Chapter 14

Energy

The use of energy has increased significantly due to various inventions and innovations of common use made in last century. Thus almost all human activities have become more dependent on energy. For developing nations in particular, there is fundamental need for reliable and affordable energy. In these countries, energy demand has been increased due to expansion in industry, modernized agriculture, increased trade and improved transportation. Pakistan is dependent on energy imports because there is lack of investment in indigenous resources of hydro, natural gas and lignite. Biomass is the largest energy source. The government has decided to stop building new coal-fired power plants because of environmental issues. The public oil and gas companies are planned to be privatized for various concerns. Due to significant increase in electricity demand, both state-owned companies and IPPs are actively engaged in producing electricity. However, fiscal sustainability has become a challenge due to increase in energy payments. This energy deficiency began from a fuel mix transformation which was initiated two decades ago, when power generation used to rely more on imported furnace oil than hydropower. The current energy crisis began to manifest itself by late 2007. The problem has evolved over the years from one of chronic power supply deficits to one where there is excess installed capacity but not enough cash flow in the system to run it. The latter created 'circular debt' issue. Specifically, the 'circular debt' in Pakistan's energy supply chain refers to the cash flow shortfall incurred in the power sector from the delayed/non-payment of obligations by consumers, distribution companies and the government. It has continued to grow in size over the years, rising from 1.6 percent of GDP (Rs161billion) in 2008, to 5.2 percent of GDP (Rs 2,150 billion) in June 2020. The present government has given prime importance to resolve this issue and working on various options to reduce circular debt.

In terms of energy-mix, Pakistan's reliance on thermal which includes imported coal, local coal, RLNG and natural gas has been decreasing over last few years. Pakistan's dependence on natural gas in the overall energy mix is on decline and the reduction of its share in the energy mix is due to declining natural gas reserves and introduction of LNG. The share of renewable energy has steadily increased over the years. The government is also taking measures to increase the shares of Hydel and Nuclear in energy-mix.

Energy systems around the world are going through rapid transitions that will bring significant changes to the way we fuel our cars, heat our houses and power our industries. These trends will have widespread implications for businesses, governments and individuals in the coming decades. In Pakistan, special measures have been taken to

use these innovations for domestic usage of energy, such as Electrical Vehicle Policy 2020-25.

Pakistan's Electricity Generation Capacity and Energy Mix

The hydro share in total electricity generation has declined in FY2021 as compared to its share in FY2020. Currently, thermal has the largest share in electricity generation. Moreover, its percentage share in FY2021 has increased as compared to FY2020. Significant growth of RLNG usage in energy mix has helped for improved supply to various power plants. RLNG is also supplied to fertilizer plants, industrial and transport sectors. The comparison of share of different sources of electricity's installed and generation capacity is given below:

Table 14.1: Fuel-wise Installed Capacity Breakup

	Installed (MW)	Percentage Share
Hydel	9,874.0	26.00
RLNG	7,325.0	19.66
RFO	6,274.0	16.84
COAL	4,770.0	12.80
Gas	4,529.0	12.15
Nuclear	2,490.0	6.68
Wind	1,235.0	3.31
Solar	400.0	1.07
Bagasse	364.0	0.98
Total	37,261.0	100.00

Source: Ministry of Energy, (Power Division)

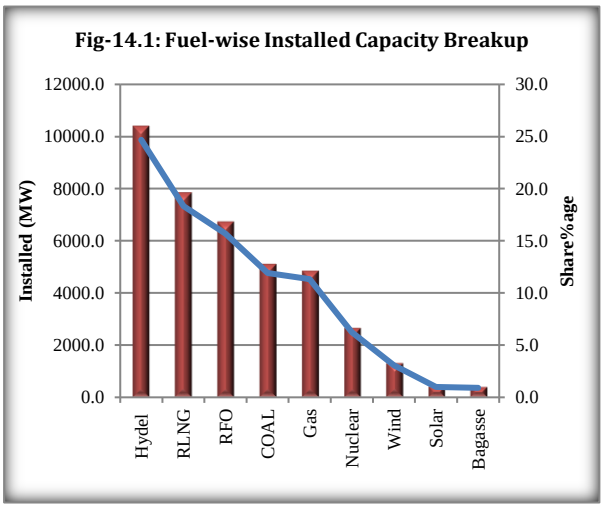


Table 14.2: Installed Capacity

	2019-20 (July-April)	2020-21 (July-April)
Installed Capacity (MW)	35,972	37,261

Source: Ministry of Energy, (Power Division)

Till April, FY2021, installed capacity of electricity has reached 37,261 MW, posting a growth of 3.6 percent.

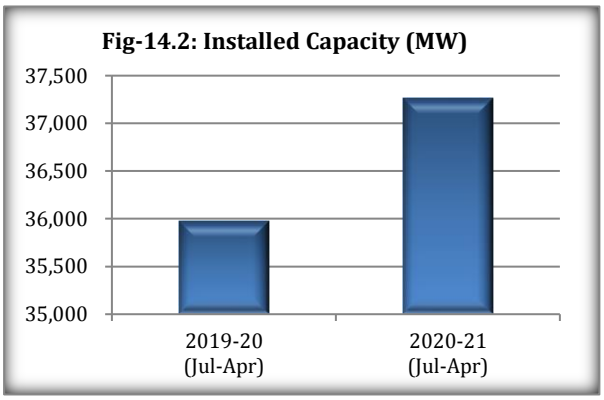
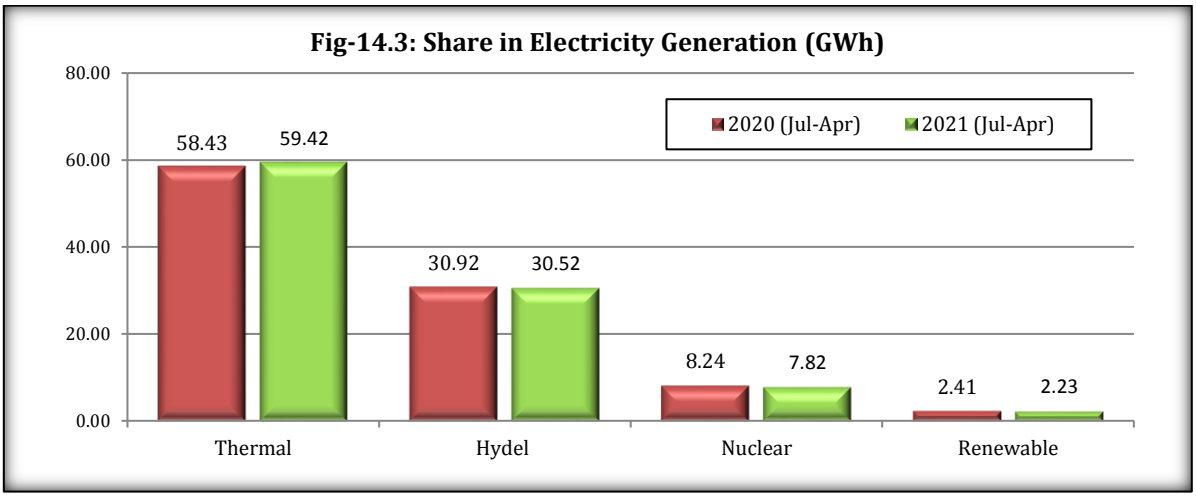


Table 14.3: Share in Electricity Generation (GWh)				**Percentage Share**	
	2019 (July-April)	**2020 (July-April)**	**2021 (July-April)**	**2020 (July-April)**	**2021 (July-April)**
Thermal	61,003	56,320	61,052	58.43	59.42
Hydel	24,931	29,799	31,357	30.92	30.52
Nuclear	2,903	7,941	8,038	8.24	7.82
Renewable	7,955	2,322	2,294	2.41	2.23
Total	96,792	96,382	102,742	100.0	100.0

Source: Ministry of Energy, (Power Division)



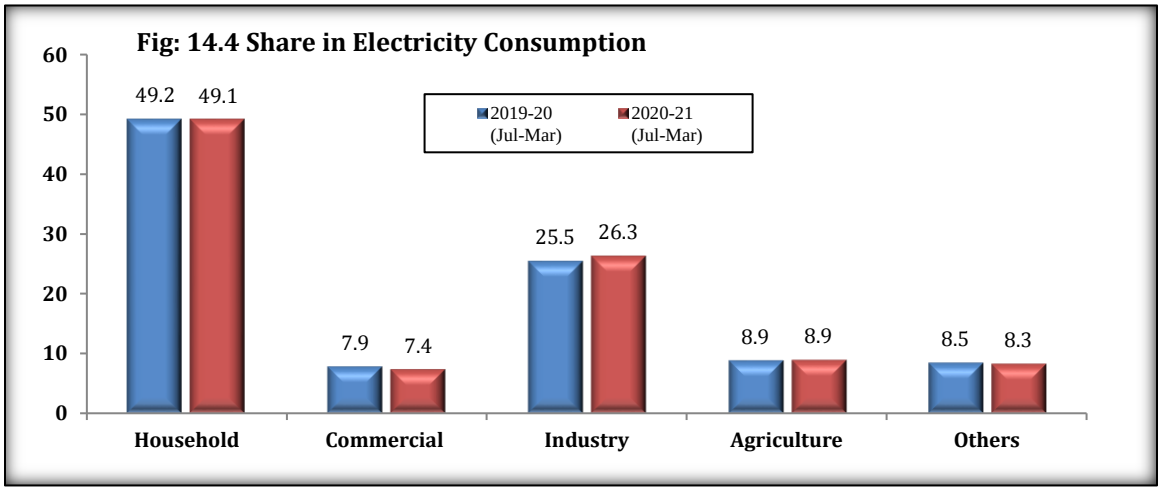
Electricity Consumption

There is no considerable change in the consumption pattern of electricity. During July-April FY2021, the share of agriculture in electricity consumption is constant. However, the share of Industry in electricity consumption has increased which shows revival of economic activities. The comparison between consumption patterns of electricity during July-March 2021 with corresponding period last year is shown below:

Table 14.4: Share in Electricity Consumption

Sector	UNITS SOLD (GWh)		%Share	
	2019-20 (July-March)	2020-21 (July-March)	2019-20 (July-March)	2020-21 (July-March)
Household	39,461	41,508	49.2	49.1
Commercial	6,313	6,246	7.9	7.4
Industry	20,461	22,280	25.5	26.3
Agriculture	7,127	7,558	8.9	8.9
Others	6,825	7,008	8.5	8.3
Grand Total	80,187	84,600	100	100

Source: Hydrocarbon Development Index of Pakistan



NEPRA has extended advice to the concerned entities, including Federal/ Provincial Governments, on various power sector issues. NEPRA also established Occupational Health, Safety & Environment (HSE) Department to enhance the safe and smooth operations and well-being of licensee employees, contractors and community as a whole. NEPRA has also established Corporate Social Responsibility (CSR) Department to streamline CSR initiatives taken by licensees for people within their organization and for the communities within they operate.

NEPRA issued an advisory to ensure following issues to help DISCOs in achieving better service delivery:

- Fully utilize investments as allowed by NEPRA so that new and critical projects are initiated and completed in time
- Install 100% metering at all levels to trace flow of electricity top-down;
- Elimination of electricity theft and billing through prepaid and postpaid initiatives;
- Engage law enforcement agencies with DISCOs to control theft and for the enforcement of disconnection order;

Oil Sector

Crude oil's local extraction and imports reached to 68.9 million barrels in Jul-Mar 2021 from 58.6 million barrel in corresponding period last year, while share of import in July-March 2021 remained 48.2 million barrel as compared to 38.8 million barrel in last year same period. Similarly in Jul-Mar 2021, consumption of petroleum products increased to 14.7 million ton from 12.5 million ton in period under discussion. Oil storage of 38,579 metric tons added in the country's logistics during the period of Jul-Mar, 2021 at the cost of Rs.5,786.8 million. Four licenses for construction and one license for operation of Lube Oil Blending, Reclamation and Grease Plants were issued. Five licenses for setting up Lubricant Marketing Company (LMC) and three Operational licenses for LMCs were also issued. These provisions of licenses will enhance the domestic supply of crude oil and will decrease import bill.

GAS Sector

Natural Gas is a clean, safe, efficient and environment friendly fuel. Its indigenous supplies contribute about 35 percent in the primary energy supply mix of the country. Pakistan has an extensive gas network of over 13,315 KM Transmission 149,715 KM Distribution and 39,612 KM services gas pipelines to cater for the requirement of more than 10.3 million consumers across the country. The Government of Pakistan is pursuing policies for enhancing indigenous gas production as well as imported gas to meet the increasing demand of energy in the country. At present, the capacity of two Floating Re-gasification Storage Units (FRSU) for Re-gasified Liquefied Natural Gas (RLNG) is 1200 MMCFD and accordingly RLNG is being imported to mitigate gas demand-supply shortfall. The average natural gas consumption was about 3,723 Million Cubic Feet per day (MMCFD) including 950 MMCFD volume of RLNG during July-Feb 2021. During July-Feb 2021, the two gas utility companies (SNGPL & SSGCL) have laid 143 Km Gas Transmission network, 2,616 Km Distribution and 886 Km Services lines and connected

70 villages/towns to the gas network. During the period 304,573 additional gas connections including 303,243 Domestic, 1,020 Commercial and 310 Industrial connections were provided across the country.

It is expected that gas will be supplied to approximately 524,000 new consumers (this target is subject to approval/revision by OGRA) during the fiscal year 2021-22. Gas utility companies have planned to invest Rs. 17,571 million on transmission projects, Rs. 91,812 million on distribution projects and Rs. 3,156 million on other projects bringing the total investment of Rs. 112,539 million during the fiscal year 2021-22.

Table14.5 : Sector Wise Natural Gas Consumption In million Cubic Feet Per Day (MMCFD)

Sector	Gas Consumption in MMCFD	RLNG (Bcfd)	Total
Power	610	578	**1,188**
Household	915	-	**915**
Commercial	65	8	**73**
Transport (CNG)	63	47	**110**
Fertilizer	687	37	**724**
General Industry	433	280	**713**
Total	**2,773**	**950**	**3,723**

Source: Ministry of Energy (Petroleum Division, Policy Wing)

Table 14.6 Gas Transmission Augmentation Projects

S. No	Project Description	Commissioning Date
1	**Installation of one (01) New Gas Turbine Driven Centrifugal Compressor at Shikarpur** In order to cater the natural gas requirement at Balochistan and Quetta, SSGCL has successfully installed one turbo compressor unit of 200 Mmcfd capacity at Shikarpur. The main objective of this project is to meet the requirement during winter season.	November 2020
2	**30" Diameter x 17 Km Pipeline from CTS Bin Qasim to Pakland** In order to enhance the pipeline capacity of RLNG from 1.2 Bcfd to 1.8 Bcfd, a 30" diameter x 17 Km pipeline has been laid from CTS Bin Qasim to Pakland in addition to already existing 42" Dia pipeline.	December 2020

Source: Ministry of Energy (Petroleum Division, Policy Wing)

Table 14.7 Gas Projects in progress

1	**24" Diameter X 31 KMs Pipeline from ACPL to Surjani** In order to cater the low pressure problem in West end of Karachi & S.I.T.E industrial area, 24" diameter x 31 Km pipeline has been planned for transporting 100 MMcfd additional gas to aforesaid area of Karachi.
2	**12" Diameter X 9 KMs Pipeline from SMS Pakland to SMS Dhabeji for Special Economic Zone** This project is being executed in order to supply 13.5 MMscfd volumes of gas to Dhabeji Special Economic Zone.

Source: Ministry of Energy (Petroleum Division, Policy Wing)

Liquefied Petroleum Gas Sector

Liquefied Petroleum Gas (LPG) plays an important role in the energy mix of Pakistan as it provides a cleaner alternative to biomass based sources, especially in locations where

natural gas is not available. The total supply of LPG during July–March, 2021 was 927,683 metric tons. Currently there are 11 LPG producers and 216 LPG marketing companies operating in the country having more than 7,000 authorized distributors.

OGRA has simplified the procedure for grant of LPG license and the same is granted on fast track basis once the requirements are met / complied. During July–March, 2020-21, one (01) license for construction of LPG production facility, nine (09) licenses for operation of LPG Storage & Filling Plants and twenty (20) licenses for construction of LPG Storage and Filling plants were issued. In addition, OGRA has also issued five (05) licenses for construction of LPG auto refueling stations and one (01) license for operation of LPG Auto Refueling Station during the same period.

Due to augmented investment and future expansion plans of the LPG marketing companies, significant investment in LPG supply and distribution infrastructure has been witnessed. OGRA has made significant contribution in national economic progress and created an environment for additional investment which will not only result in creation of infrastructure in LPG sector all over the country but will also provide jobs to hundreds of unemployed people. OGRA is playing its vital regulatory role to increase private investment in midstream and downstream petroleum industry. During July–March, 2021 an investment of approximately Rs. 17.08 billion has been made in LPG infrastructure.

Liquefied Natural Gas Sector

As of March 2021, two (02) Operational and five (05) Provisional Licenses pertaining to LNG regulated activities have been issued by OGRA which are valid and in-force. Two Provisional Licenses holders for LNG projects i.e. Energas Terminal (Private) Limited (ETPL) and Tabeer Energy (Private) Limited (TEPL) applied for the next stage of licensing i.e. construction license. Moreover, Daewoo Gas (Private) Limited (DGPL) and LNG Easy (Private) Limited have been granted provisional licenses during the period under reference for virtual pipeline projects. In addition to the above, OGRA has drafted LNG Terminal Access Rules and LNG Terminal Access Code during the period under reference. These rules are expected to play a pivotal role in liberalization of LNG market and shall also promote development of a competitive gas market by ensuring uniform principles of transparency, fair and non-discriminatory practices in all transactions concerning use of LNG terminals and ensuring safe and reliable supply of gas thus participating in economic growth.

Compressed Natural Gas (CNG) Sector

There has been a ban on issuance of new CNG License(s) since 2008 and therefore OGRA did not issue any new CNG License(s). However, the government has permitted issuance of CNG License(s) on RLNG basis only in October 2020.

Nuclear Energy

Pakistan Atomic Energy Commission (PAEC) is the only utility engaged in generation of electricity through nuclear power in Pakistan. In performing its functions, it undertakes planning, construction, operation, radioactive waste management and decommissioning

of all its nuclear power plants. The electricity produced by the operating Nuclear Power Plants (NPPs) of PAEC is delivered to its clients, namely K Electric in Karachi and Central Power Purchasing Agency (CPPA) in the rest of the country.

There are six nuclear power plants operating on two sites in the country, two units namely Karachi Nuclear Power Plant (KANUPP) at Karachi and four units of Chashma Nuclear Power Plants (C-1, C-2, C-3 & C-4) at Chashma (Mianwali District of Punjab Province). The gross capacity of these five nuclear power plants is 2,530 MW that supplied about 7,076 million units of electricity to the national grid during 1st July 2020 to 31st March 2021.

KANUPP, the oldest of the lot has surpassed its design life of 30 years and has completed 49 years of safe and successful operation. PNRA relicensed the plant after expiry of its design life and put a cap on thermal power as well as electrical power. KANUPP was allowed to operate at a maximum power of 90 MW. The second unit at Karachi (K-2) was connected to grid on 18th March 2021. The four units of Chashma are amongst the best performing electricity generating plants in the country, in terms of endurance and availability. Two of these plants, C-2 and C-4 made national records of continuous longest operation for over one year. Some performance parameters of these plants are presented in the following table:

Table14.8: PAEC's Performance Parameters

Plant	Capacity (MW)		Electricity sent to Grid (Million kWh)	
	Gross	Net	1st July 2020 to 31st March 2021	Lifetime up to 31st March 2021
KANUPP	100	90	162	14,871
C-1	325	300	1,929	41,742
C-2	325	300	1,466	22,328
C-3	340	315	1,723	10,355
C-4	340	315	1,774	8,358
K-2	1,100	1,071	22	22

Source: Pakistan Atomic Energy Commission

One more unit with gross capacity of 1,100 MW is currently under construction near the KANUPP site in Karachi, the Karachi Nuclear Power Plants (K-3). Cold functional tests for K-3 are in progress. K-3 plants are expected to become operational in 2022. PAEC has undertaken construction of another nuclear power plant at Chashma near Mianwali. The site already is home to four operating nuclear plants. This unit will be called C-5 and it will replicate the design characteristics of K-2 and K-3. As per requirement of Environment Protection Agency (EPA), Punjab, public hearing of Environment Impact Assessment Report of C-5 was arranged at Chashma site in September 2020. Punjab EPA has issued the NOC.

PAEC has intensified its activities to meet the nuclear electricity generation target of 8,800 MW by the year 2030 set through government's Energy Security Plan formulated in 2005. Completion of K-2/K-3 project will be a big step that will bring PAEC 2,200 MW closer to achieving this target. PAEC is planning to develop additional sites to house more nuclear power plants in the future and sites identified throughout the country.

These sites are investigated and acquired for future development. Ample technical and engineering infrastructure is already in place to support both the existing and the under construction nuclear power plants. Skilled labor is being produced regularly by Indigenous institutes, imparting state of the art training and education in all relevant disciplines and at all levels, from technical trainings to academic programs. These instruments are enough to successfully support the foreseeable future ambitions envisioned by PAEC for the future nuclear power program of Pakistan.

Mineral Sector

As per constitutional provisions, the Federal Government is mandated with geological surveys and regulation of mineral oil, natural gas and mineral necessary for generation of nuclear energy and those occurring in federally, controlled areas, national policy formulation, facilitation and coordination at national and international levels. All other minerals are Provincial subject and the executively and legislatively authority for regulating the development and exploitation of these natural resources through grant of mineral titles (prospecting/exploration licenses & mining leases) etc. The country is blessed with 92 minerals, out of which 50 are exploited on commercial basis. Following initiatives/achievements have been undertaken by the Petroleum Division for the uplift of mineral sector of Pakistan;

i) Baluchistan Minerals Exploration Company Limited (BMEC) has been established as joint venture with the Provincial Government in August 2020 to promote large-scale mining in the mineral rich province of Baluchistan.

ii) An investment facilitation project "Establishment of National Minerals Data Center (NMDC)" has been launched at federal level through PSDP at cost of Rs 295.000 million to maintain data repository encompassing the available geo-technical data and administrative details about licensing - granted mineral tiles and the areas applied for mining concessions. The NMDC will comprise an integrated system of the units located in each province and other concerned organizations (GSP etc.) connected to a Central setup managed by the Mineral Wing of Petroleum Division. This arrangement would enable ready access to the basic data required by the prospective investors and would facilitate the investors in a big way.

iii) Another initiative has been taken through PSDP "Legal Consultancy Services for Drafting of Model Mineral Agreement and formulation of uniform regulatory regime" at cost of Rs 100.000 million to facilitate introduction of an internationally competitive regulatory and institutional framework in the country in the light of best industry practices.

iv) Action is underway for revamping of Pakistan Mineral Development Corporation (PMDC) and restructuring of Geological Survey of Pakistan (GSP) for better service delivery to help exploration and development of indigenous mineral resources.

v) Stakeholders' consultation process initiated for formulation of policy framework to promote use of indigenous coal resources for synthesis of gas and liquid fuels.

vi) Services extended for special development packages introduced by the Federal Government for minerals sector of Baluchistan and Gilgit-Baltistan.

vii) Continued support to facilitate smooth operation of mineral sector projects - Saindak Copper-Gold (Saindak Metals Limited), Duddar Lead-Zinc (MCC Huaye Duddar Mining Company), Barite-Lead-Zinc (Bolan Mining Enterprises), Chiniot Iron Ore (Punjab Mineral Company) and mining projects of rock salt and coal.

Coal is still used as source of energy production; however, its share is 12.8% in total installed capacity. The province wise coal production along with its import is given below:

Table 14.9: COAL Production

Sr. No.	Province	FY2020	FY2021 (July to Feb)
1.	Balochistan	3,086,576	2,060,624
2.	Sindh	4,414,296	3,747,144
3.	Punjab	1,072,120	526,190
4.	Khyber Pakhtunkhwa	257,240	41,212
5.	AJ&K	272	205
6.	Import	16,421,787	12,183,161
	Total	**25,252,291**	**18,558,536**

Source: Ministry of Energy (Petroleum Division, Mineral Wing)

Renewable Sector

The Government of Pakistan is emphasizing on utilization of indigenous and environmentally clean energy generation resources. The government has made Alternative Energy Development Board (AEDB) responsible for renewable energy sector. In this regard, the promotion of alternative and renewable technologies is amongst the top priorities of the government. Several initiatives have been taken to create conducive environment for the sustainable growth of Alternative Renewable Energy (ARE) Sector in Pakistan in order to harness the potential of indigenous renewable energy resources.

Development of IPP Based Projects

The development of large-scale grid connected on ARE based power generation projects are being pursued through private investors. Under the vision of the current Government to exploit clean energy resources and increase the share of ARE in the energy mix, the Cabinet Committee on Energy (CCOE) had allowed implementation of projects that had already achieved significant milestones of project development by placing them into following three categories;

- Category-1: 19 projects of 531 MW that have already been issued Letter of Support (LOS) subject to revision of tariff in case tariff determination has been done since more than one year or if the tariff validity period has lapsed
- Category-II: 24 projects of 1339.3 MW that have acquired tariff and generation license subject to revision of tariff in case tariff determination has been done since more than one year or if the tariff validity period has lapsed

- Category-III: 110 projects of 6707 MW cumulative capacity holding LOIs to be allowed to proceed ahead after becoming successful in a competitive bidding to be undertaken as per demand communicated by NTDC.

AEDB has actively been facilitating the said projects as per the criterion set by the CCOE. Four (04) solar PV projects, listed under Category-II have been facilitated to achieve Financial Closing in February, 2021. The projects will be completed by December 2021.

AEDB has prepared the Request for Proposals (RFP) for carrying out competitive bidding for wind and solar projects falling under category-III. The RFP package was considered by NEPRA in Feb 2021 and directed AEDB to make certain changes in RFP and submit revised RFP after AEDB Board approval. AEDB has revised the RFP documents as per NEPRA's directions. Security Documents (EPA & IA) have also been revised in view of NEPRA's observations. RFP Packages are ready to be floated upon receipt of information pertaining to IRZs and total evacuation capacity/ quantum by NTDC through the Indicative Generation Capacity Expansion Plan (IGCEP).

Alternative Renewable Energy Policy 2019

The Government announced a new ARE Policy 2019 in October 2020. The policy aims at creating a conducive environment supported by a robust framework for the sustainable growth of ARE Sector in Pakistan. The GOP's strategic objectives of energy security, affordability of electricity, availability for all, environmental protection, sustainable development, social equity and mitigation of climate change will further be harnessed under the ARE Policy 2019.

Salient features of the ARE Policy 2019 are as follows:

- The policy has an expanded scope encompassing all alternative and renewable energy sources, competitive procurement and addresses areas like distributed generation systems, off-grid solutions, B2B methodologies and rural energy services.
- The policy is target oriented and sets a target of achieving 20% on-grid capacity from ARE technologies by 2025 and 30% capacity by 2030.
- It envisages development of large scale ARE projects in all parts of the country through active participation of the provinces.
- Indicative Generation Capacity Expansion Plan (IGCEP) outputs will form the basis of all on-grid capacity procurements.
- Provinces are part of the Steering Committee envisaged in the policy that will be carrying out the planning of annual ARE induction. Provincial energy departments will be carrying out competitive bidding process as per the annual ARE procurement plan approved by the AEDB on recommendations of the Steering Committee.
- The most significant feature of the policy is that it makes a transition from the traditional methods of procurement based on cost plus and upfront tariffs to competitive bidding. All new ARE projects specifically wind and solar power projects will be developed through competitive bidding.

- The policy envisages simplification and rationalization of the licensing framework for non-utility procurement to minimize regulatory fee, compliance cost and timeframes.

Distributed Generation (Net Metering)

Apart from large scale RE projects, the Government of Pakistan is also encouraging utilization of renewable energy technology at consumer ends across domestic, commercial, industrial sectors. AEDB has been promoting the renewable energy based net-metering deployments under the NEPRA (Alternative & Renewable Energy) Distributed Generation and Net Metering Regulations, 2015.

AEDB has also been carrying out certification of service providers / vendors / installers of solar systems under AEDB (Certification) Regulations, 2018 in order to facilitate the consumers, DISCOs and at the same time ensuring quality of service and equipment. AEDB issued certificates to sixty eight (68) service providers /vendors/installers during July 2020-March 2021. As of Mar 2021 the total number of active AEDB certified service providers /vendors/installers reached up to one hundred and four (104).

During the period of July 2020 to March 2021, a total of 5283 new licenses were issued by NPERA for net-metering based installation of approx. 90.15 MW. As of 31st March, 2021 a total of 10,563 generation licenses for net-metering based solar installations with a cumulative capacity of 181.27 MW had been issued by NEPRA.

Other Supportive Measures by AEDB

AEDB undertook a number of supportive measures in order to promote ARE technologies and to attract private sector investments. Some of the supportive measures taken by AEDB are as follows:

i. AEDB proactively facilitated the RE power projects in achieving their project milestones and resolution of issues and impediments faced by the project sponsors from different public sector entities.
ii. Assisted World Bank in study for analyzing the integration of variable renewable energy in the national grid with the objective of increasing the share of renewable energy in the energy mix of the country.
iii. Assisted World Bank in carrying out the Pakistan Renewable Energy Locational study that has the objective to identify the most suitable locations for VRE deployment in Pakistan to enable an informed strategic planning process of the imminent capacity ramp-up.
iv. AEDB proactively engaged with World Bank for carrying out the Pakistan Renewable Energy Competitive Bidding Study that will provide strategic analysis and advice to the AEDB and other relevant sector agencies on the implementation of competitive bidding for the contracting of Renewable Energy (RE) capacity to achieve the 2025 and 2030 targets in line with the Alternative Renewable Energy (ARE) Policy 2019.

v. Carried out stakeholder consultation for revision of AEDB (Certification) Regulations 2018 aimed to simply the procedures laid therein in order to ensure the implement the present Government's policy of Ease of Doing Business.

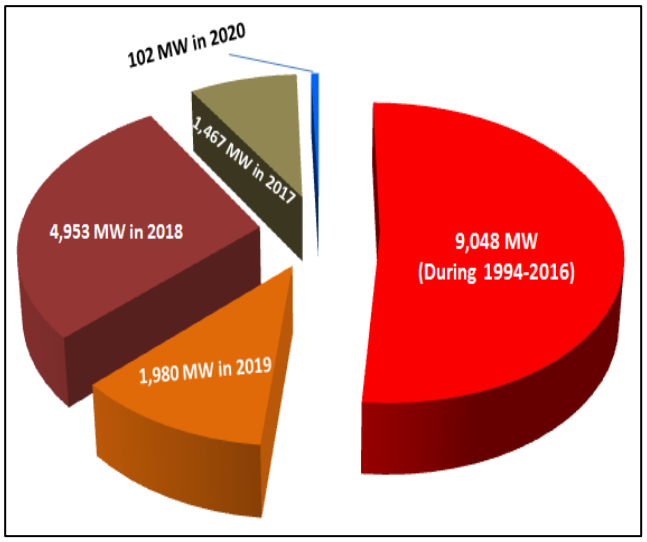
vi. Developed the RFP package after stakeholder consultation for carrying out competitive bidding amongst pipeline wind and solar projects are per the decisions of the Cabinet Committee on Energy (CCOE).

vii. Assisted NTDC in carrying out the feasibility study of solar water pumping in Baluchistan.

viii. Supported Government of Baluchistan in preparation of PC-IIs for renewable energy based off-grid electrification projects in districts of southern Baluchistan.

Private Power and Infrastructure Board

Private Power and Infrastructure Board (PPIB) acts as a one-window facilitator/one- stop organization to promote, encourage, facilitate and safeguard investment in the power sector. PPIB approves and facilitates the development and implementation of power projects and related infrastructure in private sector, public-private partnership and specified public sector projects.



The performance of PPIB is evident from the fact that under 1994, 1995, 2002 and 2015 Power Policies PPIB has so far managed to commission forty (40) independent power projects (IPPs) totaling 17,551 MW with a cumulative investment outlay of around US$ 20 billion of which nine (9) IPPs of more than 8,500 MW have been commissioned within a short period of three years i.e. during 2017-2020.

Conclusion

Pakistan is successfully overcoming energy crisis, which has direct and indirect impact on all sectors of the economy, through increase in generation as well as in transmission capacity of the system. Presently, Energy Sector is confronted with some issues, which needs to be filled up along with improvement in energy-mix for its supply at lower cost as well as fixation of other energy related issues which are strained to national exchequer. Besides ongoing big hydro power projects, present government is also pursuing renewable energy sources which are cost saving to improve the existing energy mix in the country.