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REVIEW OF CLEAN FINANCE INSTRUMENTS (CFI) & RECOMMENDATIONS FOR THEIR ADOPTION IN PAKISTAN

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REVIEW OF CLEAN FINANCE INSTRUMENTS (CFI) & RECOMMENDATIONS FOR THEIR ADOPTION IN PAKISTAN

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Study in the framework of project

Implementing Resource and Energy Efficient Technologies (REET) in Pakistan's Sugar Sector

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Renewable Energy in Pakistan: State of Play

Energy is vital to quality of human life and one of the major challenges of this time is to meet the energy requirements in a sustainable way. However, addressing the energy demand of developing countries is a more complex as well as interdisciplinary challenge.

Pakistan has abundant renewable energy resources that can be utilized for power generation and end-use sectors. In the northern region of Pakistan, glaciers and high mountain ranges maintain a lot of potential for hydropower projects. According to Water and Power Development Authority (WAPDA), Pakistan, Pakistan has the capacity of producing 60,000 MW of hydel power. However only 7,320 MW of power has yet been produced (International Hydro Power Association, 2014). Alike, within the center of the country, ample sunshine is available in the plains and desert lands which can generate massive amount of solar power. In the southern Pakistan, within the Baluchistan and Sindh provinces, Wind potential to generate power has been identified. A well-established sugar refining industry and huge amount of agricultural residues available to the country can be used for energy production.

While Pakistan is blessed with a high potential of renewable energy resources, so far, only large hydroelectric projects and few wind and solar projects have harnessed this potential. Renewable Energy accounts for 1136 MW presently installed capacity consisting of solar PV, wind and biomass-based power projects. (IRENA, 2016).

Primary energy sources

Pakistan's primary energy sources consist of following: natural gas, oil, hydropower, coal and nuclear energy. Major contributors to total primary energy supply are natural gas and oil each representing a share of 43% and 36% respectively. Remaining sources include Liquefied Petroleum Gas (LPG), coal, Hydropower and Nuclear (See fig 1 below) (IRENA, 2018).

Fig 1: Pakistan's primary source of energy

Energy mix of Pakistan

Hydro has traditionally contributed a major share in country's electricity generation. In 1960, hydro accounted for 70% of electricity production due to low cost of production. However, this proportion has declined (e.g. to 27% in 2017) although the resource base is stable[1] (International Hydro Power Association, 2014, Sarim, M., 2019). Besides hydro, other RE sources of energy (e.g. wind/solar) contribute 2% to energy generation. Whereas nuclear makes up 7%, thermal (fossil fuels) accounts for 64% (Sarim, M., 2019).

Electricity generation, transmission, policy and regulatory entities

State and privately owned thermal power generation companies are the major contributors to electricity generation. In 2015 they accounted for 66.3% of electricity generation in the country (IRENA, 2018).

Transmission and distribution networks are operated under the Ministry of Energy. The state owned National Transmission and Distribution Company (NTDC) maintains and operates the distribution network. Distribution is carried out through ten state owned distribution companies (commonly known as DISCOs). Below is the overview of the electricity sector entities.

[1] Declining share of hydropower in total primary energy supply is reflected from total demand in 1959 total electricity demand was 119MW. The increasing demand for better lifestyles and industrial development led to increased demand for electricity since then. However due to improper polices, country could not maintain the share of hydropower in country's electricity mix. By 1980, the demand and supply gap has started to grow. The government favoured thermal power plants. Subsequently share of thermal power generation capacity (consisting of natural gas, residual fuel oil, high-speed diesel and coal) increased from 42% to 65% in total installed grid connected capacity in 2015.

Fig 2: Pakistan power sector entities

Ministry of energy remains executive body holding administrative oversight of the sector with National Electric Power Regulatory Authority (NEPRA) playing its role as independent regulator. The power division of the ministry of energy is responsible for preparing policy drafts and analyses, and proposing legislative changes presented to the cabinet or parliament (IRENA, 2018). Federal government entities such as Alternative Energy Development Board (AEDB)[2], Private Power and Infrastructure Board (PPIB)[3] and Pakistan Atomic Energy Commission (PAEC)[4] are responsible to coordinate, implement and facilitate the policy of the division. Provincial energy department are established by provincial governments dedicated for drafting and implementing power policies at the provincial level. Annex B provides detailed overview of key government institutes and their roles and responsibilities.

[2] Alternative Energy Development Board (AEDB) was established in 2003. The main objective of the AEDB is to facilitate, promote and encourage development of Renewable Energy in Pakistan and with a mission to introduce Alternative and Renewable Energies (AREs) at a fast pace. (http://www.aedb.org/)

[3] Private Power and Infrastructure Board (PPIB) was created in 1994 as a "One-Window Facilitator" on behalf of the Government of Pakistan (GoP) to promote private investments in power sector. The role of PPIB has been further expanded by the GoP by allowing it to facilitate public sector power and related infrastructure projects in IPP mode. (http://www.ppib.gov.pk/)

4 Pakistan Atomic Energy Commission (PAEC) was established in 1956 with the aim to produce nuclear power and energy in the country. (http://www.paec.gov.pk)

Renewable Energy Sources in Pakistan

The following paragraphs present the overview of renewable energy potential and current status of their uptake in Pakistan.

Wind-Energy

Pakistan has a potential for wind energy especially in the southern coast and coastal Balochistan. The wind speed is on average 7-8 m/s at some sites along the Keti Bandar-Gharo corridor. Particularly in the southern regions of Sindh and Balochistan, the technical potential of wind power is high along the 1,000 km of coastline where wind speeds range between 5 and 7 m/s. The potential capacity for wind energy is estimated at 122.6 GW per year, more than double of the country's current power generation level. A newly completed wind farm in Gharo, Sindh Province, is one of a series under construction in Pakistan to reduce the country's serious energy deficit. Despite the large potential of wind energy generation, it is only recently that the sector starts to show any tangible results in terms of energy generation. For the first time in 2013-2014 the country saw a contribution of 0.2% of wind energy in its overall electricity generation (Shah Rukh et al, 2016).

Hydropower

Large Hydropower has proved to be the cheapest source of electricity. Despite the high availability of hydro power resources low investments in this sector hamper the utilization of this potential source.

Smaller (less than 50 MW) sites are available throughout the country. The micro-hydropower sector has been relatively well established yet. Since the mid-80s micro-hydro power plants supply electricity to some 40,000 rural families. Most of the plants are community-based and situated in the Northern Areas and Chitral. Small Hydropower is considered as another promising option for off-grid electricity generation. Provincial governments mainly handled the small hydropower sector: in 2006, 6,608 MW has been operational in the country based on both large and small hydropower generation (GOP, 2006). By June 2015, total installed capacity of hydropower reached to 7,116 MW in the country: 6 902 MW owned by WAPDA and 213 MW owned by IPPs (IRENA, 2018).

Solar Energy

Solar energy potential capacity is mostly in the southern and southwestern parts of the country which is estimated to be over 100,000 MW. With declining photovoltaic (PV) technology costs, the sector is nearly completing 400 MW of solar PV projects in 2015-2016. This has also provided more than 15,500 job opportunities for local people, while majority of this workforce is involved in small-scale residential and commercial deployment, which tends to be more labor-intensive than utility-scale installations. Below explains the potential of sector's growth:

- Solar Village Electrification: More than 40,000 villages which are so far from the grid that it becomes costly and uneconomic to extend the grid to these locations are prime candidates for village electrification using Solar Home Systems (SHS).
- Solar Water Heaters (SWH) and Geothermal Heat Pumps (GHP): There is a big market for investors for SWH and GHP in domestic and industrial sectors. Only 22% of the population has access to piped natural gas.
- Productive use in agriculture: Solar Powered Efficient Pumps could replace the 260,000 water pumps (tube - wells) with a sanctioned load of over 2,500 MW operated with electricity, and another 850,000 Diesel Water Pumps that consume 72,000 TOE of diesel annually.
- Street Lights: Pakistan has over 500,000 Street Lights with a sanctioned load of over 400 MW. Most of these Street Lights are based on 80W, 125W and 250W Sodium Lights. They offer opportunities to be replaced with Efficient Solar Lighting.
- Capacity Planned: AEDB has issued 24 letters of intent bringing the total install capacity at 556.5 MW in 2018. According to renewable energy policy (2006), AEDB can issue letters of intent (LOIs) for projects of capacity larger than 50 MW[5]. Punjab[6] has issued 8 LOIs for 1,419 MW (this includes 1000 MW Qauid-e-Azam solar park project in Bahawalpur, Punjab which is launched on the

[5] Except for hydel. For hydel AEDB can issue LOI for capacity even below 50 MW (GOP, 2006). Interview with Sohaib Malik (Market Analyst, Wood Mackenzie, Denmark), March 12th, 2019

[6] The role of Provincial governments for renewable energy power generation is assisting the implementation of renewable energy projects within their geographical jurisdiction either by implementing such projects themselves or in collaboration with the AEDB through facilitating allocation of land use rights (e.g. for wind farms), permitting, creating awareness of RE use and removing other impediments which may hinder the progress in their development (GOP, 2006).

behest of Government of Punjab), Sindh has issued 17 letters[7] of intent for 1,200 MW and Khyber Pakhtunkhwa has issued one letter of intent for a 50 MW project (IRENA, 2018). Hence by around 2020, one can expect an installed PV base of some 3 GW.

Biomass / Bagasse

Biomass availability in Pakistan is also widespread. Approximately 50,000 tonnes of solid waste, 225,000 tonnes of crop residue and over 1 million tonnes of animal manure are produced daily. It is estimated that potential production of biogas from livestock residues is 8.8 to 17.2 billion meters^3 of gas per year (equivalent to 55 to 106 TWh of energy). Large sugar industry in Pakistan also generates electricity from biomass energy for utilization in sugar mills (Energypedia, n.d.). Integration of electricity generated from biomass energy to the national grid can ease the electricity shortage in the country. A large number of people in rural areas in Pakistan depend on forests for their livelihood, fuel wood and shelter. Many use the forests in unsustainable ways to satisfy their domestic energy needs. Therefore, forest depletion and degradation are a major challenge. Almost all of Pakistan's biomass power generation is done in steam power plants, since biomass gasification and newest fermentation technology has not been introduced in the country (Energypedia, n.d.).

Bagasse: Pakistan is among the world's top-10 sugarcane producers, with highest utilization of biomass. Therefore, there exists huge potential in the country to generate electricity from bagasse, which is a clean fuel with low carbon emission. According to AEDB Renewable Energy Policy 2006, sugar mills are allowed to feed to grid surplus electricity produced using bagasse-based co-generation power plants (GOP, 2006). A combined capacity of 700 MW was allowed to be fed into the grid by sugar mills (GOP, 2006). Nearly all the sugar mills in Pakistan have in-house plants for the production of electricity, however, they are operating inefficiently. If high pressure boilers are installed and bagasse is efficiently utilized, it can significantly enhance the energy production capacity of the sugar cane industry and sugar mills would be able to feed surplus electricity to the grid.

[7] The Government of Sindh can allow letters of intent for a max generation capacity of 100 MW of solar power (Sindh Board of Investment, 2016).

Challenges to financing renewable energy

Pakistan is facing dual challenges of energy shortage and climate change. Sustainable means of energy generation particularly renewable energy can profoundly deal with these challenges. Although, the energy sector presents exceptional opportunities but at the same time, it confronts certain financial challenges for investors and governments who must deliver capital to come up with long term benefits and efficiencies. Profitable investment decisions must be based on accuracy and reliability of data and analysis. There is a need to provide capacity building on Project Financing for (small to large) RE projects. Following paragraphs list barriers to RE projects financings at macro-level, in developing country context and lastly in the case of Pakistan:

Financing barriers

At macro-level there are six types of barriers that are associated with investment in RE projects:

- Cognitive barriers: they relate to awareness, understanding and attention afforded to RE financing and risk management instruments. RE projects are usually small, their developers unknown and lack capacity and mostly not in position to take-on risks necessary to meet the expectations of lenders (UNEP, 2004).
- Political and regulatory barriers: they are associated with regulatory and policy issues and governmental leadership. According to Switch Asia (2016) regulatory framework for RE are weak in developing countries (e.g., deficiency in a country's enabling environment and weak legal framework for financial institutions and instruments). There is also a lack of accounting and reporting standards, credit reporting, credit bureaux, credit registries and insolvency regime. All of the aforementioned support investor confidence and effective risk management, particularly in new markets such as green investments.
- Analytical barriers, these relate to quality and availability of information required to assure and guarantee loss coverage and developing quantitative analytical methodologies for risk management instruments. In absence of high-quality assessments of renewable energy resources, the risks of financing into RE projects naturally grow up making private financing harder to

obtain. Benchmarks to compare viability of RE projects are lacking. RE technologies are compared with conventional technologies thus do not appear attractive to investors.

- Market barriers, they relate to lack of financial, legal and institutional frameworks to support the uptake of RE projects (UNEP, 2004). Financial markets in developing countries are generally underdeveloped (e.g. lack of availability of long-term financing, high transaction costs, poorly capitalized developers – due to developers' poor capitalization, RE projects also look for project financing where security for the loan comes from future cash flows. Sponsors of these projects don't have significant seed funding or equity investment; thus, the loan repayment has to be made out of cash flows they generated. However, a share of project will still need to be funded from equity).
- Administrative barriers concerning e.g. to compliance with policy frameworks that support renewable energy projects.
- Lastly legal and tax barriers (e.g. property rights, legal and tax systems for RE technologies.

Although there are many developers, there are only few project sponsors. Lack of equity finance means that project developers would not be able to finance project development costs alone without external support. Competitiveness of RE technologies depends on supportive regulatory frameworks such as guaranteed premium price, preferred access to grid and supportive investment framework.

Some persistent challenges related to RE sector particularly in developing countries include (UNEP, 2004):

- Often-small scale of projects (this becomes especially a challenge as due diligence costs are too high for investors to undertake investment in small-scale projects. Typical due diligence costs of large projects are between 0.5 million to 1 million USD. Projects below the size of 10 million USD are not attractive for international donors to consider. RE projects are typically of small size and do not come up to the size attractive for large investors[8].

[8] Bagasse based projects for example have small size compared to fossil fuel based power projects. This is evident from the fact that in 2015-16, three companies applied for NEPRA tariff with average size of 33 MW. While the average size of furnace oil power plants is 200 MW. (author's own calculation). This shows

- Technology efficacy risk (e.g. low efficiencies. Though innovations are improving efficiencies of RE technologies over time.)
- Resource availability and supply risk (As regards Biomass (e.g. Biogas / Bagasse Co-generation projects), the major risk is the continuous supply of resource. An issue that appears repeatedly when seeking finance for biomass/biogas and cogeneration projects is security of fuel supply and volatility fuel price (March, 2004).

Asian banks are reluctant to finance RE projects mainly due to:

- High risk and low rate of return on investment capital compared to fossil-energy projects.
- The comparative cheapness of fossil energy, including the availability of funds for realizing its projects (Peimani, H., 2018). Compared to conventional technologies, renewable energy technologies have higher costs of investment. Conventional energy projects have better access to long-term finance. Low / subsidized fossil fuel prices may make conventional technologies more attractive to investors. High costs of renewable energy projects (e.g. costs to set up renewable energy power plants & creating infrastructure and transmission lines up to demand locations especially in the case of wind power projects) compared to conventional technologies.

As regards Pakistan, main challenges to access to finance for RE investment (e.g. High Pressure Cogeneration Projects (HPC)) are following:

Capital intensity of projects

- Due to capital intensive nature of the projects – i.e. approximately 1.5x the comparative cost of fossil fuels- it is not possible for sugar mills to fund High Pressure Cogeneration (HPC) projects entirely off their own balance sheet
- Only small percentage of sugar mills meet the credit quality guidelines of the banks
- High project sponsor risk[9]

traditionally large sizes conventional energy projects corresponding investment sizes compared to their renewable energy competitors.

9 Almost all financial institutions in Pakistan, indicated this as a major barrier for them to offer finance for HPC project development. Project sponsor risk is significant challenge hindering the investment in RE projects in Pakistan like HPC projects. Only a few borrowers meet the expected credit worthiness of local banks. Factors increasing sponsor risk are affiliation of borrowers with political parties, bad credit history and their perceived lack of understanding of risks associated with developing and operation HPC projects)

Perceived credit risk of sponsors affects provision of finance for such projects[10].

Significant power sector circular debt

- Circular debt existing in Pakistan's power sector discourages any investment in the power sector in particular in renewable power. Circular debt is created when central power purchasing company buys electricity from independent power producers, sells it to distribution companies who sell it to consumers. Distribution companies are due to several reasons unable to recover their costs (e.g. due to electricity theft), thereby not being able to repay central purchasing company which in turn is not able to pay back the independent power purchasers thus creating a revolving debt in the sector. Circular debt and sponsor risk are two challenges that ought to be redressed in order to remove barriers to investment in power sector (Matthew Dever, 2014).

Fig 3: Circular debt in Pakistan power generation and distribution system

Lack of effectiveness of State Bank of Pakistan (SBP) renewable energy facility

- For a number of reasons RE technology has not been developed sufficiently in Pakistan, not least of which is a result of uncertainty of regulatory processes, lack of effective financing sources and an inability of indigenous industry to establish a supportive technology base.
- Existing SBP refinancing policy (see section below for the introduction to SBP's refinancing facility) is not being fully utilized by the financial institutes in Pakistan. The facility does not address the barriers [11] (i.e. Competitiveness concerns of renewable investments on part of financiers) and thus is not being used by the local banks. In fact, initial scheme was introduced in 2009

[10] "The factors impacting on the level of sponsor risk include the sugar mill owner's political affiliations, their corporate payment history as well as their perceived lack of understanding of the key risks associated with developing and operating an HPC project" (Matthew Dever, 2014).

[11] According to Matthew Dever (2014), when the scheme was introduced in 2009, there was a perceived liquidity problem in the wholesale banking market. However the problem no longer was there and the market was flush with liquidity. Therefore, the scheme remained underutilized (Mattew Dever, 2014).

with the objective to address perceived liquidity problem in the financial market at that time. However, as Mattew (2014) assessed through the interviews with financial institutes, liquidity was only a short-term problem and in fact it didn't exist in the long run and market was soon flush with liquidity. Consequently, the utilization of the SBP refinancing facility remained low.

No credit enhancement facility

- Currently there is no specific credit enhancement or loan guarantee instrument available in Pakistan to support the financing of HPC projects.

Lack of transparency of information

- Lack of information flow and resource for investors can be a barrier to effective mobilization of capital for the sector. Furthermore, risk aversive nature of banks in Pakistan is also a challenge to financing RE investments.

Financial institutions supporting the development of Renewable Energy in Pakistan

Following are important RE financing institutions in Pakistan.

State Bank of Pakistan (SBP)

State Bank of Pakistan is the central bank of Pakistan. It was established in 1948 with head office in Karachi. The bank is autonomous in its functions. According to State Bank of Pakistan Act 1956, the bank's main objective is to regulate monitory and credit system of the country and ensure monetary stability.

The role of state bank in promoting climate investment:

- Enabling:
    a. Regulatory framework (Green banking guidelines)
    b. Market Development: Credit guarantee facility
    c. Public Financing Mechanism (Refinance: credit line for clean energy)
- Awareness & Capacity Building: Workshops/Seminars/ Conferences

In order to promote renewable energy projects in the country, State Bank of Pakistan announced the scheme for Financing Renewable Energy in 2009.
This scheme was revised in 2016, taking the low utilization of the scheme in consideration and to make the scope and

financial mechanism more attractive to borrowers and financing banks/Development Finance Institutions (DFIs) (see preceding section for the reasons of low utilization of the scheme).

The current scheme is in place until end of June, 2019. The scheme will provide concessionary financing (i.e. at 2% rate of refinance to banks which can charge a rate of up-to 4% to end-user each for category I and II (see below) – for category I financing under the scheme is available for a period of up-to 12 years while up-to 10 years for category II). For power generation, the scheme is focusing on alternative / renewable energy sources (solar, wind, hydro, biogas, bio-fuels, bagasse cogeneration, and geothermal as fuel). Scheme is available under two categories, as given below:

- Category I: large renewable energy projects ranging from (1 MW to 50 MW). Maximum refinance allowed is Rs 6 billion per project.
- Category II: small scale renewable energy solutions (4 KW to 1 MW) to promote renewable energy uptake among domestic, commercial & industrial consumers – in line with NEPRA's net metering regulation[12].

The State Bank shall provide refinance to each bank/DFI on service charge (2% mark-up) basis. Refinance shall be allowed to banks/DFIs by the concerned office(s) of SBP BSC (Bank) on submission of documents as may be required by State Bank of Pakistan (SBP, 2016).

Other Features of Financing Scheme for Renewable Energy:

- Second hand machinery shall not be eligible
- Banks/ DFIs shall ensure that firm commitments of funds not financed under SBP scheme are available
- Banks/ DFIs shall make direct disbursements to manufacturers / suppliers / contractors
- Refinance to be provided on the basis of Internal Audit Certificate of financing bank/ DFI

Benefits of Revised Scheme:

- Expected to increase investment in Renewable Energy sector
- Will reduce power short falls
- Promotion of R&EE at consumer level

12 NEPRA's net metering regulations (called "National Electric Power Regulatory Authority (Alternative & Renewable Energy) Distributed Generation and Net Metering Regulations, 2015") allows distributed generators to supply its generated electric power to distribution company (e.g. DISCOs). According to the regulation, at the end of billing cycle, the distribution company (e.g. DISCOs) shall net off the kWh supplied by it to the distribution generator against the kWh supplied to it by the distribution generator (NEPRA, 2015).

- Environment friendly energy projects reducing impact on climate change
- More incentive for lending banks (higher spread) and end users (low rate)
- Likely to reduce electricity tariff which will increase business activities

Futher insitutions financing RE in Pakistan

EcoEnergy

EcoEnergy[13] was established by founders with strong roots in Pakistan. EcoEnergy goes to the doorsteps of off-grid businesses and households to sell and service high-quality solar solutions. Backed by pay-as-you-go technology, they make electricity affordable to their customers by breaking it down into monthly installments and letting them pay for only what they use.

Kreditanstalt für Wiederaufbau (KfW)

During the recent years, the role of German commitments in Pakistan's renewable energy sector is widely recognized as it has brought sustainable results in the development of country's hydropower. KfW co-funded both of Pakistan's main hydropower projects for example, Tarbela and Ghazi Barotha. KfW also supported Ghakkar substation. Together with European partners, KfW is currently involved in the construction of another two hydropower plants. Thanks to many years of solid cooperation, KfW can also influence the structures of the Pakistani energy supply system. It played an instrumental role in instigating a reorganization of the state-run energy utility WAPDA for example.

The overall objective of the KfW's projects was not only efficient energy supply but the promotion of social and economic development through improved employment and income effects and a contribution to climate change mitigation through prevented CO_2 emissions[14].

World Bank and Bank Group's

To face the sustainable development challenge, the World Bank Group adopted the Maximizing Finance for Development (MFD) approach, which entails working with governments to crowd in the private sector while optimizing the use of scarce

13 https://ecoenergyfinance.org/

14 https://www.kfw-entwicklungsbank.de/International-financing/KfW-Development-Bank/Local-presence/Asia/Pakistan/

public resources. This approach is guided by the Hamburg Principles adopted by the G20 in 2017 and builds on the substantial experience across the institution.

Since 2006, the Bank Group has supported Pakistan with policy reforms in the power sector.

In 2014, it focused on improving the sector's financial and operational performance to reduce its dependence on public funding, enhance transparency, and build credibility with investors. The Bank Group also helped to expand the availability of natural gas. Support for these programs was provided through two World Bank development policy credits of $600 million in 2014 with parallel financing from ADB and JICA, and $500 million in 2015. International Financial Corporations (IFC) supported these reforms by managing coordination between the government, regulator, and private investors to facilitate private investments. IFC invested $755 million (including funds mobilized from other development partners) in two hydro and four wind projects and a liquefied natural gas terminal, as well as $125 million to set up a renewable energy development platform. These investments facilitated private investments of over $4 billion.

From 2014 to 2017, the World Bank Group supported eight new projects in renewable energy in Pakistan and the country's first liquified natural gas import terminal.

The Bank Group's combined investments in the power sector since 2014 have contributed to over 6,000 MW in incremental generation capacity with a direct investment of over $4 billion and mobilization of $6 billion from other international finance institutions, commercial banks, and the private sector.

The Multilateral Investment Guarantee Agency (MIGA) is a member of the World Bank Group, it has provided $231 million in risk guarantees for two hydro projects.
An IDA credit of $588 million and partial guarantee of $460 million mobilized $1.85 billion for the Dasu hydropower plant.

Pakistan German Renewable Energy Forum (PGREF)

The PGREF is a cooperative initiative launched (26.05.2016) in Pakistan between the two countries and has been created to

develop network between respective industries, researchers and public sectors in renewable energy and energy efficiency.

Objective: The PGREF will help to promote the knowledge transfer and development of renewable energy (RE) and Energy Efficiency (EE) projects under (Public-Private Partnership) PPP mode, between the partner organizations and also establish permanent links between business community and Governments of both countries. It will also help build the capacity of manpower and service providers through training programs in Germany and also establish training institutions of international standards in Pakistan.

Members: Important members of the PGREF include Alternate Energy Development Board, Energy Department Punjab, Pakistan and German Solar Associations, and German Pakistan Trade Investment organization.
German energy companies are also engaged in different projects in Pakistan like wind parks in Sindh or engineering services for projects like the Quaid-e-Azam Solar Park.

Analysis potential CFI instruments

Selection of instruments

This chapter provides an analysis of financial instruments for RE sector investment. The instruments covered in this chapter range from grants to debt financing to insurance and guarantee instruments. To be successful, the instruments should be selected considering barriers to be addressed (e.g. lack of long-term finance) or resource supply risk etc.).

Grants and long-term equity

Grants fund part of investment costs of RE projects in an effort to reduce the ultimate financial cost and to increase their competitiveness (World Bank, 2011).

Grants can be used to oblige off-taker to purchase the output of renewable energy projects (e.g. feed-in-tariff/subsidies etc.) to reduce ultimate customer prices.

Simple grants provide no control over the project itself. Project developers do not have the incentive to deliver a viable project and they do not feel obliged to perform a high-quality project.

Grants vary from loans in that with loans sufficient profit has to be generated in order for repayment of the loan. Grants may however be necessary to reduce the costs of a project and make it affordable. Grants are easy to manage because they don't involve due diligence on a project's ability to repay and loan administration is unnecessary (World Bank, 2011).

Venture Capital Equity

Equity funding from public sources can be used to support renewable energy investments to develop high-risk projects with intentions to exit the projects subsequently (World Bank, 2011).

Venture capital targets new technologies and companies with high potential for growth. Financiers would like to make initial public offer on the stock market or sale to a larger company interested in acquiring a businesses' technology. Funding of this type is high risk reflected by high returns required.

For such type of instruments to work, highly developed financial markets are required for initial financiers to be able to exit their investment through selling shareholding in still risky businesses. Such funding is not suitable for low-income countries unless the technology is really innovative and attractive for investors.

Debt

There are two type of debt: 1. Senior debt 2. Mezzanine or quasi-equity finance. Senior debts are those debts which are in the form of credit lines or project loans and are first to be repaid from a project. Debt financing from public sources can be blended with more expensive commercial funding in order to provide long-term debt than may be available from financial markets. A number of ways of debt amortization and repayment schedules can be used to make the payment of debt subject to long term spread of cost of debt service depending on project's cash flows.

Distinction between direct loans to project companies and credit lines can be made. Credit lines extended through commercial financing institutes can give incentive to intermediaries to extend their own loans for renewable energy projects (World Bank, 2011).

Mezzanine or quasi-equity finance: Mezzanine or quasi-equity finance is subordinated debt that is to be paid after senior debt is repaid. It is risky, but has higher return than on senior debt. Mezzanine finance is an important asset for RE financing. It allows project developers to reduce risk to senior lenders by reducing the share of senior debtors in the overall project financing, while they can still retain control of the project.

Asset based securities

Asset based securities are bonds that that are guaranteed by security of cash flows of RE projects. They are different from company bonds which are backed by company assets.

Cash flows of projects provide security that the holders of these bonds will be repaid. Asset backed securities are used to refinance projects through their cash flow although they can be issued in the form of bonds to finance projects ahead of their construction. This way public funds can be freed up and can be used to support new projects. Blending a number of Renewable

Energy projects can help issue bonds against cash flows of multiple projects. By doing this reserve requirement that commercial financial institutes have to retain as security is decreased.

For assets-based securities to work a sophisticated market is required that is able to analyze and value the risks associated with such securities and price them. Suitability of least developed counties for implementing securities varies from case to case.

Guarantees

Credit guarantees aim to ensure repayment of a loan in part or full. This gives lenders motivation and they will now be more willing to lend money to groups who normally don't have access to credit. Such groups may be turned down by credit providers because (Alvaro Ruiz Navajas, 2011):

- The client does not have a financial record.
- Client is perceived too risky (e.g. SMEs, small farmers, women and poor)

Following are different type of credit guarantees.

- **Direct guarantees**: Here the donor repays up to an agreed percentage to lender in case of default. Lender brings in client seeking loans and asks for guarantee. Guarantor then decides whether to guarantee loan or not. This form of guarantee is easier to administer since role of donor agency is clearly defined. The disadvantage of is that they operate in an isolated way. Clients find it difficult to access such scheme since only few institutional relations are used.
- **Indirect guarantees:** a third party is responsible for administering the fund established by the donor agency. Indirect guarantee guarantees loans to a certain percentage. Donor agency debits final amount of guarantee fund to the third party. Donor agency only receives progress reports. Advantage of indirect guarantee scheme is that continuity of the scheme is possible. On the other hand, bureaucratic tardiness could lead to lack of interest by clients to apply for the guarantees.
- **Individual model:** In this case guarantor /donor approves individual borrower to be eligible for guarantee. However, borrower still has to fulfil the lender's

requirements. If borrower's loan gets approved, borrower shall pay a fee to the donor. Banks can collect this fee and forward to donor entity.

- **Portfolio model:** In this case guarantor does not guarantee individual loans. Rather it specifies criteria for guaranteeing a portfolio. Criteria may be what target group; the guarantor will be offering guarantee to. For example, SMEs, level of assets, size of the loan etc. The major advantage for participating institutions is that the maximum possible loss is known in advance. That loss could be determined to fall into acceptable levels. The fund however needs to be established in such a way that lenders consider financial viability of the projects than only security aspect (Alvaro Ruiz Navajas, 2011).
- **Funded schemes:** funded schemes although they vary from country to country but can still be defined as follows:
    - The government is the only financier of the fund
    - Banking institutions participate in the fund
    - Banking and non-banking institutions participate in the fund
- **Unfunded schemes:** in this case government finances guarantees whenever a loan default. Banks decided whether a loan should be guaranteed or not. Lastly banks administer the guarantee, are part of the risk and share costs usually 25%. Therefore, banks ought to take all precautions before availing guarantee since government can reject the claim.
- **Open scheme:** A credit guarantee scheme (CGS) is created in order to favour access to credit to a certain target group. Depending on degree of specification of the target group, a CGS scheme can be either open or closed. If there is no requirement for a target group, then the scheme is called open. Schemes for SMEs are usually open.
- **Closed scheme:** if scheme is introduced for a particular target group (e.g. independent workers/specific region etc.), then scheme is called closed. Despite the target group is defined, not all members of respective target group can access guarantee. They still have to follow the set criteria for availing guarantee.
- **Ex-ante scheme:** in these schemes, borrower proposes financial proposal to the guarantor. If guarantor agrees with the project, it gives borrower a letter that he can apply for loan from respective bank. Bank then evaluates

if it can lend loan.

- **Ex-post schemes:** In this case it is other way around. Banks refers lender to guarantor after evaluating it. If guarantor also agrees, guarantee cover will be approved otherwise not.
- Intermediary model is where micro-finance banks are given guarantee from banks. Then they lend funds or finance a line of credit for micro enterprises using micro-credit technologies. Since microfinance providers are more reliable, banks favor this. In case of default guarantee can be redeemed.

Resource insurance

These insurances relate to resources for renewable energy projects. For example wind, sun etc. This insurance insures investors against uncertain resources like wind and solar insurance that can cover the investor against still or cloudy periods. Such insurance needs sophisticated financial market. Even in sophisticated markets, there may still be a role for public agencies to support the provision of reinsurance (effectively insuring the insurers) (World Bank, 2011).

Results-based financing

RBF based financing aims to shift the payment from input based to output based. This way financing risk is shifted from financiers to implementing agencies. Input based financing is contribution to project financing. Whereas RBF are the costs or outputs (e.g. successful implementation of project).

RBF is subject to specific results to be achieved and can be in the form of a subsidy, reward or financial incentive.
In contrast to paying individual input costs, RBF payment is conditional upon achieving verifiable results which are largely within the control of recipient.

Recipient is thus certain that it has to pre-finance its activities based on the certainty that it will receive payment as long as it delivers pre-agreed service.
Financier's credit worthiness and track record of recipient allows them to raise pre-financing either internationally or local (World Bank, 2011).

Carbon financing

Advance sales of CERs helps to mobilize funds for project developers to manage risks associated with CERs of RE projects. Either developer or purchaser of CER is responsible for the registration of CERs under CDM. Commercial entities are already engaged in purchases of CERs and World Bank also administers a number of trust funds for the purchase of CERs.

Expert interviews on adopting CFIs in Pakistan

Analysis of interview results

Interviews with financial experts and RE financing organizations were conducted to collect their insights into advancing RE financing and role of clean finance instruments for this purpose. Feedback of experts into existing barriers to RE financing, role of CFIs especially refinancing and credit guarantee schemes and Islamic finance was collected through the interviews. Summary results of interviews are presented below. Interviews with Pakistani counterparts and financial institutes are currently being undertaken by the IHT Pakistan. The results of this review will be up-dated based on completion of the remaining interviews.

Stakeholder types interviewed for this review:

Stakeholder type	Number of organizations
Development Finance Institutes (DFIs)	3
Banks/Commercial Finance Institutes (CFIs)	3 (2 from Pak, 1 from Germany)
UN/regional sustainability research and analysis organizations	4

Summary results:

The following paragraphs summarize results of the interviews. We analyze results according to the type of stakeholder as per above table and correlate the results to the findings of desktop research as presented in chapter 2.

Barriers

According to DFIs more important barriers to RE financing in developing countries are as follows:

- Lack of awareness amongst SMEs on RE. In most developing countries SMEs are not aware of economically viable RE technologies.
- Lack of holistic plans to adopt RE in developing countries. Governmental subsidies on fossil fuels based technologies make RE technologies uncompetitive.
- Lack of market for RE loans. Due to lack of loan takers,

there is no incentive for lending institutes to create RE lending products.
- Lack of strict and binding regulations to invest and use RE (unless there are no binding regulations SMEs are not likely to invest into RE)

Above findings reflect the barriers to RE finance (e.g. cognitive, political and market barriers) as discovered through desk-research (see chapter 2). We now look at the feedback of interviewees from commercial financial institutes and banks regarding barriers. They report following barriers to RE investment by SMEs:

- Monopolistic energy market
- Size of investments not suitable to SMEs
- Lack of regulatory frameworks
- Perceived limited resource (e.g. bagasse) availability
- Lack of awareness

Commercial financial institutes and banks confirm that the major barriers lie in political, market and cognitive aspects.

According to international sustainability research and analysis organizations following summarizes the barriers to SMEs investment into RE:

- Lack of SME dedicated loans
- Lack to connection to national grid at the point of generation
- Lack of technical capacity at the part of SMEs
- Inadequate policy and incentives
- Low bankability of projects

Above results also confirm main barriers to be political, cognitive, analytical and market aspects which are causing lack of investment into RE at SMEs.

Role of CFIs:

From DFI's perspective, the role of clean finance instruments is summarized as follows:

- CFIs (such as simple and easy to access soft loans) can increase SME's interest and participation in RE projects
- CFIs must however take up the needs of SMEs (e.g. they

must be “cheap” in terms of opportunity costs and not involve too much bureaucratic processes)

One of SMEs’ challenge is lack human capital and technical skills to comply with complex requirements of lending institutes. As emphasized in bullet point 2 above, soft loans, grants and other easy to access measures should be used which require less complex lending procedure.

For commercial financial institutes and banks below bullet points summarize success factors for CFIs to improve access of SMEs to RE finance:

- CFIs can only be successful if there is demand from SMEs (i.e. SMEs are operating in the RE industry and thus drive market demand for investment into RE projects)
- Furthermore, CFIs can only succeed if all other barriers (e.g. noted in section above) are eliminated.

Commercial financial institutes and banks thus emphasize on the market pull factors. Market can be created through early public sector intervention (e.g. through grants and soft loans etc.)

According to international sustainability research and analysis organizations following summarizes the role of CFIs:

- CFIs (e.g. specific feed-in-tariff by RE technology) can increase RE up-take in the SME sector.
- Risk-sharing mechanisms developed together by governments and international financial institutions can distribute the risk and improve risk perception of RE projects.

According to international research institutes interviewed, CFIs can help de-risk RE investments, facilitate technology transfer through availability of capital at reasonable costs. Aforementioned results are in alignment with the desktop research results (e.g. need to reduce high risk-perception of RE due to low competitiveness in relation to fossil fuel technologies) as observed in chapter 2.

Refinancing/ credit guarantee scheme

For DFIs following bullet points provide a summary of interview results regarding the question whether or not a refinancing/credit guarantee scheme can be a solution to improve SME access to RE finance:

- A cheap source of refinance may help lower the threshold for SME to engage in RE. What is important however is to make sure that the subsidy obtained is used for the technology it is provided. It would though increase the administrative burden on the part of SME and/or lending institute.
- 100 % credit guarantee is not an ideal solution. Partial credit guarantee is more suitable in order not to crowd out private sector. Credit guarantee could however distort the market in the sense that SMEs may not tend to repay loan.
- Without mature financial markets, credit guarantee schemes are however less likely to be successful. As long as the markets do not mature, grants and soft loans (e.g. max. 2% interest rate) are best option. However, implementation should be preceded by the test piloting of the initiative.

For commercial finance institutes and banks following bullet points summarize their response to the question of using refinancing scheme/credit guarantee schemes to improve SMEs' access to RE finance:

- Credit guarantee/refinance scheme could help if other barriers are eliminated.

Above observation is also reflected in Matthew Dever (2014). Through interviews with local banks in Pakistan, Matthew investigated the reasons for low up-take of State Bank of Pakistan (SBP) refinance scheme for RE (see chapter 2) by local commercial banks in Pakistan. Dever found that the refinance facility does not address the main barrier to financing RE which is why it is not being taken-up by the local financial institutes. The main barriers to RE projects in Pakistan are their lack of competitiveness with fossil fuel based power generation projects (i.e. government subsidies on fossil fuel based power plants e.g. incentives for coal mining project investors such as 30 years exemption from withholding of income tax, custom duty is exempted while sales tax is also waived off on the

imported machinery for the Thar Coal Field etc.[15])

International sustainability research and analysis organizations reported following on the question regarding refinancing/credit guarantee scheme as a solution to improve SMEs' access to finance for RE investment:

- Since investors look for investments which are de-risked, credit guarantees can help reduce risk on development of RE projects. However, their implementation should be preceded by the test piloting of the initiative.

[15] http://www.oraclepower.co.uk/country-overview/investment-incentives/

Recommendations for State Bank of Pakistan on promoting RE

This chapter provides recommendations for the State Bank of Pakistan on promoting RE in Pakistan. These recommendations are based on the preceding desktop research and interviews with international and Pakistan experts of devising financial instruments.

Following are policy recommendations:

1. Revise and improve attractiveness of SBP refinancing scheme

Under the current SBP refinancing scheme (in operation until end of June 2019)[16], SBP lends commercial financial institutions at 2% for onward lending to end-users at up-to 4[17]% (see figure below).

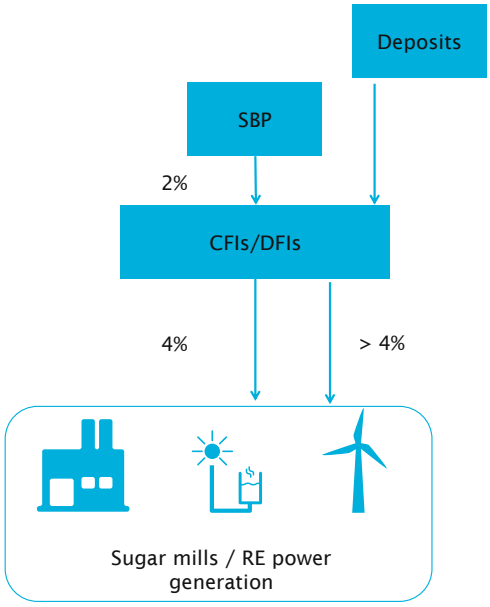

Fig 4: SBP refinancing scheme for RE

While the scheme was meant to address perceived liquidity problem that market was facing in 2009, the market soon became flushed with liquidity. Therefore, the scheme was not taking up by the financial institutes at that time. Since the

[16] Came into action on June 20th, 2016

[17] In parallel to SBP refinancing scheme, commercial financial institutes also offer financing to RE projects on commercial rates. Banks are offering loans at market rate (i.e. KIBOR rate[17] – currently 12.5% – + upto 3.5% their own spread[17]). However, commercial financing is only available for large scale projects.

liquidity problem is expected to emerge again as the interest rates have jumped up to the same levels as of 2009[18] (the time when the scheme was initially introduced), the revised and improved SBP refinancing facility may be used to tackle liquidity problem. SBP however should undertake a comprehensive stakeholder consultation on the revision and improvement of the facility in order to address the bottlenecks stakeholders faced with regard to old facility (e.g. low profit margins etc.).

2. Raise awareness to incentives for investing into RE

Currently there is a lack of awareness of investors to benefits of investing into RE. SBP may raise awareness of investors, project sponsors/developers to benefits from RE business opportunities. Incentives provided under RE policy 2006 of the Alternative Energy Development Board (AEDB) Pakistan (custom duty and sales tax exemption for machinery import and income and turnout tax waiver etc.) and other such policies, should be communicated to sponsors/developers by the State Bank of Pakistan to attract their interest.

3. Create SME dedicated RE financing products

Since there is no credit enhancement scheme available to SME borrowers for RE in Pakistan (see chapter 2), State Bank of Pakistan may consider devising partial credit guarantee to compensate partial loss of loan default and be extended through the commercial banks.

4. Special purpose vehicle

Special purpose vehicle (SPV) can be created to enable RE financing (See below the schema of SPV). SPV shall serve as a specially created temporary legal entity to either isolate a sugar mill's RE assets or pool several SME's assets into a separate business entity to seek RE financing, generation of income and repayment. This will reduce the exposure of commercial financial institute due to a risk sharing mechanism (SPV) so created. SPB may tailor refinancing scheme to deal with SPVs.

[18] i.e. 12.5%

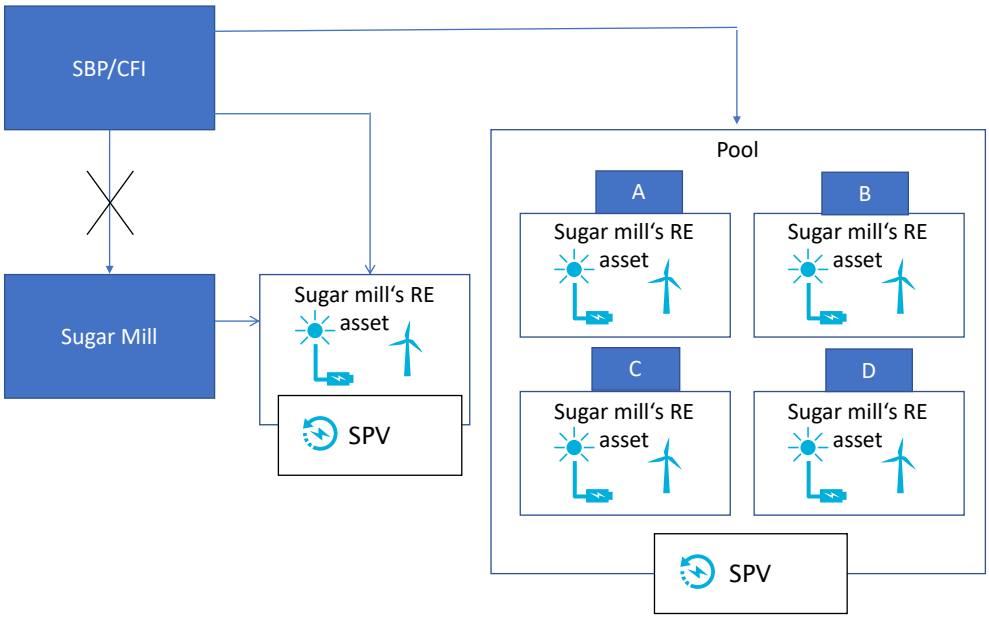

Fig 5: SPV concept

5. Training and capacity building of lending institutes

Another key barrier to RE financing is the lack of human capital to evaluate RE loans and investments. We therefore recommend State Bank of Pakistan to undertake measures to build capacity of commercial financial institutes in Pakistan regarding the assessment of RE loan applications (business case evaluation). SBP may develop training courses[19] for the lending staff of commercial financial institutes and build their capacity in collaboration with the CSCP.

[19] e.g. on how to take up SBP refinancing scheme and learn through simulation exercises how to assess risks of RE projects

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Annex A: Interview questionnaire "review of Clean Financial Instruments"

The sugar industry depends on the continuous supply of raw material, sugarcane. Industries in Pakistan use waste product of the sugar production, bagasse, to produce electricity. However, productivity and efficiency of generating electricity from bagasse varies from sugar mill to sugar mill. Inefficient technologies account for higher energy consumption and wastage of energy resource. For example, an average sugar mill in Pakistan consumes about 1250 MJ/ton, which is much higher compared to their Indian counterparts, which consume only about 935 MJ/ton. This translates to respectively higher emissions of greenhouse gases and also economic costs. This SWITCH-Asia project has the objective to enhance the resource efficiency of the sugar sector through the adoption of Resource and Energy Efficiency (R&EE) technologies.

The major reason for low up-take of R&EE technologies in Pakistani sugar mills is lack of access to finance. Financial institutes in Pakistan lack the capacity to evaluate such technologies and thereby establish green investment products for SMEs to adopt these technologies.

CSCP will review and document clean financial instruments (CFIs) in Europe and Asia that have potential relevance for adoption in Pakistan. Expert interviews are part of review of suitable finance instrument to promote clean technologies especially bagasse-based cogeneration power projects in sugar mills in Pakistan.
Outcome of the review will be recommendations for the State Bank of Pakistan on incorporating the relevant CFIs into a proposed renewable energy refinance policy.

We would like to request you to kindly take 15-20 min to complete the below questionnaire and provide us with your valuable insights into the topic.

Thank you and we appreciate your time and support to our review of clean finance instruments!

Questionnaire

- Please provide some information about yourself and your organization?

Name	
Organization	
Location	
Position	
Email	
Phone	

- What is the role of your organization as regards resource & energy efficiency (REE) financing?

- In your view what are the major barriers to investment in REE for the SMEs (e.g. installing Co-gen biomass power plants)?

- How do you think Clean Finance Instruments (CFIs) can promote REE in SMEs?

- What CFIs does your organization use to promote REE at the SME level?

- What is the experience of your organization with CFIs (e.g. success /failure factors)?

- To what extent, do you think a refinancing/credit guarantee scheme improve access to REE finance for SMEs (e.g. for High Pressure Co-gen projects)?

- What actors do you think could co-finance such a solution (e.g. national government, international donors, investor agencies)? Please elaborate names and potential role of actors.

- What other suggestions would you like to give for improving access to REE finance for SMEs in Pakistan?

- Any other comments you would like to share?

END OF QUESTIONNAIRE. THANK YOU!

Annex B: Energy sector entities in Pakistan and their role

Organization	Type	Role
Power Division, Federal Ministry of Energy	Federal ministry division	Executive agency of the Government for all issues pertaining to power generation, transmission, distribution, pricing, regulation and consumption. Co-ordinates and plans the nation's electricity sector; formulates policy and specific incentives. Liaises with provincial governments
NEPRA	Regulator	Independent regulator Ensures power market operations including generation, transmission and distribution. Issues generation, transmission and distribution licenses, and determines tariffs for the power sector
PPIB	Agency	facilitator on behalf of the federal government to promote private-sector participation in the power sector for large hydropower and non-renewable technologies
AEDB	Agency	promotes and facilitate exploitation of renewable energy resources. Develops national strategies, drafts policies and plans for utilization and promotion of renewable energy. Co-ordinates and facilitates commercial application of renewable energy technologies as well as facilitating private investors. Forum for evaluation, monitoring and certification of renewable energy projects and products
NTDC	State-owned public limited company	Responsible for all properties, rights, assets, obligations and liabilities of the 220 kV and 500 kV grid stations and transmission lines and networks.
CPPA (Guarantee)	State-owned limited guarantee	Responsible for power procurement from generation companies, hydropower and IPPs on behalf of DISCOs for delivery through 500 kV, 220 kV and 132 kV networks. Performs power market clearing function

Organization	Type	Role
Power utilities (DISCOs)	State-owned companies	Ten separate electricity retail companies responsible for administering the O&M, supply, distribution, construction and expansion of the 132 kV and 11 kV grid network within their respective areas of jurisdiction.
K-Electric	Private power utility company	Responsible for generation, transmission and distribution of electric power for the city of Karachi.
Provincial energy departments	Provincial government departments	Four provincial energy departments (Punjab, Sindh, Khyber Pakhtunkhwa and Baluchistan) and the AJK Power Development Organization support energy project implementation within their respective regions. Responsibilities include liaising with the federal government to implement policies and measures to incentivize energy project development.
WAPDA	Agency	Responsible for large-scale hydropower project development and water sector projects.
Generation companies	State-owned companies	Government-owned but independently operated companies responsible for O&M of public-sector thermal power plants.
PEPCO	State-owned company	Established in 2007 to manage the transition of government entities from a bureaucratic structure to a corporate, commercially viable entity. It is responsible for the management of all the affairs of the corporatized nine DISCOs, four generation companies (GENCOs) and NTDC, all of whom are working under an independent Board of Directors.

Annex C: Interview respondents

Following interviews have so far been conducted:

Organization	Name of interviewee
KfW Development Bank (Germany)	Johannes Alexeew (Project Manager)
Sparkassenstiftung für internationale Kooperation (SBFIC) (Germany)	Dr. Ilonka Rühle-Stern / Ilan Wolkov (Head of Division Asia / Green Finance expert)
Rheinischer Sparkassen- und Giroverband (RSGV) (Germany)	Johanna Stange (Sustainability Programme Manager (Referentin Nachhaltigkeit)
Islamic Corporation for the Development of the Private Sector (Jeddah, Saudi Arabia)	Amir Hamza Syed (Officer, Monitoring and Evaluation)
(1) Business Council for Sustainable Development Zimbabwe (2) Toxoconsol Consultancy (Harare, Zimbabwe)	Tawanda Collins Muzamwese (Executive Director, Chief Sustainability Consultant)
Institute of Development Studies (IDS), United Kingdom	Patrick Schroeder (Research Fellow)
Wood Mackenzie, Denmark	Sohaib Malik (Senior Analyst)
UN Habitat, Pakistan	Jawed Ali Khan
The Bank of Punjab, Pakistan	Aurangzeb Akram
Habib Metropolitan Bank Ltd., Pakistan	Zulfiqar Alavi