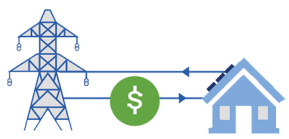
• Renewable Energy Zoning

PPIB must focus on involving the private sector in building infrastructure for transmission lines.

• Mini and Micro Grids

Stand alone and decentralized systems such as mini and micro grids can be developed for overcoming the economic barrier.

• Feed in Tariffs



This approach creates the healthy competition among electricity generators. It ensures compensation to the renewable electricity producers at a fixed rate over a specific period of time.

Government organizations can boost efficiency and advancement of renewable energy projects by sharing information apparently and coordinating efforts sensibly. If institutions work together, they can collectively add unique expertise and intuitions that will help both in achieving the common objectives. In order to handle the energy-related issues in Pakistan, this process will apparently make more refining policies available

Green Energy transition guidance for CPEC

A portion of CPEC is already focussed on renewables since both China and Pakistan are aware of the detrimental impacts of coal. In the long term plan, it has already been stated that in future, RE will be the major investment area. Along with coal, even the current focus of CPEC is on renewables such as solar, wind, and hydro. Suki Kinari is worth $ 1.8 billion with a capacity of around 870 MW. Construction of Karot hydropower is also on way, which will be able to produce around 720 MW of power.

CPEC
China Pakistan Economic Corridor

Role of Nuclear and hydrogen based economy

Although dependence of Pakistan on nuclear power is very low, still Pakistan signed a contract with IAEA to ensure the safety of these nuclear plants. the emissions from these plants are very low, their economics have made them a rather unattractive alternate in the eyes of policy makers.

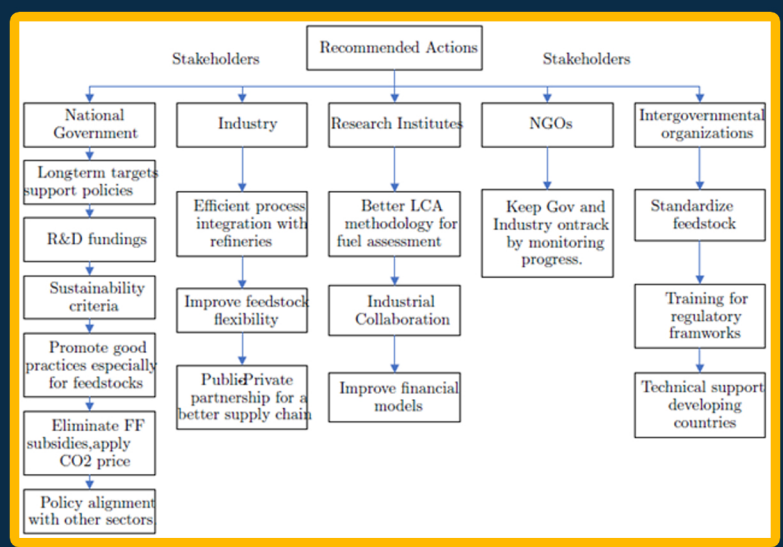
Hydrogen can be produced, transported, and stored in different ways that even involve renewables. Looking at the long term, hydrogen can be a very cheap alternative, especially when there is a need to store energy even for months. IEA predicts that the cost of hydrogen based power will decline by 30% till 2030. Hydrogen can replace natural gas as a fuel, by starting from small proportions (say

• An integrated Energy Plan

Provinces have power to develop their own power policies which generates a develop to develop an integrated plan that can generate the most feasible outlook while at the same time concentrating on the financial constraints and the NDCs. This process will further prioritize the technologies, and will identify the most appropriate locations for installing the renewable plants.

• Stakeholder Involvement

Policy formulations at each level must involve all the relevant stakeholders ranging from the local community to national government. Various tasks where each of the stakeholder can assist is shown in the figure below:



Enhancing Green trade policies and Technology transfer

- Green trade policies and technology transfer from developed to developing countries has appeared to be the most effective pathway to ensure an efficient technology conversion and resource harnessing.

- Renewables should be subsidized and use of carbon emitting must be discouraged since they adversely affect the environment quality and trade balance.

- Actions that promote LCT absorption, use and production—such as investments in human capital, infrastructure and firms—also benefit entire economies. It is possible to limit global warming with existing LCT—provided it is deployed on a massive scale to developing countries."

- Mass deployment of existing technology in just four sectors—energy, industry, transport and buildings—can account for two-thirds of the emissions reductions needed by 2030.

- Policies to promote technology transfer using LCT by creating demand for LCT products and encourage innovation through domestic policies such as subsidies, public procurement and financing; reducing trade restrictions and formalize processes.

- Responsible and committed investments in human capital, infrastructure and financial markets to increase a country's ability to absorb and use technology

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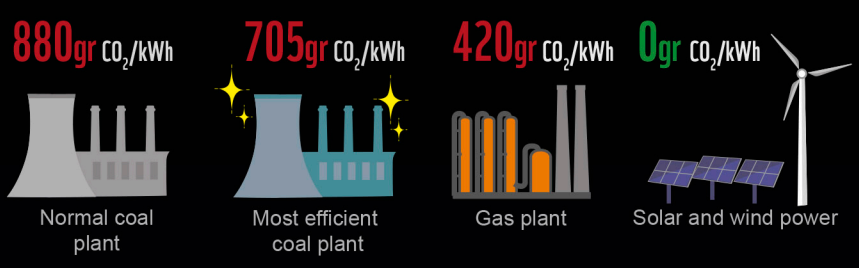
PROSPECTS OF COAL VS RE INVESTMENT

RE investments will provide long term benefits considering many social, economic, and environmental benefits. But a diverse energy mix and self energy reliance using Thar coal can also build a financially affordable energy sector.

Given Pakistan's rapid increase in energy demand due to urbanization, industrialization, and population growth.

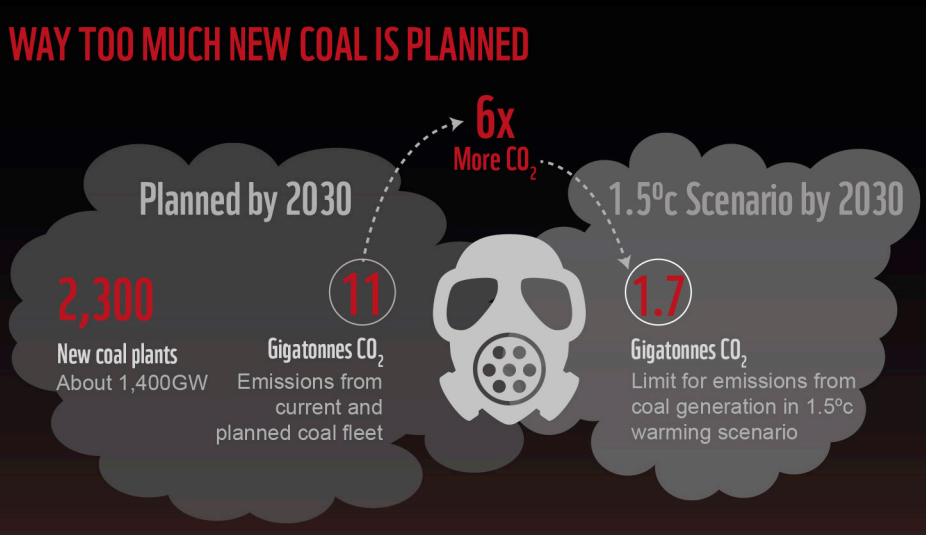
Prospects of Coal vs RE Investment

Constant increase in coal power in Pakistan is against the word trend where even major coal-dependent economies like China and India are moving away from it in near time. Pakistan has good potential for both solar and wind. Especially the south-east region of Thar, there is a major solar potential, while the area is currently focussing on providing supplies to coal based plants. Although at this stage, most policy makers recommend that coal is a necessity since it provides a pipeline for making investments for renewables in the time to come where the prices will be even more cheaper.



REGULATORY POLICIES

- Setting renewable portfolio standards (RPSs) which must state that a certain percentage of total electricity must be generated through renewables.
- Tradable certificate schemes in which each generator can buy or purchase a set of certificates, This must also be supported by strictly penalizing the non-compliance.
- For increasing the bankability of RE projects, Feed in tariff (FIT) and Feed in premium (FIPs) have been encouraged worldwide.
- Auctions have also been used by many countries to bring transparency and commitment in any RE project.
- Decentralize solutions have lower cost and wait times as compared to grid extension projects, and are more sustainable.
- Along with the above-mentioned regulatory framework, non-regulatory policies must also work along. This includes providing tax incentives, providing capital grants and



...INCOMPATIBLE WITH THE 1.5°c LIMIT, WHATEVER ITS EFFICIENCY.
...A CLIMATE KILLER

Greening CPEC:

- Public and private investments and interventions should be made for the provisioning of water services and water resource management.
- Integrated Water Resources Management (IWRM) must be adopted with an objective of scaling the implementation of ecosystem-based technologies for effective water management.
- Sustainable land management practices must be adopted to control land degradation caused by mining activities to enhance productivity of other ecosystems and services
- Gender-based equality and women's empowerment initiatives must be brought into mainstream discourse and action. This is critical to the success of regional development.
- Groundwater management strategies should be developed, including improved environmental standards in the extractive sector and governance using regulatory and incentive-based tool
- Both countries must formulate environmental policies related to the foreign investments in energy projects of CPEC