

Combating Climate Change through the Promotion and Application of Sustainable Biomass Energy Technologies in Pakistan (PASBET)

Part I: Project Information

GEF ID
10720

Project Type
FSP

Type of Trust Fund
GET

CBIT/NGI
☐ CBIT
☐ NGI

Project Title
Combating Climate Change through the Promotion and Application of Sustainable Biomass Energy Technologies in Pakistan (PASBET)

Countries
Pakistan

Agency(ies)
UNDP

Other Executing Partner(s)
Ministry of Climate Change (MoCC)

Executing Partner Type
Government

GEF Focal Area

Climate Change

Taxonomy

Focal Areas, Climate Change, Climate Change Mitigation, Energy Efficiency, Renewable Energy, Technology Transfer, Agriculture, Forestry, and Other Land Use, Financing, Influencing models, Convene multi-stakeholder alliances, Demonstrate innovative approaches, Transform policy and regulatory environments, Strengthen institutional capacity and decision-making, Stakeholders, Beneficiaries, Private Sector, Individuals/Entrepreneurs, Large corporations, SMEs, Civil Society, Community Based Organization, Non-Governmental Organization, Academia, Type of Engagement, Participation, Information Dissemination, Partnership, Consultation, Communications, Public Campaigns, Awareness Raising, Gender Equality, Gender Mainstreaming, Women groups, Sex-disaggregated indicators, Gender results areas, Knowledge Generation and Exchange, Capacity Development, Access and control over natural resources, Participation and leadership, Access to benefits and services, Capacity, Knowledge and Research, Learning, Adaptive management, Enabling Activities, Innovation

Rio Markers**Climate Change Mitigation**

Climate Change Mitigation 1

Climate Change Adaptation

Climate Change Adaptation 0

Duration

60 In Months

Agency Fee(\$)

326,709.00

Submission Date

11/3/2020

A. Indicative Focal/Non-Focal Area Elements

| Programming Directions | Trust Fund | GEF Amount(\$) | Co-Fin Amount(\$) |
|-------------------------|------------|----------------|-------------------|
| CCM-1-1 | GET | 1,854,221.00 | 13,200,000.00 |
| CCM-1-3 | GET | 1,584,820.00 | 10,893,300.00 |
| Total Project Cost (\$) | | 3,439,041.00 | 24,093,300.00 |

B. Indicative Project description summary

Project Objective

Widespread application of sustainable biomass energy technologies for supporting socio-economic development of and reducing greenhouse gas (GHG) emissions from, the rural sector in Pakistan.

| Project Component | Financing Type | Project Outcomes | Project Outputs | Trust Fund | GEF Amount(\$) | Co-Fin Amount(\$) |
|---|----------------------|---|--|------------|----------------|-------------------|
| Component 1: Establishment of Policy and Regulatory Framework for Sustainable Woody Biomass Energy Production and Utilization | Technical Assistance | 1.1. Effective enforcement of policies and regulations on the sustainable production and use of woody biomass for energy generation and utilization in rural areas of Pakistan. | <p>1.1.1. Completed comprehensive situational and feasibility analyses for mainstreaming woody biomass production in the agriculture and forestry sectors, including assessments of potential areas for sustainable woody biomass production and utilization^[1] in Punjab, Khyber Pakhtunkhwa (KP), Sindh and Balochistan provinces^[2].</p> <p>1.1.2. Developed and implemented policies and market-based regulatory framework for supporting woody biomass production and use, including national strategy for promotion of sustainable biomass energy production and utilization, using community-based woodlots and agroforestry production at the provincial level, and fiscal incentives for private-sector participation in woody biomass energy technology business.</p> <p>1.1.3. Formulated and approved technical, management and operational standards in biomass energy development and utilization, woody biomass fired devices and equipment and comprehensive biomass energy management.</p> <p>1.1.4. Formulated energy-integrated development plans of 8 pilot towns two in each province of Punjab, KP, Sindh and Balochistan^[3].</p> | GET | 753,734.00 | 4,324,200.00 |

1.1.5. Trained and qualified 60 provincial governments personnel (15 from each province) that provide technical support on sustainable production of woody biomass and enforcement of regulatory framework for biomass use for energy production and utilization.

[1] This also includes the utilization of available forestry waste such as twigs and branches of standing trees, leftover wood, and branches after commercial harvesting of sustainable forests.

[2] Two districts each in the provinces of Punjab, KP, Sindh, and Balochistan identified as target areas for the planned technology demonstrations, with big potentials for woody biomass production and utilization.

[3] Based on enhanced provincial data banking systems that include sustainable woody biomass production and utilization, provincial economic and social development parameters and performance indices, energy demand and use trends in each province.

| | | | | | | |
|---|----------------------|--|---|-----|--------------|--------------|
| Component 2: Promotion of Biomass Energy Production and Energy Efficient Utilization Technologies | Technical Assistance | 2.1. Enhanced woody biomass production on forested, non-forested, and on farm lands to cater local biomass energy needs, including for power generation and rural industry operations. | <p>2.1.1. Developed, disseminated, and applied guidelines for sustainable production and utilization of woody biomass.</p> <p>2.1.2. Completed supply chain and market analysis and documented woody biomass demand and supply in the country.</p> <p>2.1.3. Established farmers/communal forest nurseries over at least 300 hectares to provide planting stock for raising woody biomass in rural areas in the provinces of Punjab, KP, Sindh and Balochistan, including energy plantations over 40,000 ha of fast-growing native tree species at non-forested lands in selected districts each of these provinces for woody biomass supply.</p> <p>2.1.4. Established and operational fuelwood production from 4.5 million trees of common fuelwood plant species on farmlands for supply of woody biomass for production and utilization of biomass energy in rural areas.</p> | GET | 533,069.00 | 4,751,400.00 |
| Component 2: Promotion of Biomass Energy Production and Energy Efficient Utilization Technologies | Investment | 2.2. Increased investments in the application of technologies for the production, and energy efficient utilization of woody biomass energy. | <p>2.2.1. Completed and operational woody biomass-based energy generation technology demonstrations in 4 selected sites, one in each province of Punjab KP, Sindh and Balochistan showcasing the cost-effective application of decentralized woody biomass-based electricity generation and distribution (through mini/micro-grids)^[1].</p> <p>2.2.2. Completed and operational three (3) demonstrations of cost-effective production of woody biomass fuels such as wood chips, briquettes, and pellets for use in decentralized woody-biomass based power generation and distribution.</p> | GET | 1,249,604.00 | 8,700,000.00 |

2.2.3. Completed and operational demonstrations of the cost-effective applications of energy efficient woody biomass fired technologies and comprehensive energy management systems in selected energy end-use sectors in support of rural socio-economic development[2].

2.2.4. Published and disseminated information about the results and impacts of the completed demonstrations of decentralized woody biomass-based energy production and utilization for power and non-power applications.

[1] This involves the installation of a collective total woody biomass-based power generation capacity of 5.4 MW in the 4 provinces to supply of electricity to supply unelectrified rural villages.

[2] This includes local production of energy-efficient wood-fired devices that are cost-effectively utilized in rural industries to improve energy utilization efficiency and reduce GHG emissions.

| | | | | | | |
|--|----------------------|---|--|-----|------------|--------------|
| Component 3. Supporting Financial Requirements for Biomass Energy Technologies Initiatives | Technical Assistance | 3.1. Adequate amounts of financial resources available for woody biomass energy technology application projects in the country | <p>3.1.1. Established and operational investment and financing mechanisms for supporting the commercial viability and operation of woody biomass energy production for power and non-power applications, and the development of biomass energy industries.</p> <p>3.1.2. Established and operational market-oriented mechanism for the enhanced development and utilization of biomass energy resources, energy efficiency and comprehensive biomass energy management systems for supporting sustainable rural socio-economic development.</p> <p>3.1.3. De-risked biomass-based power generation projects, decentralized biomass-based energy generation in rural areas, and business plans for the GoP and private sector to facilitate financing and implementation.</p> | GET | 500,000.00 | 3,500,000.00 |
| Component 4: Biomass Energy Technology Capacity Building and Knowledge Management and Gender Mainstreaming | Technical Assistance | 4.1. Enhanced local capacity, skills and knowledge in the development, installation, and operation of biomass energy technology systems in rural Pakistan | | GET | 238,870.00 | 1,670,400.00 |

| |
|---|
| <p>4.1.1. Developed and implemented gender sensitive capacity development training programs for the design, construction, operation, and maintenance of woody biomass-based energy production systems both for power (e.g., decentralized power generation and distribution) and non-power (e.g., industrial energy efficient wood-fired equipment and devices) applications, as well as for strengthening institutional capacity for supporting sustainable biomass energy production and utilization.</p> <p>4.1.2. Trained and qualified people (60 from each province) providing training on woodlot operations and management, woody biomass fuel production, and woody biomass-based power generation and distribution, including trained and qualified community members (600 men and 400 women) providing training on the promotion of the widespread applications of energy efficient wood-fired equipment and devices.</p> <p>4.1.3. Sensitized key value chain actors of biomass energy enterprises that provide technical services and invest in the applications of cost-effective, climate resilient and energy efficient woody-biomass energy technologies.</p> <p>4.1.4. Knowledge products on lessons learned, best practices, etc. that are available through online repository for sharing experiences and replicating and scaling-up use of climate resilient and energy efficient biomass energy technologies.</p> |
|---|

Sub Total (\$)

3,275,277.00

22,946,000.00

Project Management Cost (PMC)

| | | |
|------------------------|--------------|---------------|
| GET | 163,764.00 | 1,147,300.00 |
| Sub Total(\$) | 163,764.00 | 1,147,300.00 |
| Total Project Cost(\$) | 3,439,041.00 | 24,093,300.00 |

C. Indicative sources of Co-financing for the Project by name and by type

| Sources of Co-financing | Name of Co-financier | Type of Co-financing | Investment Mobilized | Amount(\$) |
|------------------------------|---|----------------------|------------------------|--------------|
| Recipient Country Government | Ministry of Climate Change (MoCC), GoP | In-kind | Recurrent expenditures | 1,500,000.00 |
| Recipient Country Government | Ministry of Climate Change (MoCC), GoP | Grant | Investment mobilized | 2,000,100.00 |
| Recipient Country Government | Ministry of Planning, Development & Special Initiatives through CRE | In-kind | Recurrent expenditures | 1,500,000.00 |
| Recipient Country Government | Ministry of Planning, Development & Special Initiatives through CRE | Grant | Investment mobilized | 493,000.00 |
| Recipient Country Government | Ministry of Energy (Power Division) through NEECA | In-kind | Recurrent expenditures | 1,500,000.00 |
| Recipient Country Government | Ministry of Energy (Power Division) through NEECA | Grant | Investment mobilized | 500,000.00 |
| Recipient Country Government | Government of Punjab (Forest Dept.) | In-kind | Recurrent expenditures | 1,500,000.00 |
| Recipient Country Government | Government of Punjab (Forest Dept.) | Grant | Investment mobilized | 800,000.00 |
| Recipient Country Government | Government of Khyber Pakhtunkhwa (Forest Dept.) | In-kind | Recurrent expenditures | 1,500,000.00 |
| Recipient Country Government | Government of Khyber Pakhtunkhwa (Forest Dept.) | Grant | Investment mobilized | 800,000.00 |
| Recipient Country Government | Government of Sindh (Forest Dept.) | In-kind | Recurrent expenditures | 1,500,000.00 |

| | | | | |
|-------------------------------|---|---------|------------------------|----------------------|
| Recipient Country Government | Government of Sindh (Forest Dept.) | Grant | Investment mobilized | 800,000.00 |
| Recipient Country Government | Government of Balochistan (Forest Dept.) | In-kind | Recurrent expenditures | 1,500,000.00 |
| Recipient Country Government | Government of Balochistan (Forest Dept.) | Grant | Investment mobilized | 800,000.00 |
| GEF Agency | UNDP | Grant | Investment mobilized | 1,000,200.00 |
| Private Sector | 1. Pakistan Tobacco Company 2. Independent Power Producers (IPPs) | In-kind | Recurrent expenditures | 1,500,000.00 |
| Private Sector | 1. Pakistan Tobacco Company 2. Independent Power Producers (IPPs) | Grant | Investment mobilized | 2,600,000.00 |
| Beneficiaries | Local Communities | In-kind | Recurrent expenditures | 1,500,000.00 |
| Beneficiaries | Local Communities | Grant | Investment mobilized | 800,000.00 |
| Total Project Cost(\$) | | | | 24,093,300.00 |

Describe how any "Investment Mobilized" was identified

In 2019, the Government of Pakistan launched a Ten Billion Tree Tsunami Program (TBTT-P), a national program, for the revival of the forestry sector in the country. The proposed GEF project builds on the interventions under the forestry component of the TBTT-P. The funds allocated for on-the-ground interventions are placed at the disposal of respective provincial governments, which are likely to be spent in the target districts of the proposed project's and will directly contribute to its objectives. These TBTT-P resources are considered investments mobilized from the federal and provincial governments under the proposed project. The provincial governments of Punjab, KP, Sindh, and Balochistan have shown their interest in promoting farm-forestry and raising woodlots for piloting biomass energy production technology demonstrations. Their allocated resources for these activities that are also part and parcel of the proposed project and are considered investments mobilized, including the grants they provide through their public sector development funds. Private sector entities operating in project areas that will benefit from woody biomass-fired energy generation and consuming equipment will be encouraged to co-finance relevant project activities under proper agreements with the project authorities. Similarly, entrepreneurs and Small and Medium Enterprises (SMEs) engaged in woody biomass trading and production activities will be encouraged to make investments by financing at least 25% of activity costs, especially associated with efficient technology transfer for biomass conversion energy.

D. Indicative Trust Fund Resources Requested by Agency(ies), Country(ies), Focal Area and the Programming of Funds

| Agency | Trust Fund | Country | Focal Area | Programming of Funds | Amount(\$) | Fee(\$) | Total(\$) |
|-------------------------|------------|----------|----------------|----------------------|--------------|------------|--------------|
| UNDP | GET | Pakistan | Climate Change | CC STAR Allocation | 3,439,041 | 326,709 | 3,765,750.00 |
| Total GEF Resources(\$) | | | | | 3,439,041.00 | 326,709.00 | 3,765,750.00 |

E. Project Preparation Grant (PPG)
PPG Required



| PPG Amount (\$) | | | | PPG Agency Fee (\$) | | | |
|-------------------------|------------|----------|----------------|----------------------|------------|-----------|------------|
| 150,000 | | | | 14,250 | | | |
| Agency | Trust Fund | Country | Focal Area | Programming of Funds | Amount(\$) | Fee(\$) | Total(\$) |
| UNDP | GET | Pakistan | Climate Change | CC STAR Allocation | 150,000 | 14,250 | 164,250.00 |
| Total Project Costs(\$) | | | | | 150,000.00 | 14,250.00 | 164,250.00 |

Core Indicators

Indicator 6 Greenhouse Gas Emissions Mitigated

| Total Target Benefit | (At PIF) | (At CEO Endorsement) | (Achieved at MTR) | (Achieved at TE) |
|--|----------|----------------------|-------------------|------------------|
| Expected metric tons of CO ₂ e (direct) | 64633 | 0 | 0 | 0 |
| Expected metric tons of CO ₂ e (indirect) | 3059000 | 0 | 0 | 0 |

Indicator 6.1 Carbon Sequestered or Emissions Avoided in the AFOLU (Agriculture, Forestry and Other Land Use) sector

| Total Target Benefit | (At PIF) | (At CEO Endorsement) | (Achieved at MTR) | (Achieved at TE) |
|--|----------|----------------------|-------------------|------------------|
| Expected metric tons of CO ₂ e (direct) | | | | |
| Expected metric tons of CO ₂ e (indirect) | | | | |
| Anticipated start year of accounting | | | | |
| Duration of accounting | | | | |

Indicator 6.2 Emissions Avoided Outside AFOLU (Agriculture, Forestry and Other Land Use) Sector

| Total Target Benefit | (At PIF) | (At CEO Endorsement) | (Achieved at MTR) | (Achieved at TE) |
|--|-----------|----------------------|-------------------|------------------|
| Expected metric tons of CO ₂ e (direct) | 64,633 | | | |
| Expected metric tons of CO ₂ e (indirect) | 3,059,000 | | | |
| Anticipated start year of accounting | 2022 | | | |
| Duration of accounting | 5 | | | |

Indicator 6.3 Energy Saved (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

| Total Target Benefit | Energy (MJ) (At PIF) | Energy (MJ) (At CEO Endorsement) | Energy (MJ) (Achieved at MTR) | Energy (MJ) (Achieved at TE) |
|--------------------------|----------------------|----------------------------------|-------------------------------|------------------------------|
| Target Energy Saved (MJ) | | | | |

Indicator 6.4 Increase in Installed Renewable Energy Capacity per Technology (Use this sub-indicator in addition to the sub-indicator 6.2 if applicable)

| Technology | Capacity (MW) (Expected at PIF) | Capacity (MW) (Expected at CEO Endorsement) | Capacity (MW) (Achieved at MTR) | Capacity (MW) (Achieved at TE) |
|------------|---------------------------------|---|---------------------------------|--------------------------------|
| Biomass | 5.40 | | | |



Indicator 11 Number of direct beneficiaries disaggregated by gender as co-benefit of GEF investment

| | Number (Expected at PIF) | Number (Expected at CEO Endorsement) | Number (Achieved at MTR) | Number (Achieved at TE) |
|--------|--------------------------|--------------------------------------|--------------------------|-------------------------|
| Female | 2,000 | | | |
| Male | 2,000 | | | |
| Total | 4000 | 0 | 0 | 0 |

Part II. Project Justification

1a. Project Description

1) The global environmental and/or adaptation problems

The 5th Assessment Report of the IPCC states that global anthropogenic GHG emissions have continued to increase from 1970 to 2010 with significant increases toward the end of this period and about half of cumulative anthropogenic CO₂ emissions between 1750 and 2010 have occurred during last 40 years of this period^[1]. IPCC further states that bioenergy can play critical role for mitigation of GHG emissions^[2]. Pakistan is party to the UNFCCC and a such has made a voluntary commitment of reducing GHG emissions up to 20% of its 2030 projected GHG emissions subject to international assistance to meet the total abatement cost^[3].

Pakistan is the 6th largest country in the world having around 213 million population with annual growth rate of 2%. About 37% of these lives in cities, while a majority (63%) resides in rural areas (Pakistan Economic Survey, 2018-19)^[4]. With ever increasing human population and recent development, energy demand has increased many folds. The country is one of the developing countries that are struggling hard to meet the demand for electric power generation. Pakistan currently relies on fossil fuel sources in the operation of its conventional thermal electricity generation assets, with adverse environmental impacts, particularly GHG emissions. In terms of energy-mix, in 2018 Pakistan's reliance on oil for energy production reduced to 31%, on gas to 34%, while share of hydro-based energy stood at 7.7% and renewable energy contributed 1.1% to the total energy mix of the country. Renewable energy's contribution increased to 2.1% in 2019 and is likely to increase further in coming years, as the Government of Pakistan is looking for cost effective, clean, and alternative energy sources to tackle the energy crises and to keep economic development on track. The government now plans to increase renewable energy share to 30% by the year 2030. Out of several available options of renewable energy technologies, biomass energy is considered promising especially in an agrarian country like Pakistan, where agriculture sector offers employment opportunities to around 38% of its population and contributes 18.5% to the country's GDP and contribution of forests to GDP is only around 0.4% (Pakistan Economic Survey, 2018-19).

The energy sector in Pakistan has faced many difficulties over the past two decades, mainly because of high electricity generation costs, insufficient energy generation capacity, and highly inefficient energy generation, transmission, and distribution systems (GoP, 2013)^[5]. In fact, biomass generated by the agriculture sector has massive potential for energy generation and can reduce the increasing power demand-supply gap. The biomass scoping exercise conducted jointly by the FAO and the World Bank suggested that biomass coming from the agriculture sector is mainly from crop residues, namely wheat straw, rice straw, and cotton stalk, and of food processing residues, i.e. bagasse and rice husk. In case of woody biomass harvesting and wood processing residues, the exercise could not draw any conclusion on the potential availability of woody biomass and wood residue, as there were large discrepancies in the reporting. Further data collection and validation of existing data on wood biomass availability was recommended for complete assessment of availability

of the woody biomass. The report recommended that both primary and secondary crop residues can be converted into electricity through combustion, gasification, and/or con-generation technologies. However, the selection of the most suitable biomass-energy conversion technology will depend on energy needs and the existing energy infrastructure available in the country (FAO 2014[6]). The renewable energy resource mapping conducted in 2016 provides both theoretical and technical potential of biomass energy generation from crop residues. The theoretical feedstock potential was estimated at about 25.3 million tonnes/year (62,785 GWh/year of thermal energy) for crop processing residues and 114 million tonnes/year (456,440 GWh/year of thermal energy) for crop harvesting residues. Based on the existing use of the residues, the technical potential was estimated around 25.1 million tonnes/year (96,890 GWh/year of thermal energy). The analysis also showed that bagasse offers the highest potential through their use as a fuel in cogeneration plants. The installed capacity of the cogeneration plants using bagasse generated by 86 existing sugar mills in Pakistan was estimated at about 1,840 MWe, whereas Municipal Solid Wastes (MSW) with a combine installed power capacity was estimated around 370 MWe (World Bank, 2016[7]). These estimates suggest that there is considerable information gap in woody biomass availability assessment in the country and its potential for generation of power.

Renewable and sustainable biomass has been shown to have the potential to generate 76% of the peak demand for electricity in Pakistan. It is estimated that agricultural waste materials could generate 56% of Pakistan's electricity, and woody biomass could sustainably generate 9.5% of the peak demand for electricity. Fuelwood has several advantages over fossil fuels i.e., it is a cheap source of energy generation, could mitigate environmental pollution and has less amount of sulfur and other poisonous

gases. It has been estimated that 45,000 GWh annually can be added to the national grid if half of the total consumption of fuelwood is devoted to energy generation, which is 49% of the aggregate energy demand of 2018 (Pakistan Economic Survey, 2018-19). With the introduction of efficient woody biomass systems, the consequences of air pollution can be eradicated to a great extent in Pakistan. Currently, several kinds of energy devices for utilizing biomass exist, which are based on the direct combustion process to obtain useful energy. In the industrial sector, these devices have been utilized in sugar mill boilers and brick kilns to avoid harmful emissions. Wood fired systems are more energy efficient if the fuelwood is processed (dried, chipped, pelletized) before utilized

Context and global Significance

Among the options for Pakistan to reduce GHG emissions, particularly in the rural areas of the country, is the utilization of sustainable biomass energy resources, particularly woody biomass, to displace fossil fuel-fired energy systems, as well as the widespread application of energy efficient measures and practices in energy consuming operations and processes that support economic development. The sustainable production of woody biomass such as the establishment, operation and maintenance of dedicated fuelwood lots and the processing of wood wastes such as construction scrap wood, sawmill residues, and forest residues into woody biomass resources is an essential aspect of the promotion and widespread application of these renewable energy resources for displacing fossil fuel consumption. The processing of woody biomass into more efficient forms such as chips, pellets and briquets will enable more efficient and effective combustion, leading to lesser energy use and emissions. The application of appropriate woody biomass combustion technologies (e.g., gasification, fluidized bed, mass burning) would also facilitate more energy efficient utilization of this sustainable energy resource. Moreover, the production and utilization of energy efficient wood burning or wood-fired equipment (e.g., industrial ovens/kilns/furnaces) will facilitate maximum benefits from the utilization of these sustainable renewable energy resources. The proper (i.e., wise, efficient and effective) utilization of such devices and equipment will further ensure the realization of the energy and environmental and socio-economic benefits of woody biomass energy resources. Though the Government

of Pakistan is keen to enhance the share of renewable energy in the total energy mix of the country, especially from by utilizing the potential of biomass power energy, still there are many challenges which has to be overcome. Some of these challenges include: 1) lack of financing and high initial costs to set up a biomass power project; 2) lack of training, awareness, demonstration to farmers; 3) Lack of financial support and incentives; 4) lack of centralized approach and limited institutional support, especially from the provincial governments; and ineffective government policies; 5) long payback time to investors; and 6) undeveloped biomass market/lack of commercial services (Irfan et. al. 2019[1]).

Root Causes and Threats

The major causes of low level of application of woody biomass-based energy generation both for electricity production and non-power applications in the rural areas of Pakistan are the following:

Unsustainable use of woody biomass: Increase in human population has led to higher demand of limited forest resources (timber, fuelwood, and fodder) in the whole of the country to meet livelihood and household needs (e.g. building and energy needs). It is expected that unsustainable biomass use practices will further lead to deforestation and forest degradation.

Use of inefficient methods/technologies for biomass energy conversion: In Pakistan, rural industries that make use of woody biomass (e.g., tobacco curing) utilize energy inefficient equipment that consumes lots of woody biomass that often comes from unsustainable sources[2].

Pakistan is faced with the challenges in meeting the rural sector's energy needs, which has hampered the economic growth and socio-economic development efforts of the Government. Many villages and towns in rural areas are still either without electricity or experience frequent power outages due to load-shedding. In order to address these challenges, the government has shown its commitment for electricity generation through renewable energy sources. Biomass energy, such as woody biomass, is now being considered as a promising and alternate source of energy for generating electricity in the remote towns/villages of the country where the resources are available and can be sustainably produced and utilized. In the case of woody biomass energy (electrical and thermal) generation, the sustainable commercial development, production, and utilization of this resource must consider the abovementioned issues to ensure that the country fully benefit from its rational use.

Barriers

The overall project objective is the *widespread application of sustainable biomass energy technologies for supporting socio-economic development of, and reducing greenhouse gas (GHG) emissions from, the rural sector in Pakistan*. Despite a number of baseline initiatives (presented below), a number of barriers still exist to realize this objective. These barriers: policy, regulatory and institutional; use of poor technologies; inadequate investments and access to

financing, and limited capacity, awareness, and knowledge and are listed below:

Inadequate policy guidelines, regulatory framework, and institutional support for promoting woody biomass production for energy use and encouraging fuelwood production on farmlands:

- Policy and regulatory uncertainties (e.g. pricing, tariff, complex government procedures, delays in clearance and government approvals) for woody biomass production and utilization for energy production;
- Lack of clear strategy and economic incentives for promoting energy plantations and fuelwood production on farmlands and establishing woody biomass marketing channels;
- Weak institutional support for market actors involved in promoting innovative practices and efficient biomass energy technologies.
- Limited institutional capacity to provide technical support and regulatory enforcement for woody biomass energy production and use; and,
- Lack of feasibility studies and economic analysis for promoting energy efficient biomass technologies.

Limited financial investment and economic incentives for woody biomass production and application of energy efficient technologies and adoption of innovative approaches for woody biomass energy conversion and use:

- Lack of sustainable supply of woody biomass and fuelwood to meet the current and future demands of woody biomass energy production;
- Lack of economic incentives or financial matching between supply and demand for sustainably growing woody biomass resulting in poor confidence for local energy market.
- Lack of investment by the private sector for raising energy plantations and promoting fuelwood production on farmlands mainly because limited incentives for the private sector and financial resources available to farmers and SMEs.
- Poor technology: The current wood-fired equipment used in industries are energy inefficient, utilizes substantial amount of fuelwood that often result in high rate of local deforestation and increased GHG emissions.
- Limited private sector involvement in biomass energy production: So far, private sector involvement is limited to sugar mills that are utilizing bagasse for cogeneration of electricity (for own use and outside sales) and thermal energy (for own use); and,
- The most common biomass energy conversion practice is direct burning which is both inefficient and polluting leading to greater CO₂ emissions.

Limited capacity, awareness, and knowledge about the environmental benefits of use of efficient technologies.

- Limited capacity in raising energy plantations at wider landscapes and developing/using efficient technologies for biomass energy conversion.
 - Limited knowledge and low priority on creating public awareness on role of forests for rural socio- economic development; and,
 - Lack of awareness and knowledge about modern biomass energy conversion technologies, especially for their industrial applications; and,
 - Lack of transparent trade markets at the local level for the buyers and sellers of woody biomass. As a result, fuelwood prices vary from vendor to vendor.
- Entrepreneurs must come forward to exploit this opportunity, which could be explored by understanding the value/supply chain of woody biomass enterprises.

1a.2: The baseline scenario and any associated baseline projects

Pakistan is currently relying on fossil-fuel to meet its energy needs and unable to make transition to Renewable Energy (RE) despite have tremendous potential for renewable energy technology development and application. It is estimated that about 27% of the population still lacks electricity access and those who do, experience frequent blackouts. The total power generation capacity in the country is around 25,000 MW, out of this RE-based electricity production accounts only 1,558 MW[1]. Over-reliance on fossil fuel for power generation will worsen climate change impacts on the country, which already stands at number eight of countries affected by the climate change. By utilizing the potential of RE production, Pakistan could not only meet its growing energy needs, but also help in reducing GHG emissions. To achieve the production of RE, actions are required both at the national and provincial levels. However, the situation has changed with the 18th constitutional amendment in 2010 when the subject of energy was largely decentralized by giving autonomy to provinces to regulate policy measures and take initiatives for energy production, including linked to power production from renewable resources like biomass. Preliminary analysis of baseline scenario shows that the provinces have taken steps and launched number projects and programs for RE production, including biomass conversion to energy which provide a solid baseline for the proposed project.

The major on-going and planned baseline projects/programs being undertaken by the federal and provincial governments of Punjab, KP, Sindh, and Punjab are listed below:

| Project/Program | Implementing Entity | Status | Source of Funding | Total Cost (In US\$ million) |
|----------------------------|------------------------------------|---------|------------------------|------------------------------|
| Federal Ministries | | | | |
| Integrated Energy Planning | Ministry of Planning & Development | Planned | Government of Pakistan | 2.532 |

| | | | | |
|--|--------------------------------|----------|------------------------|--------|
| Distributed Generation Schemes through Renewable Energy | Ministry of Energy (Power) | Planned | Government of Pakistan | 6.329 |
| Ten Billion Tree Tsunami Program (Federal Component) | MoCC | On-going | Government of Pakistan | 41.76 |
| Punjab | | | | |
| Renewable Energy Development Sector Investment Program | Energy Dept. GoPb | On-going | Government of Punjab | 78.136 |
| Feasibility Study Consultancy for Biomass based Power Plant setup near wheat and rice production | Energy Dept. GoPb | On-going | Government of Punjab | 1.028 |
| Energy Efficiency & Conservation Programme (Punjab) | Energy Dept. GoPb | On-going | Government of Punjab | 6.438 |
| Energy Sector Policy Formation | Energy Dept. GoPb | Planned | Government of Punjab | 0.063 |
| Piloting, waste to energy projects and closure of selected solid waste dump sites and trapping of methane emission | Local Govt. & Comm. Dev. Dept. | Planned | Government of Punjab | 1.266 |
| Energy audit of Local Governments and solarization of selected energy needs | Local Govt. & Comm. Dev. Dept. | Planned | Government of Punjab | 3.164 |
| Ten Billion Tree Tsunami Program (Punjab Component) | Forest Dept. | On-going | Government of Punjab | 84.05 |
| Khyber Pakhtunkhwa (KP) | | | | |
| Development of Renewable Energy in Khyber Pakhtunkhwa (REDSIP) | Ener. & Power Dept. KP | On-going | Government of KP | 15.823 |
| Electrification of 100 Villages through Solar/Alternate Energy | Ener. & Power Dept. KP | On-going | Government of KP | 1.484 |
| Electrification of Un-Electrified village | | | | |

| | | | | |
|--|------------------------|----------|---------------------|--------|
| s through Solar/Alternate Energy in remaining Districts of Khyber Pakhtunkhwa Phase-II. | Ener. & Power Dept. KP | On-going | Government of KP | 0.814 |
| Solar Electrification of 4,000 Masajid in Khyber Pakhtunkhwa | Ener. & Power Dept. KP | On-going | Government of KP | 15.284 |
| Sustainable Energy & Economic Development Programme (SEED) | Ener. & Power Dept. KP | Planned | DFID | 43.599 |
| Improving Quality of Learning through Provision of Sustainable Renewable Energy Solutions in Primary Schools in Southern Districts of KP | Ener. & Power Dept. KP | On-going | UNOPS | 8.568 |
| Introduction of Zigzag Technology in Construction and Operation of Brick Kilns in Khyber Pakhtunkhwa | Env. Dept. KP | On-going | Government of KP | 0.127 |
| Raising of Fuel wood species plantation in SWA | Forest Dept. KP | On-going | Government of KP | 1.026 |
| Promotion of Energy Plantation in District Kurram | Forest Dept. KP | On-going | Government of KP | 0.506 |
| Energy Plantation in Sub-Division, D.I Khan. | Forest Dept. KP | On-going | Government of KP | 0.152 |
| Billion Tree Afforestation Project KP (Phase-III) | Forest Dept. KP | On-going | Government of KP | 45.89 |
| Ten Billion Tree Tsunami Program (KP Component) | Forest Dept. KP | On-going | Government of KP | 81.36 |
| Sindh | | | | |
| Ten Billion Tree Tsunami Program (Sindh Component) | Forest Dept. Sindh | On-going | Government of Sindh | 16.43 |
| Enhancing Tree Cover on State Forest Lands in Sindh | Forest Dept. Sindh | On-going | Government of Sindh | 4.26 |
| Sarsabz Sindh Making Sindh Green and Environment Friendly | Forest Dept. Sindh | On-going | Government of Sindh | 3.61 |

| Balochistan | | | | |
|--|--------------------------|----------|---------------------------|----------------|
| Ten Billion Tree Tsunami Program (Balochistan Component) | Forest Dept. Balochistan | On-going | Government of Balochistan | 20.73 |
| Total: | | | | 484.429 |

In term of biomass resources, the proposed project will mainly focus of woody biomass conversion for energy production, including the supply chain such as energy plantations, fuelwood from farmlands and discarded woody waste. However, possibility of using biomass from other sectors e.g. agriculture residues (wheat straw, rice rusk/straw, and cotton sticks) will also be explored. The current biomass conversion practices in Pakistan are largely direct burning which is both inefficient and polluting in addition CO₂ emissions, whereas modern biomass energy conversion technologies (e.g. direct combustion and dendro-gasification) exists in the market and are already proven technologically viable. The proposed project will build on these baseline initiatives and technologies for promotion and application of sustainable biomass energy production technologies in Pakistan.

1a.3: The proposed alternative scenario with a brief description of expected outcomes and components of the project

The proposed project is expected to bring about an increased utilization of indigenous renewable energy (RE) resources for meeting the electricity and other energy requirements of the country. It will facilitate the realization of an alternative scenario in the country's energy sector characterized by an increased share of RE (excluding hydro) in the power generation mix of the country by 2030 as per the GOP's plan, with woody biomass contributing significantly compared to that at present. Such scenario means Pakistan meeting its growing energy needs, with reduced carbon and environmental footprints. In such scenario, the provinces are able to enforce energy policy measures and take initiatives for energy production, including linked to power production from renewable resources like biomass.

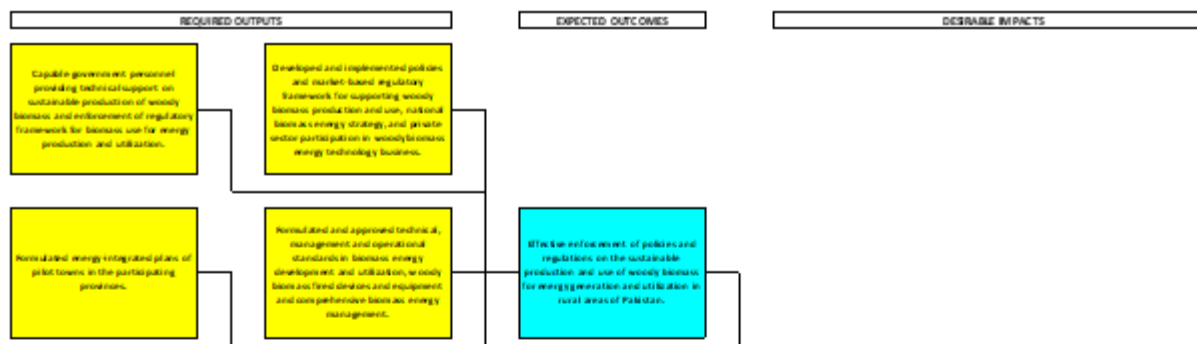
Theory of Change

Essential changes in the current energy situation in the rural sector in Pakistan will facilitate the widespread application of sustainable biomass energy technologies and such transformations will significantly contribute to the sector's socio-economic development. With the widespread application of such energy technologies, particularly those that utilize woody biomass, will also bring about reduction in the greenhouse gas (GHG) emissions from this sector. These changes include: (1) effective enforcement of policies and regulations on the sustainable production and use of woody biomass for energy generation and utilization; (2) enhanced woody biomass production on forested, non-forested, and on farm lands for woody biomass energy supply; (3) increased investments in the application of technologies for the production, and energy efficient utilization of woody biomass energy; (4) improved availability of financial resources available for woody biomass energy technology application projects; and, (5) enhanced local capacity, skills and knowledge in the development, installation, and operation of biomass energy technology systems. The removal of the current barriers/challenges to the achievement of these changes is therefore key to achieving the objective of widespread application of sustainable biomass energy technologies for supporting socio-economic development in the rural sector of Pakistan. The overall strategy to facilitate these changes is barrier removal. By implementing strategic barrier removal

activities, specific outputs will be delivered, which collectively will bring about the desired changes. With the facilitation of the achievement of these major changes, the resulting main global environmental benefit would be reduction of GHG emissions from the rural sector in Pakistan. The other desirable impacts are: (1) improved sustainable socio-economic development; and (2) Improved local environment and minimized unhealthy conditions from the use of inefficient biomass energy technologies and equipment. Fig. 1 illustrates the theory of change that will be the basis for the design of the proposed project.

The proposed project will build on the existing initiatives of the Government and private sector for promoting energy plantations, which produces a range of biomass by-products (e.g. trimmings and wood waste) that could be converted into biomass energy through simple processing technologies and appropriate applications. The project strategy is to remove major barriers to the enabling of these various aspects of woody biomass-based power generation, sustainable woody biomass production and utilization, and the application of energy efficient wood-fired equipment/devices and innovative practices in the efficient use woody biomass resources.

Component 1: Establishment of Policy and Regulatory Framework for Sustainable Woody Biomass Energy Production and Utilization - This component aims to address policy, regulatory, institutional barriers in sustainable production and use of woody biomass for promoting efficient biomass energy technologies to reduce GHG emissions from the rural areas. The expected outcome is the effective enforcement of policies and regulations through enhancing institutional capacities to support woody biomass production for biomass energy generation and utilizations. This will involve developing policy guidelines and market-based regulatory framework that support woody biomass production and utilization for energy production both for power and non-power applications. The power applications will focus on decentralized power generation and distribution (through mini/micro-grids) in the unelectrified areas where woody biomass is available either from forest residues or fuel trees that are commercially grown in community-operated woodlots and farmlands. A comprehensive situation analysis will be conducted for mainstreaming woody biomass production into the agriculture and forestry sectors. Based on this situation analysis a national strategy for promotion of sustainable biomass energy production and utilization will be developed with the involvement of key stakeholders. The effective implementation of this strategy would help in establishing community-based energy plantations and promoting fuelwood production on farmlands in potential districts of Punjab, KP, Sindh, and Balochistan. Proper feasibility studies will be conducted, and energy-integrated action plans of 8 pilot towns (2 in each province) will be developed for sustainable woody biomass production and supply for generating biomass energy. A capacity development program will be organized and conducted to train 60 national and local government personnel (15 from each province) that will provide technical support on sustainable production of woody biomass and enforcement of regulatory framework for biomass use for energy production and utilization. Technical, management and operational standards will be formulated and approved for biomass energy development and utilization, woody biomass fired devices and equipment and comprehensive biomass energy management.



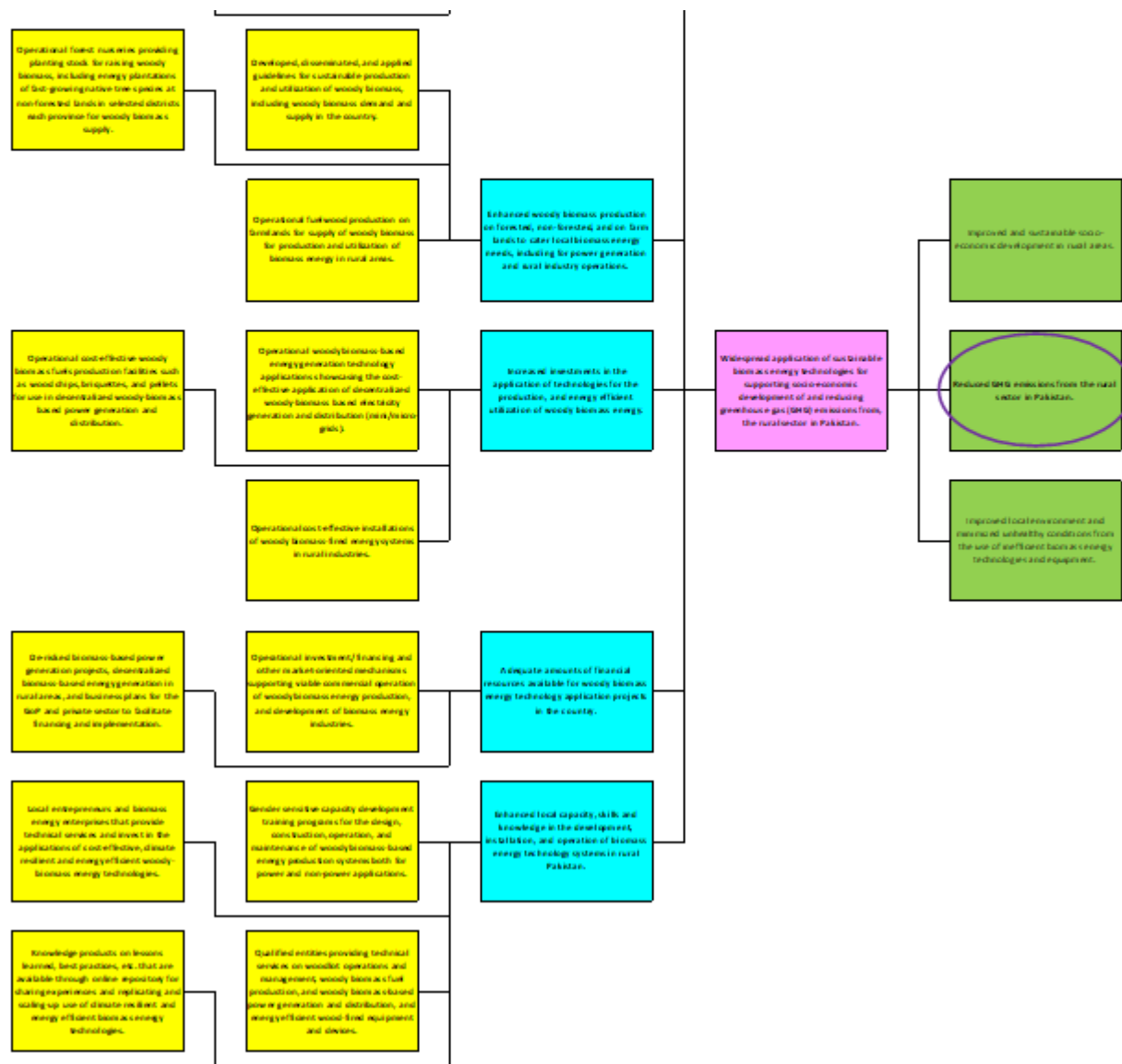


Fig. 1: Theory of Change for the PASBET Project

Component 2: Promotion of Woody Biomass Energy Production and Energy Efficient Utilization Technologies - The main thrust under this component is on ensuring sustainable biomass supply and biomass energy production and utilization through introduction of cost-effective, climate resilient and energy efficient biomass energy technologies. There are 2 expected outcomes under this project component. The first one is enhanced woody biomass production on forested, non-forested, and on farm lands to cater local biomass energy needs, including for power generation and rural industry use in unelectrified areas of

the country by providing technical support for improved biomass production, including sustainable supply of planting stock of fast-growing native plant species and managing supply chain of woody biomass with the involvement local entrepreneurs and SMEs. This will include development and disseminating guidelines among stakeholders and partners for sustainable production and utilization of wood biomass by raising energy plantations. Supply chain and market analysis will be conducted to document woody biomass demand and supply in the biomass energy sector. Technical and financial support will be provided to local farmers and community organizations establishing farmers/communal nurseries over around 300 ha to provide planting stock for raising woody biomass on forested, non-forested and farm lands by involving individual farmers and community organizations. To enhance woody biomass production for catering the biomass energy needs for power generation productive use businesses, and rural industries, the project will facilitate the establishment of energy plantations (over 40,000 has.) by planting fast-growing native tree species on forested and non-forested lands in selected districts of Punjab, KP, Sindh, and Balochistan. Local farmers will be encouraged to enhance sustainable fuelwood production by planting trees of locally adapted tree species for supply of locally produced fuelwood for biomass energy production and utilization for power generation and supply and rural industries. Effective safeguarding measures will be taken to avoid negative effects local ecosystems and biodiversity. During the project design and development (PPG) stage, the services of a biodiversity and safeguards specialist will be engaged to carry out the assessments and feasibility studies in the selected districts. The proposed locations in selected districts will be thoroughly and carefully selected. Furthermore, a Biodiversity Action Plan will also be prepared during the PPG stage to ensure that the potential risks verified and come up with the appropriate preventive and alleviative risk mitigation measures.

Raising woodlots by establishing block plantations and planting fast-growing native tree species on farm-lands will improve tree cover in the targeted areas, which will have a positive impact on biodiversity through creating new habitats for insects, birds, small and large mammals, and will enhance soil microbial biodiversity. Moreover, the interventions like raising forest nurseries, energy plantations, and fuelwood on farmlands will involve local people thus help creating “green jobs” and increasing household income and alleviating poverty from the rural landscape through establishing sustainable woody-biomass production and marketing system run by the local communities with the technical backstopping by the government personnel of the line departments. The main beneficiaries of these green jobs would be woman, youth, and marginalized segments of the society in rural communities. Working closely with nature enhances resilience. Hence, this helps in recovery from pandemics like COVID-19 and other similar threats in the future. including looming dangers of climate change and natural disaster like flash-floods and prolonged droughts.

The second outcome is increased investments in the application of technologies for the production, and energy efficient utilization of woody biomass energy. The activities that will be carried out will address the technological barriers by promoting and showcasing biomass energy efficient technologies and adoption of innovative practices for woody biomass energy conversion and utilization. Cost-effective applications of EE woody biomass fired technologies and comprehensive energy management systems in selected energy end-use sectors in support of rural socio-economic development will be demonstrated. Among these is the design, engineering, construction, commercial operation, and maintenance of woody biomass fired power generation and distribution systems in the 4 provinces for the supply of electricity to selected unelectrified rural villages. These will showcase the cost-effective application of decentralized woody biomass-based energy generation and distribution (through mini/micro-grids). The demonstrations will involve the installation of a woody biomass fired power generation system that will produce and distribute electricity to consumers (residential, commercial, and industrial) in the surrounding villages. A mini/micro-grid system will be installed for supplying the electricity to consumers. Where possible and feasible, other RE-based power generation units will also be integrated into the system to operate in hybrid mode or as supplementary unit when the main biomass-fired unit is under maintenance. Such system will be operated and maintained as a commercial business. A key driver of the business model will be the need to collect fees for electricity sales and use part of revenues for the operation, repair, and maintenance of the system. This will involve increased investment both from the public and private sectors

for promoting biomass energy efficient technologies and scaling-up innovative practices for biomass energy production and utilization at the rural industry levels. Fiscal incentives will be provided to the private sector, local entrepreneurs and industry engaged in biomass production and utilization for designing and production of energy efficient technologies and equipment. There will be applications of innovative and energy efficient wood-fired industrial equipment to reduce GHG emissions from rural industries. For example, introduction of wood-fired tobacco curing barns (e.g., twin-tarbu barn) in partnership with leading tobacco companies active in Swabi District of KP. So far, wood briquetting/pelleting technology has not been introduced in the rural areas in Pakistan, though it has been practiced at some localities at a very small scale. Three (3) pilots for showcasing improved woody biomass fuel production technologies for producing wood chips, briquettes and pellets at potential sites will be implemented. Entrepreneurs in rural areas hardly have access to technical assistance and financial support for installing energy efficient equipment. Technical support and partial financial assistance will be provided to selected local entrepreneurs for the production of energy efficient wood-fired equipment. The results and impacts of these investment activities will be monitored, documented, and published for dissemination.

In summary, there will be demos in each of the 4 provinces for woody biomass-based energy generation technology applications. There will be 4 sites (one per province) for the woody biomass based power generation and distribution demos. There will be at least 4 sites (one per province) for the industrial demos where the cost-effective applications of energy efficient wood-fired industrial equipment will be showcased, plus the 3 pilots for showcasing improved woody biomass fuel production technologies for producing wood chips, briquettes, and pellets.

Lastly, in the light of the current Covid-19 pandemic situation in the country, the investment activities of the proposed project will be designed to not only to demonstrate the relevant technologies that the project is promoting but also to support more resilient livelihoods and infrastructure that enables green recovery from COVID-19 impacts and building future resilience. The envisioned demos of the project will engage the private sector to further bolster the objective of promoting low-carbon, low-pollution, and nature positive solutions for to support rural socio-economic development in the country. These actions would help in supporting low carbon development through applications of cost-effective renewable energy, low-carbon, and energy efficient technologies.

Component 3: Supporting Financial Requirements for Biomass Energy Technologies Initiatives - This component will target the removal of financial barriers to woody biomass production and application of energy efficient technologies and adoption of innovative approaches for woody biomass energy conversion and use, including biomass energy production for power and non-power applications. The expected outcome from the delivery of the expected outputs under this component is adequate amounts of financial resources become available for woody biomass energy technology application projects in the country. The realization of this outcome will involve establishing and operationalizing financial mechanisms for supporting commercial viabilities and operations of woody biomass energy production for both power and non-power applications and development of biomass energy industries at potential locations in targeted districts. The establishment of proper marketing and supply chain would be crucial for the demonstration of the woody biomass energy production technologies. For this purpose, market-oriented mechanism will be established for the development and utilization of biomass energy resources, energy efficiency and comprehensive biomass energy management systems for supporting sustainable rural socio-economic development. These interventions will support creation of “green jobs” and produce benefits for the rural people, especially marginal segments of the society and climate vulnerable communities and help in avoiding potential exposure of these people to COVID-19 or threats from future pandemic. Feasible financial schemes for setting up biomass energy technologies application projects, woody biomass-based energy generation, and EE wood-fired device/equipment production business will be supported, as well as decentralized biomass-based energy generation initiatives in rural areas. Business plans/models for the district governments and private sector to facilitate financing and implementation of woody biomass energy production projects will be developed.

Component 4: Biomass Energy Technology Capacity Building and, Knowledge Management and Gender Mainstreaming - This component will primarily address the capacity, awareness and information barriers associated with biomass energy production and utilization technologies. Enhanced local capacity, skills and knowledge in the development, installation, and operation of biomass energy technology systems in rural Pakistan is the expected outcome from the delivery of the planned outputs of this project component. Therefore, building local capacities, creating awareness, generating, and disseminating technical knowledge, and gender mainstreaming steps across the project interventions will be the key elements of this component. This will involve the design (based on a capacity needs assessment) and implementation of gender sensitive capacity development training programs for the design, construction, operation, and maintenance of woody biomass-based energy production systems both for power and non-power applications, as well as for strengthening institutional capacity for supporting sustainable biomass energy production and utilization. Training of trainers will also be carried out to enable capacity development on woodlot operations and management, woody biomass fuel production, and woody biomass-based power generation and distribution, and on the promotion of the widespread applications of energy efficient wood-fired equipment and devices. Outreach activities will also be provided to key value chain actors of biomass energy enterprises to enhance their capacity and motivate them to provide technical services and invest in the applications of cost-effective, climate resilient and energy efficient woody-biomass energy technologies. Knowledge products on lessons learned, best practices will be produced and disseminated through online repository for sharing experiences and replicating and scaling-up use of climate resilient and energy efficient biomass energy technologies.

1a.4: Alignment with GEF focal area and/or Impact Program strategies

The proposed project is line with the GEF-7 Climate Change focal area investment strategy and its goal “to make transformation shifts toward low emission and climate-resilient development pathways.” It fits well under the focal area Objective 1: “promote innovation and technology transfer for sustainable energy breakthroughs”, which calls for facilitating innovative solutions, including technologies, management practices, supportive policies, and financial mechanisms that encourage private sector engagement for technology transfer and innovation to deliver sustainable energy solutions that control, reduce, and prevent GHG emissions. The project components are well aligned with two entry points of the GEF-7 Climate Change Mitigation Objective: (a) de-centralized renewable power with energy storage, and, (b) accelerating energy-efficiency adoption.

The proposed project will develop and demonstrate the application of new business models that ensure sustainable woody biomass production and supply, and decentralized woody biomass-fired power generation and distribution, which will collectively bring about reduced rural carbon emissions and air pollution. This will be supplemented by the promotion of innovations (e.g. processed woody biomass like pellets, briquets, chips etc.) and technology transfer in the rural villages and towns to support socio-economic development in an environment-friendly manner.

Energy efficient wood-fired equipment and appliances/devices are commercially available in other countries. However, these technologies are yet to be promoted in Pakistan, particularly in unelectrified rural areas where rural households and rural industries use woody biomass as energy source. The current use of woody biomass in these areas are very energy wasteful because the wood-fired equipment (e.g., boilers, kilns, tobacco curing barns). Improving the efficiency of such equipment and making the wood-fired thermal energy processes optimal will contribute to energy savings and GHG emission reduction and reduced air pollution.

1a.5: Incremental/additional cost reasoning and expected contributions from the baseline, the GEFTF, LDCF, SCCF, and co-financing

Pakistan has experience high rate of deforestation over the last three decades. Though government of Pakistan has taken some steps to increase forest cover in the country through mass afforestation programs, these measures will not be enough unless a holistic approach is adopted to mitigate climate change threats. Substitution of fossil fuel by renewable energy resources such as woody biomass, promoting and facilitating commercial sustainable woody biomass production and supply, and application of energy efficient biomass energy conversion technologies would contribute to the country's efforts to address climate change challenges. The current biomass energy conversion practices in Pakistan are practically direct burning, which is inefficient and contributing to GHG emissions, whether it is woody biomass used for cooking and space heating, or rural industry thermal operations. Efficient biomass energy conversion technologies have been applied in the country in various energy end use sectors, and have proven successful in reducing, if not eliminating, GHG emissions by virtue of their displacement of fossil fuels that would typically be used in such energy consuming operations and processes. There are indeed major challenges stacked up against the widespread application of energy efficient biomass energy conversion technologies in the country, as well as in sustainable woody biomass production. The GEF resources requested for this project will be targeted to remove these identified major barriers/challenges. The envisioned barrier removal activities that will be carried out under this project are practically the incremental activities that the requested GEF funding will support. Without GEF support, rural communities in Pakistan would continue to rely on traditional use of non-sustainable fuelwood to meet their energy needs. Inefficient wood-fired industrial equipment (e.g., kilns, boilers), coupled with increasing growth of rural energy consuming enterprises, will lead to unsustainable production, and use of biomass resources, thus increasing the chances of further increase in deforestation—loss of carbon stock. Hence increased GHG emissions.

1a.6: Global environmental benefits (GEFTF) and/or adaptation benefits (LDCF/SCCF)

The proposed project will generate multiple global environmental benefits (GEB). The primary GEB will be reduction in GHG emissions by promoting biomass energy efficient technologies such as biomass-based power generation and innovative practices for woody biomass energy conversion and utilization. This will directly contribute to reducing GHG emissions in the rural areas and towns, especially through introduction of improved wood-fired industrial thermal equipment such as efficient wood-fired boilers, kilns, and furnaces and tobacco curing barns.

The GHG emissions that are attributable to the project will come from the woody biomass energy production and woody biomass energy technology application activities that will be carried out under the project. Such applications in the rural sector areas of selected districts of the 4 provinces - Khyber Pakhtunkhwa, Punjab, Sindh and Balochistan) are intended to facilitate reduced GHG emissions from energy activities of the country. Some expected replications of these applications will be facilitated during the project implementation period, and this will be in operation towards the end of the project or just after the end of the project. Based on the preliminary line up of demonstration woody biomass-based electricity production as presented in Annex D, the quantity of direct and consequential GHG emission reduction that can potentially be realized from the barrier removal activities of the project is about 3.1 million tons of CO₂ by the end of the project's 10-years influence period. It is estimated that about 64,633 tons of direct GHG emission reduction can be

potentially achieved during the five-year implementation period of the PASBET Project. These estimates of GHG emission reductions that can be facilitated and influenced by PASBET are preliminary. As the project application development process is progressing, the MCC will organize experts to carry out further detailed analyses to come up with an improved estimation of the GHG emission reduction impact of the project.

1a.7: Innovation, sustainability, and potential for scaling up

Innovation: The project intends to promote and facilitate commercial production and utilization of sustainable woody biomass in energy deficient remote districts of the country. The application of decentralized power generation and distribution in these areas using available sustainable woody biomass resources is a new and innovative endeavor in Pakistan. To sustainably support the operation of such system, the project will introduce environment friendly fuelwood supply systems that involves the establishment of energy plantations and promoting farm-forestry for enhancing forest cover and woody biomass with the involvement of local communities and private sector. This is an innovative model that would generate important lessons and best practices for wider application across the country. The introduction of energy efficient biomass energy technologies (specifically using sustainable woody biomass) and the adoption of innovative practices for biomass energy conversion and utilization would substantially contribute to reducing GHG emissions, improving local environment and minimizing unhealthy conditions due to smoke/smog produced from the use of inefficient wood-fired technologies and equipment. Through the project's collaborative approaches, incentive measures, sustainable supply chain development will act as catalyst for engagement of local entrepreneurs and private sector for production and sustainable use of woody biomass.

Sustainability: Sustainability of project interventions will be ensured by building on the earlier initiatives of the government and private sector for curbing deforestation and enhancing tree cover in the country. A strong linkage and collaboration with government's on-going initiatives (Clean and Green Pakistan, TBTT-P, REDD+ Readiness project, SFM, SLM projects etc.) would help in creating sustainability. The involvement of relevant federal government agencies, provincial forestry departments, local community leaders, woody biomass traders and entrepreneurs, and private sector into every aspect of project designing and implementation would enhance ownership of project interventions and improved/sustainable access and benefit sharing. The project's enabling environment and capacity building efforts for the widespread applications of woody biomass energy generation technologies and energy efficient wood-fired equipment/devices for the industrial sector of the target remote rural areas, as well as the raising of energy plantations for the sustainable supply of woody biomass would help in maintaining health environment promoting local livelihoods through sustainable production and utilization of woody biomass, thus reducing pressure on natural ecosystems and GHG emissions.

Scaling-up: The innovative ideas and practices under the three proposed components of the project can be replicated and scaled-up to other parts of the country, especially in Sindh and Balochistan. Raising energy plantation on barren lands and trees grown on farm lands will provide a major economic incentive to rural communities to expand these activities to other potential sites to earn the hard cash through production and sale of woody biomass to wood-fired thermal equipment used in rural industries and at the same time reducing threats to natural forests and reducing GHG emission from the introduction of efficient technologies. Lessons learned and knowledge generated through on-the-ground project interventions will help in replicating and scaling-up best practices at the national, sub-national and regional levels.

[1] WWEA and HBS. 2017. Impact of 18th Constitutional Amendment on Governance of Renewable Energy in Pakistan. WWEA Policy Paper Series (PP-02-17): 31 pp.

[1] Irfan, M., Z. Yu Zhao, M. K. Panjani, F. H. Mangi, H. Li, A. Jan, M. Ahmed, and A. Rehman. 2019. Assess the energy dynamics of Pakistan: Prospects of biomass energy. Energy Report 6 (2020) pp. 80-93.

[2] For example, the estimated firewood consumption in curing tobacco at Pakistan Tobacco Company's (PTC) operations in 2009 was about 2.2 kg of firewood per kg of cured tobacco. In 2009, about 16,505 tons of firewood was burned for tobacco curing in PTC owned barns resulting in 543 tCO₂e emissions. CH₄ and N₂O contributed 183 and 360 tCO₂e emissions, respectively. The high consumption of unsustainable wood in the tobacco curing industry contributed to deforestation and forest degradation in surrounding areas and produce higher quantity of GHG emissions.

[1] IPCC, WGIII,AR5,SPM pp 6 http://report.mitigation2014.org/spm/ipcc_wg3_ar5_summary-for-policy-makers-approved.pdf

[2] IPCC, WGIII, AR5, SPM pp 26 http://report.mitigation2014.org/spm/ipcc_wg3_ar5_summary-for-policy-makers-approved.pdf.

[3] Pakistan's Nationally Determined Contribution (Pak-NDC). Ministry of Climate Change. 31 pp.

[4] Pakistan Economic Survey, 2018-19. Ministry of Finance, Islamabad. (finance.gov.pk): 185 pp.

[5] National Power Policy, Government of Pakistan, 2013.

[6] FAO, 2014. Sustainable biomass production and biomass mapping for electricity in Pakistan (Scoping Phase).

[7] World Bank. 2016. Renewable Energy Resource Mapping: Final Report for Biomass Atlas for Pakistan. 76 pp

1b. Project Map and Coordinates

Please provide geo-referenced information and map where the project interventions will take place.

The project will be implemented in selected districts of Punjab, KP, Sindh, and Balochistan. These are both experiencing deforestation and have potential for enhancing woody biomass through targeted afforestation operations, including raising woodlots and farm-forestry. The proposed project districts include: Bhakkar and Layyah of Punjab, Dera Ismail Khan and Swabi of KP, Jacobabad and Kashmore of Sindh, and Dera Bugti and Jaffarabad (including Sohbatpur) of Balochistan province. Annex A shows a map for geo-reference of project districts where project interventions will take place.

2. Stakeholders

Select the stakeholders that have participated in consultations during the project identification phase:

Indigenous Peoples and Local Communities Yes

Civil Society Organizations Yes

Private Sector Entities Yes

If none of the above, please explain why:

In addition, provide indicative information on how stakeholders, including civil society and indigenous peoples, will be engaged in the project preparation, and their respective roles and means of engagement.

The project designing/planning team will work closely with the key stakeholders at the national, provincial, and local levels for effective planning and implementation of the proposed project. The cross-sectoral and participatory nature of the project would require involvement of wide range of stakeholders at different stages of project implementation. Therefore, a comprehensive “stakeholders participation strategy” with a clear road map will be developed during the inception phase of the project. A mechanism for involvement local user groups, traders, and entrepreneurs, including both men and women will be devised.

The key stakeholders that identified through the preliminary analyses are listed in table below. A more detailed stakeholder engagement plan will be developed during the PPG phase to describe stakeholders’ specific roles and engagement during the implementation of the full project.

| Stakeholders | Contribution during Project Design and Development |
|--|---|
| Ministry of Climate Change (MoCC) | MoCC oversees inter-provincial coordination of forestry-related matters and is responsible for consultation with the provincial forest departments, prepares policy, strategy, and action plans for sustainable management of woody biomass in the country. It also responsible for meeting international obligations under various MEAs. The Ministry will also support for inter-provincial coordination during designing phase of the project and ensure inter-sectoral coordination with the relevant ministries for planning and taking actions for sustainable biomass production, decentralized power generation and introducing efficient woody biomass energy conversion technologies. |
| Economic Affairs Division (EAD) and Ministry of Planning Development and Reforms (MoPDR) | The EAD and MoPDR will provide guidance in project planning and implementation phase, including coordination with Finance, and development Planning ministries to mobilize co-financing of the project. The Centre for Rural Economy (CRE) operating under the MoPDR will provide support for filling gaps in woody biomass based rural economy and to study its value chain and recommend ways and means to improve supply chain for |

| | |
|---|---|
| | meeting needs producers and consumers, as well small farmers. |
| Provincial Forestry Departments | The provincial Forest Departments of Punjab, KP, Sindh, and Balochistan will support during project planning and stakeholder consultations. They will also facilitate data collection for use in project design, as well as provide technical support for raising energy plantation and ensure provincial co-financing of the project. |
| Ministry of Energy (Power Division) – Alternative Energy Development Board (AEDB) | AEDB has the Federal Government mandate to facilitate, promote and encourage development of Renewable Energy in Pakistan and with a mission to introduce Alternative and Renewable Energies (AREs) at an accelerated rate. It will provide technical support in the design of activities on the formulation of policies, programs and initiatives through private sector that are supportive of woody biomass energy generation, in line with achieving sustainable economic growth. It will provide advice on the design of activities on transfer of technology and development of local technical services on woody biomass resources. |
| Ministry of Energy (Power Division) - National Energy Efficiency & Conservation Authority (NEECA) | NEECA serves as a federal focal agency for initiating, catalyzing, and coordinating all energy efficiency and conservation activities in different sectors of economy. It develops mechanisms and procedures for conservation and efficient use of energy. NEECA has been charged with a wide range of responsibilities. They will help in the project designing and developing policies and regulatory frameworks during the project implementation. NEECA will also take lead role for technology transfer, capacity development and organization of trainings for capacity building of individual, SMEs, and private sector in designing and using energy efficient wood-fired industrial equipment. |
| Research and academic institutions | National and provincial research institutions including Pakistan Forest Institute and National University Science and Technology (NUST) will be engaged in the design of capacity building of farmers, woody biomass producers, traders, and other actors involved in biomass supply chain. Moreover, the Global Change Impact Studies Centre (GCISC) of MoCC will lead the design of the research activities of the project and support establishing online Knowledge Management (KM) repository. |
| Civil Society Organizations/Community Based Organizations/ | CSOs/local CBOs including Women Organizations being important stakeholders will be consulted during the PPG phase by holding consultative meeting and stakeholders' workshop to seek their input and identify their possible roles during implementation of project activities. Farmers' ass |

| | |
|---|---|
| Farmers' Associations ^[1] | ociation will be established and involved in raising woodlots and promoting fuelwood production on farmlands. |
| Private Sector (Electric Power Producers and Rural Industries) | Private sector such electric power producers, woody biomass traders, rural industry companies will be involved in the project designing by holding special consultative sessions with biomass energy consumers and individual meetings, as well as ensuring the participation in the project design's validation workshop. Private sector's stake and roles during implementation of the project, including in controlling deforestation, raising energy plantations, and introducing energy efficient technologies. They will also be sensitized and encouraged to co-finance the project activities by offsetting GHG emissions and making investments for raising woodlots and technology transfer. |
| International NGOs, UN Agencies, and Donors. | A number of international NGOs like International Renewable Energy Agency (IRENA), ICIMOD, and ACARDA have been involved in renewable energy (including biomass energy) studies, assessments, and mapping. There are study reports and research findings that will inform the project designing. Similarly, UN Agencies—UNIDO, FAO and UNDP have been involved in special studies and bio-energy resource mapping. Besides, multi-lateral donors such World Bank and Asian Development Bank have been assisting Pakistan for assessment of renewable energy potential in the country. They will be involved in the project designing through their participation in the stakeholders' consultative workshops and meetings to be organized during the PPG Phase. |

^[1] The discussions with the local communities were mainly part of the stakeholder consultation activities that they have done under the Government's Ten Billion Tree Tsunami Program. The discussions under that program were done through workshops and focused consultations and were in line with the objective to pave the path for job creation for common people through green initiatives. The government is focused to increase the number of private nurseries for raising plants to generate the economic opportunities. Hence, the discussions with the local communities in the planned project districts was, among others, on how the proposed project will build on the planned technical and financial support that will be provided to local farmers and community organizations under the program for establishing farmers/communal nurseries to provide planting stock for raising woody biomass on forested, non-forested and farm lands by involving individual farmers and community organizations. Among the discussions that were carried out with stakeholders were with the technical personnel of the Provincial Forestry Departments, who themselves are regularly in touch with local communities including those communities in the planned project districts. The Forestry personnel informed the project proponents about the suggestions of the local communities in comprehending the key challenges to tackling deforestation and in coming up with concrete measures to tackle the issue with other innovative measures such as the planned interventions of the proposed project.

The project development team will carry out the required stakeholders' consultations during the PPG stage, not only for data gathering but also for the preparation of the project's Stakeholder Engagement Plan.

3. Gender Equality and Women's Empowerment

Briefly include below any gender dimensions relevant to the project, and any plans to address gender in project design (e.g. gender analysis).

Women's participation, representation, and access to woody biomass and energy efficient technology/equipment used in rural cottage industries will be considered a priority in this project. The proposed project would also contribute towards better health and socio-economic uplifting of women in rural areas through specific interventions that: promote participatory and consultative planning and decision-making; improve women's capabilities through their involvement as trainers, consumers, and producers, and advance their role in decision making regarding raising wood lots and farm-forestry. The project will also have gender specific indicators, which include collection of gender-disaggregated data and strong M&E mechanism to advance gender mainstreaming and social equity. During the design and development of the project, a gender analysis will be conducted to assess opportunities for enhancing women's role in natural resources management, in general, and particularly in the development and operations of a sustainable biomass energy market in Pakistan. The community consultations will be organized to obtain views and inputs of a wide range of local stakeholders, including women, to develop project activities and to inform a robust stakeholder involvement plan with full gender considerations.

A more detailed assessment will be done on the various aspects of gender equality and mainstreaming will be carried out during the project design and development (PPG). Such assessment will determine how the project will facilitate gender equity in the woody biomass production in the forest areas and farmlands, as well as in the demonstration of the cost-effective applications of woody biomass energy production and energy efficient wood-fired equipment in rural industries, as well as in providing financial support for biomass energy technologies initiatives. During the project conceptualization (i.e., PIF development), the project proponents did not have enough information about the current gender equity situation in the planned project districts in the 4 project provinces. Nonetheless, the project proponents have taken note of the potential barriers which limit the active participation of both the genders (men and women) in agricultural operations and also towards gender disparity in agricultural extension. Like in agriculture, it is envisioned that woody biomass production and utilization for power and non-power applications will involve both men and women in various operations and processes. And like in agriculture, there may exist gender disparity with reference to biomass energy technology extension, education, and other advisory services, perhaps due to the existing social, cultural, and religious norms in the society of Pakistan. In this regard, the following indicative gender equality actions are recommended actions in the project design and implementation that will enable reduction of the existing or potential inequalities and comply with national and international gender regulations and best practices. During the PPG stage, the details of these indicative recommended actions, as well as others that will be identified later, will be determined.

- The project design will be guided by principles of gender equality and women's empowerment. Qualified and capable women shall be given equal opportunity in the decision-making and strategic project design process.
- The project will involve the implementation of policy barrier removal activities, and in that regard, the proposed policies, regulations, standards on the application of sustainable woody biomass energy production and utilization technologies in the 4 provinces shall be gender responsive.
- The project proponents will formulate a gender action plan for the project and ensure that it is implemented thoroughly.

- In the implementation of the project activities, it will be ensured that gender equity is included as a criterion for providing/distribution of goods and services to communities in the project districts.
- The strengthening of the existing governance structures that promote gender equality and leadership in local governance structures in agriculture and forest sectors in the 4 provinces to support project implementation will be sufficiently covered in the implementation of activities that are for removing institutional barriers.
- As part of the project knowledge management and information dissemination activities, information exchange and learning for men, women, and youths in the communities within the project districts will be promoted. It will be ensured that both men and women access information sharing sessions.
- In the capacity development activities of the project, gender disaggregated data will be collected during trainings, workshops, discussions, interviews, or focus group interaction.
- In the monitoring and evaluation activities of the project, both men and women will be consulted during baseline data assessments, mid-term evaluations and terminal evaluations in the project sites.
- Lastly, both men and women will have equal opportunities in the development and promotion of service provision jobs in the relevant downstream activities of the application of woody biomass energy technologies in the rural energy sector and rural industries.

A comprehensive project gender mainstreaming for the project will be completed and submitted with the project document at time of CEO Endorsement.

Does the project expect to include any gender-responsive measures to address gender gaps or promote gender equality and women empowerment? Yes

closing gender gaps in access to and control over natural resources; No

improving women's participation and decision-making; and/or Yes

generating socio-economic benefits or services for women. Yes

Will the project's results framework or logical framework include gender-sensitive indicators?

Yes

4. Private sector engagement

Will there be private sector engagement in the project?

Yes

Please briefly explain the rationale behind your answer.

The private sector will be the key stakeholder and major player in planning and implementation of the proposed project. The main private actors will be woody biomass based Small and Medium Enterprises (SMEs), and businesses engaged in woody biomass fuel production. A detailed analysis of, and consultation with private sector entities will be conducted during the PPG Phase and their role/involvement in the rural electrification program of the country, in promoting energy efficient biomass energy technologies in rural industries, raising energy plantation, and woody biomass energy production and supply. These entities will be encouraged to participate in: (a) woody biomass energy generation and supply; (b) woody biomass supply chain analysis and identification of market needs; (c) raising energy plantations and wood lots; (d) development of business-based energy models for woody biomass based SMEs in collaboration with local communities; (e) development of partnership with the project for transfer of technology and introduction of best practices for reducing GHG emissions from the energy consuming operations in rural industries; and, (f) capacity building and knowledge management interventions targeting biomass production and promoting biomass energy efficient technologies, and public awareness raising campaigns.

5. Risks to Achieving Project Objectives

Indicate risks, including climate change, potential social and environmental risks that might prevent the Project objectives from being achieved, and, if possible, propose measures that address these risks to be further developed during the Project design (table format acceptable)

| Risks | Rating | Mitigation Measures |
|--|--------|--|
| Security situation (e.g. law and order) may delay project implementation in some project districts. | Medium | <p>Preventive: Insecure project sites will be avoided for the selection of target areas. By adopting a participatory approach and involving all local stakeholders, risks related to social instability is reduced. In addition, the project's partnerships with local entrepreneurs and biomass traders will ensure that project interventions continue even under moderate security threats.</p> <p>Alleviative: Proper coordination with the provincial line department, security agencies and district administration during field activities reduce/eliminate security threats during the field operations.</p> |
| Resistance or low levels of participation of individual entrepreneurs and SMEs | Medium | <p>Preventive: The project will be implemented with the involvement of local communities, biomass traders and rural industries. Wherever possible, their legitimate interests and socio-economic needs will be safe-guarded.</p> <p>Alleviative: The project will explore the possibilities of providing incentives (social, economic, and technological) to local farmers and entrepreneurs to encourage their participation in project designing and implementation.</p> |
| <p>Natural disasters (including those linked to climate change) may slow or prevent project implementation.</p> <p>Please see Annex E regarding how the proposed project will be designed and implemented taking into consideration potential climate change</p> | Medium | <p>The project is designed for increasing resilience of forest plantations and among communities prone to natural disasters. In the event of a natural disaster (e.g. floods, drought) improved woody biomass management, including raising wood lots and growing fuelwood trees on farm lands will reduce the damages and impacts of the climate change.</p> <p>Considering the potential climate change events (e.g., monsoon flooding, high ambient temperatures, drought), the project design will be designed in such a way that these will be</p> |

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| on potential climate change-related events that may happen in Pakistan. | | ct demo units will be designed in such a way that these will be resilient and comply with internationally accepted infrastructure design and engineering standards. |
| <p>COVID-19 pandemic could limit mobility and communication among stakeholders, especially travel to field project sites and stakeholders' consultations during the project designing and implementation phases.</p> <p>Please see Annex F for explanations on how the project will address Covid-19 and how the risks and opportunities from this pandemic will be considered in the proposed project.</p> | Medium | <p>The designated implementing partner and project development team will make use of the strategies applied in the GOP's and the UNDP's (and other UN Agencies' and Donors') successes in curtailing the spread of COVID-19 and suppressing social and economic impacts of this pandemic in the design and possibly also in the implementation of the project. These include safety-net for the poor, localized, micro level smart-lockdowns, and use of electronic media for communicating with the provincial governments, development agencies, and donors. The lessons learned during the pandemic will be fully considered in maintaining effective communication with stakeholders and partners. Moreover, the PPG activities will be designed for decentralized actions and geographic clustering requiring minimum travelling to and from and within the project sites. These aspects will be further examined during the PPG stage and reported in the CEO Endorsement Request.</p> |
| Local communities and farmers do not adhere to forestry interventions and sustainable production of woody biomass in their agriculture fields | Low | <p>Preventive: Participatory nature of the project designed, and incentives measures associated with raising energy plantations and use of efficient technologies will encourage communities/farmers adhere to the proposed interventions. Furthermore, compliance measures to adopted and proper checks and balances during the implementation of the project will help in mitigating this risk.</p> <p>Alleviative: Public awareness and targeted campaigns, as well as market linkages will encourage farmers to fuelwood production on less productive lands.</p> |
| Introduction of improved wood-fired equipment in areas having standing natural forests may create a perverse incentive that lead to more production than replacement of inefficient methods leading | Medium | <p>Preventive: The project will ensure that all power generation and EE equipment introduced in applicable rural industries have appropriate licenses and following regulatory guidelines to be monitored by the provincial forest departments and local authorities. For this purpose, a proper certification scheme will be introduced. Moreover, areas with closer natural forests will be avoided for project interventions.</p> |

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| g further degradation of natural forest. | | Alleviative: Proper check and balance will be maintained to ensure that use of woody biomass is sustainable and does not exceed the production limits. The possibility of using alternate biomass e.g. crop residuals will also be explored. |
| Woody biomass use could exceed production. Even fast-growing species will take up to five years to mature. Moreover, climate change risks (flash floods and prolonged drought) and rainfall variability could impact production of woody biomass. | Medium | <p>Preventive: The project will develop specific criteria to validate the areas that support operations of rural industries that use wood as fuel that will include evidences (i) availability of woody biomass, (ii) access to market supplies, and past production experience Other criteria will be identified during the PPG Phase.</p> <p>Alleviative: Use of wood biomass by the relevant rural industries will be carefully monitored and regulated will involvement of provincial forestry departments.</p> |
| Improved and efficient wood-fired equipment to be introduced may not be suitable under the local conditions and plantation-based woody biomass production enterprises, especially if woodlots were not well-established and managed. | Medium | <p>Preventive: The PPG phase would assess whether the alternate kilns proposed for reducing GHG emissions are indeed the appropriate technology to be introduced for wood-fired industrial equipment operations. Moreover, technology transfer has to be adaptable to local communities' preferences, affordable, and easily accessible. The project seeks to mitigate this risk by recommending appropriate technologies based on proper feasibility studies.</p> <p>Alleviative: A mechanism for certification appropriate/efficient technologies/equipment will be introduced and enforced with the involvement of concerned departments and agencies. In addition, disincentives (fines, penalties etc.) will be introduced to reduce the severity of this risk.</p> |

6. Coordination

Outline the institutional structure of the project including monitoring and evaluation coordination at the project level. Describe possible coordination with other relevant GEF-financed projects and other initiatives.

The Ministry of Climate Change (MoCC) will be the main project Executing Agency and will coordinate the project implementation with the provincial governments of Punjab, KP, Sindh, and Balochistan, and other relevant federal ministries, including Economic Affairs Division (EAD), MoPDR and Ministry of Energy (Power Division). At the provincial level, the Provincial Forest Departments will be the main executing partners which will guide the project implementation and will ensure inter-agency coordination at the provincial level. The project will be implemented under the National Implementation Modality (NIM) modality of the UNDP. For this purpose, Project Management Unit will be established under the MoCC by hiring a competent team of national experts/staff. The MOCC will chair the Project Steering Committee/Board having representation of the relevant ministries and concerned provincial government and other key project partners, including private sector. The coordination mechanisms, including roles and responsibilities of each partner organization will be further elaborated during the PPG phase in consultation with the project stakeholders, especially MoCC and provincial forestry departments.

The project will be implemented by the designated implementing partner, which is the Ministry of Climate Change (MCC), under the UNDP's national implementation modality. In this case, the Government of Pakistan as represented by the MCC is fully responsible for the effective use of the project resources and the delivery of the agreed tangible outputs of the project and bring about the expected project outcomes. As the GEF Agency for this project, the UNDP will not be executing any project activity apart from the required GEF Agency oversight services, and ensure compliance with the specific instructions that must be followed regarding the financial management requirements to be complied with by the project's executing entities, as well as ensure that the Minimum Fiduciary Standards Requirements of the GEF are met by these entities at all stages of project implementation.

The indicative project Organogram is shown in Fig. 2 below. It illustrates the project management and coordination mechanism among key project stakeholders and beneficiaries.

Coordination with GEF Financed Projects and other Initiatives

The GEF has financed a number of forestry sector projects in the past and some of these are still on-going, whose experiences and lessons learned will be used in the project design and their application for "combating climate change through the application of sustainable woody biomass energy technologies." The proposed project will take into consideration the scope, plans, and achievements of these projects and involve their teams and respective government officials to ensure complementarity and develop synergies with these projects and avoid duplication of interventions and project areas. The UNDP together with the MoCC will ensure coordination and synergies with on-going GEF projects. The following GEF projects of potential relevance with the proposed project are currently being implemented in Pakistan:

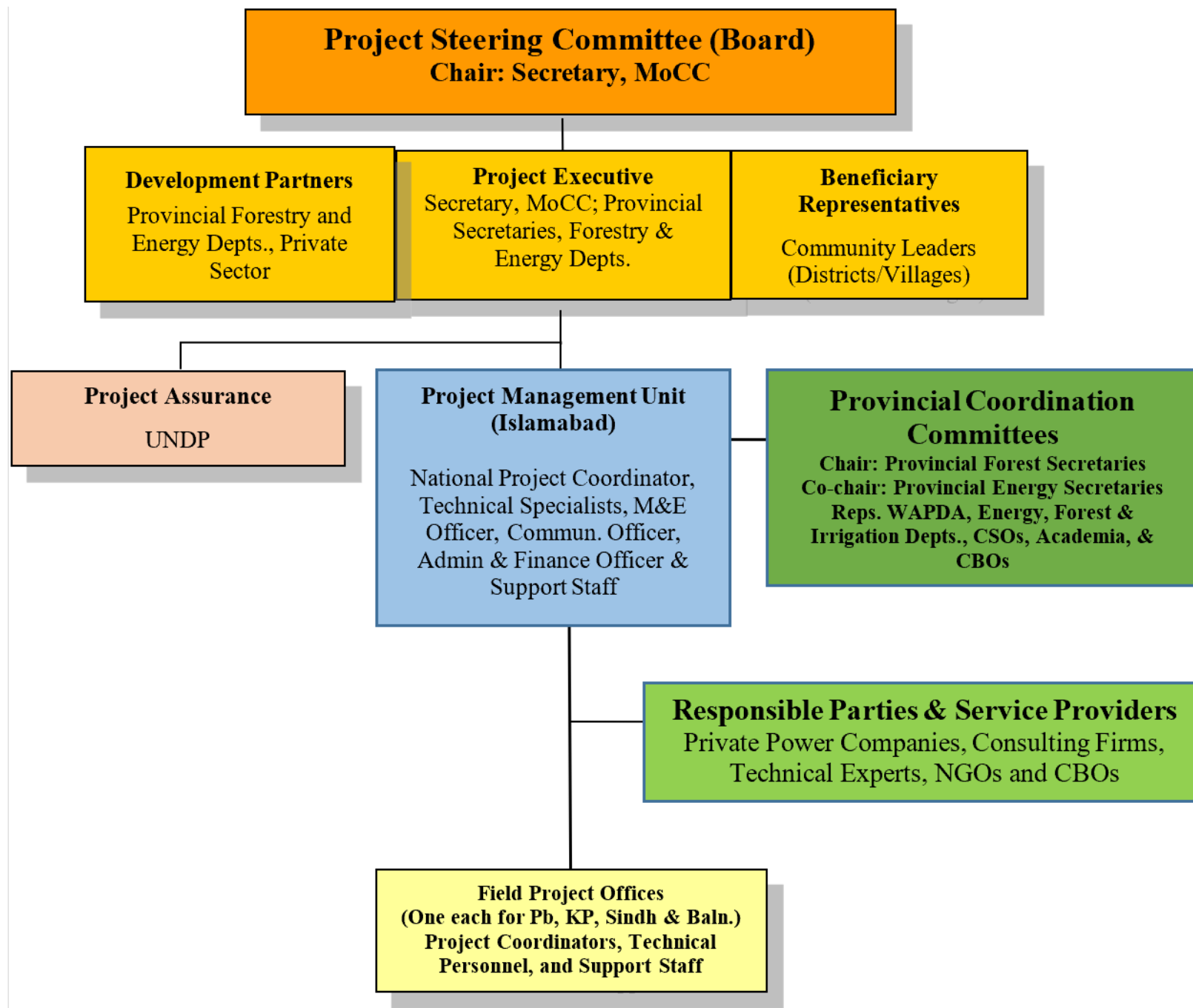


Fig. 2: Indicative Project Management and Coordination Arrangements

- *9516--FAO's GEF Project for Reversing Deforestation and Degradation in high-conservation value Chilgoza pine forests in Pakistan:* FAO is implementing a GEF funded project in collaboration with provincial Forests Departments and with the involvement of the local communities. The proposed project will work closely with the Chilgoza project to utilize complementarities and synergies.
- *5660--Sustainable Forest Management (SFM) to Secure Multiple Benefits in Pakistan's High Conservation Value Forests:* This is another on-going GEF Project targeting adoption of integrated approach for the management of high conservation value forests that will generate global biodiversity conservation and carbon sequestration benefits and provide ecosystem services to local communities and enhance resilience across three different landscapes. The proposed project will closely coordinate with SFM project and build on the lessons learned, best practices documented, and training material produced, especially on restoration and rehabilitation of degraded forests, and raising block plantations.
- *4754--Sustainable Land Management Program to Combat Desertification in Pakistan:* This GEF project is near completion which has focused on creating enabling environment for sustainable land management (SLM), building local capacities, establishing SLM information system, and providing incentives for sustainable management of land and water resources. The proposed project will benefit from the training products, best practices documented, raising shelterbelts and woodlots, and land use planning guidelines developed under this project.
- *9231--Pakistan Snow Leopard and Ecosystem Program (PSLEP):* This is another GEF project being implemented in the mountain landscape of Pakistan with a GEF grant of USD 4.6 million. The proposed project will benefit from the lessons learned and experiences derived from this project, particularly sustainable forest management practices, and fuelwood collection.

The project proponents will also consult the GOP entity that implemented the UNIDO-GEF Project on the already completed Promoting Sustainable Energy Production and Use from Biomass in Pakistan to learn from the implementation experiences and build on the results of that project.

Coordination with other non-GEF Initiatives

There are several other non-GEF projects funded by the donors and federal and provincial governments. The proposed project will coordinate and establish linkages with these projects. The most prominent ones include:

- *ADB Energy Sector Reforms and Financial Sustainability Program* – This recently approved (Dec 2019) program is aimed at addressing, among others, energy infrastructure policy constraints in Pakistan's energy sector. ADB is financing the program with support from its development partners such as the Export–Import Bank of Korea.
- *Ten Billion Tree Tsunami Program (TBTT-P):* The Government of Pakistan has recently launched TBTT-P (Phase-I) with financial layout of Rs.125 billion (US\$806 million) by up-scaling the Green Pakistan Program for the revival of the forestry and wildlife sectors in the country.
- *Pakistan REDD+ Readiness Preparation Project:* In compliance of Cancun agreement, Pakistan is implementing REDD+ activities to mitigate climate change through reducing carbon emissions from forestry sector with a World Bank grant of US\$ 3.8 million REDD+ Readiness programme.

7. Consistency with National Priorities

Is the Project consistent with the National Strategies and plans or reports and assessments under relevant conventions

Yes

If yes, which ones and how: NAPAs, NAPs, ASGM NAPs, MIAs, NBSAPs, NCs, TNAs, NCSAs, NIPs, PRSPs, NPFE, BURs, INDCs, etc

UNFCCC National Communications (NC)

- UNFCCC Biennial Update Report (BUR)

- UNFCCC National Determined Contribution

- UNFCCC Technology Needs Assessment

- UNCCD Reporting

The proposed project is in consistency and aligned with the national, strategies and plans or reports and assessments under relevant conventions, which has been elaborated in the table below:

| National Policies, Strategies and Action Plans | Consistency and Alignment |
|---|---|
| Pakistan 2025-- One Nation and one Vision, 2014 | This is the high level and long-term strategic document, which considers climate change as a priority area and recognizes Pakistan's commitment to fulfil obligations under international treaty including UNFCCC. The reduction in the GHG emission is directly linked with the introduction of efficient technologies output. The document sets goals for responding to climate change, including "to promote long term sustainability, conservation and protection of natural resources." The proposed project will focus on this goal by promoting sustainable management of natural resources and climate change mitigation. |
| Pakistan's Nationally Determined Contribution (NDC) | Pakistan's response to the global warming and climate change challenges has been closely aligned with the strategy for sustainable development, environmental protection, SDGs, and UNFCCC objectives. Pakistan's NDC projected increase in GHG emissions based on massive changes in land use and deforestation due to use of biomass in energy and industrial processes. The document estimates total GHG emissions around 405 metric tons of CO ₂ e equivalent as of 2015, and the project figure is around 1603 metric tons of CO ₂ e by 2030 and maintain land |

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| | use change and forestry related emissions at 29 metric tons of CO ₂ e by 2030. The proposed project will contribute to achieving these targets. |
| TNA—Report Climate Change Mitigation, 2016 | Pakistan's Technology Need Assessment (TNA) Report, 2016 elevates Pakistan's present low per-capita consumption of energy through greater renewable energy use and predicts reduced burden on rural women for biomass fuel collection and use. The report stresses that local environmental and health impacts of unsustainable and inefficient traditional biomass fuels and GHG emissions need to be largely circumvented through clean, renewable energy alternatives. The project design will be informed with findings of this report. |
| National Climate Change Policy (NCCP) | The project directly assists Pakistan's aim to climate change mitigation and climate change mainstreaming into economically and socially vulnerable sectors. This project specifically supports the policy's focus to: integrate cost effective climate change mitigation in forestry and energy sectors; strengthen inter-ministerial and inter-provincial decision making and coordination mechanisms for woody biomass production and utilization for biomass energy production.; facilitate effective use of opportunities (e.g. economic) encouraging public-private sector investment in biomass energy production and utilization through introduction of efficient technologies. |
| Draft Alternative and Renewable Energy Policy (ARE Policy 2019) | Draft ARE Policy (2019) provides a comprehensive framework encompassing wider scope not only for the purposes of generation for grid but also for encouraging renewable energy resources and utilization of ARE technologies (ARET) based applications by commercial and domestic consumers. The technologies covered under this policy are both conventional renewable energy sources including solar, wind, geothermal, and biomass. The policy recommends launch of biomass energy projects. The proposed project design will benefit from policy elements focusing on biomass production and conversion to biomass energy, which will be further explored during the PPG |
| | The proposed project in line with the National Forest Policy (NFP), 2015, which provided an overarching framework for reversing decline of forestry sector in Pakistan. The project outcomes and outputs are directly linked three objectives of the NFP—1) promoting ecological, social, and cultural functions of forests through sustainable management and use of forest produce including woody biomass, 2) facilitating imple |

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| National Forest Policy 2015 | <p>a use of forest produce including woody biomass, 2) facilitating implementation of international conventions and agreements related to forestry, wetlands, biodiversity, and climate Change. The policy calls for launch of mass afforestation programme and provide incentives for promoting farm forestry, urban forestry, commercial and industrial forestry by promoting private investments for increasing woody biomass.</p> <p>in the country.</p> |
| Ten Billion Tree Tsunami Programme (TBTT-P) | <p>The Government of Pakistan has launched TBTT-P (Phase-I) by up-scaling the existing Green Pakistan Programme for the revival of the forestry and wildlife resources in the country. The objective of the Programme is “to facilitate transition towards environmentally resilient Pakistan by mainstreaming climate change adaptation and mitigation targeted initiatives for promoting afforestation, biodiversity conservation and creating enabling environment.” The proposed project is aligned with the various TBTT-P interventions under the forestry component to be implemented in Punjab, KP, Sindh and Balochistan.</p> |

8. Knowledge Management

Outline the Knowledge management approach for the Project, including, if any, plans for the Project to learn from other relevant Projects and initiatives, to assess and document in a user-friendly form, and share these experiences and expertise with relevant stakeholders.

Knowledge Management (KM) will be one of the core components of the proposed project. The project interventions will be documented and strategically communicated to relevant stakeholders for variety of purposes such as technical reporting complying international obligations, enhancing national capacities, and creating mass awareness. The detail knowledge management and dissemination approach will be realized in the project's KM Strategy, which shall be developed during the project inception phase.

This proposed project recognizes the importance of knowledge management. The approach to be adopted for the KM is briefly described below:

1. Project results and experiences will be documented and stored by the executing partners having specific, expertise. Each project partner will be responsible for seeking and coordinating participatory learning and sharing information pertaining to project implementation.
2. The project achievements and results will be shared with the stakeholders, researchers, donors and published as project reports and peer reviewed journals within and outside the project circle wishing to use the information for further research.
3. Develop an online repository for knowledge management products for project partners and general public. The repository will ensure that all information, pertinent data, lessons learned, best practice & expertise generated during implementation are widely disseminated to concerned stakeholders and emerging experts not only across the country but the region.
4. A database on woody biomass production and supply chain and market analysis will be developed and shared with project partners. Similarly, inclusive assessments/feasibility studies on potential areas for woody biomass production and utilization for energy conversion will be shared with the stakeholders.
5. The publications and journal articles will be shared with the Program Steering Committee (PSC) and provided open access on the Project website and the website of the MoCC and the UNDP. Efforts will be made to produce guidelines and strategies in national language, so that the same could be used by the SMEs, biomass traders and entrepreneurs.

Refer to Annex G for the elaboration of the envisioned knowledge management system for the proposed project.

9. Environmental and Social Safeguard (ESS) Risks

Provide information on the identified environmental and social risks and potential impacts associated with the project/program based on your organization's ESS systems and procedures

Overall Project/Program Risk Classification*

PIF

CEO Endorsement/Approval MTR

TE

Medium/Moderate

Measures to address identified risks and impacts

Provide preliminary information on the types and levels of risk classifications/ratings of any identified environmental and social risks and potential impacts associated with the project (considering the GEF ESS Minimum Standards) and describe measures to address these risks during the project design.

Based on the assessment of the individual risks, the overall project is considered moderate risk in regard s social and environmental impacts. The identified p otential risks would be further subjected to a more d etailed risk assessment during the PPG phase of the project development. This would enable the project development team to identify appropriate preventive and alleviative mitigation measures during the proje ct design, and project implementation, respectively. The project is envisioned to promote efficient techn ologies and innovative practices for production of bi omass and its conversion to energy as the core of it s implementation strategy. It is expected that asses sments and feasibility studies to be conducted durin g the PPG phase will help in identification of social a nd environmental risks and impacts with a reasonab le degree of certainty, which can be addressed throu gh application of standard best practices, mitigation measures, and stakeholders' engagement during the implementation of the project. Moreover, an Environ mental and Social Management Framework (ESMF) will be developed during the PPG phase of the proje ct development to outline the procedures for further screening, assessment, and management of risks d uring implementation.

Supporting Documents

Upload available ESS supporting documents.

Title

Submitted

PIMS 6542 PAK PASBET SESP 280920_final

Part III: Approval/Endorsement By GEF Operational Focal Point(S) And Gef Agency(ies)

A. RECORD OF ENDORSEMENT OF GEF OPERATIONAL FOCAL POINT (S) ON BEHALF OF THE GOVERNMENT(S): (Please attach the Operational Focal Point endorsement letter with this template).

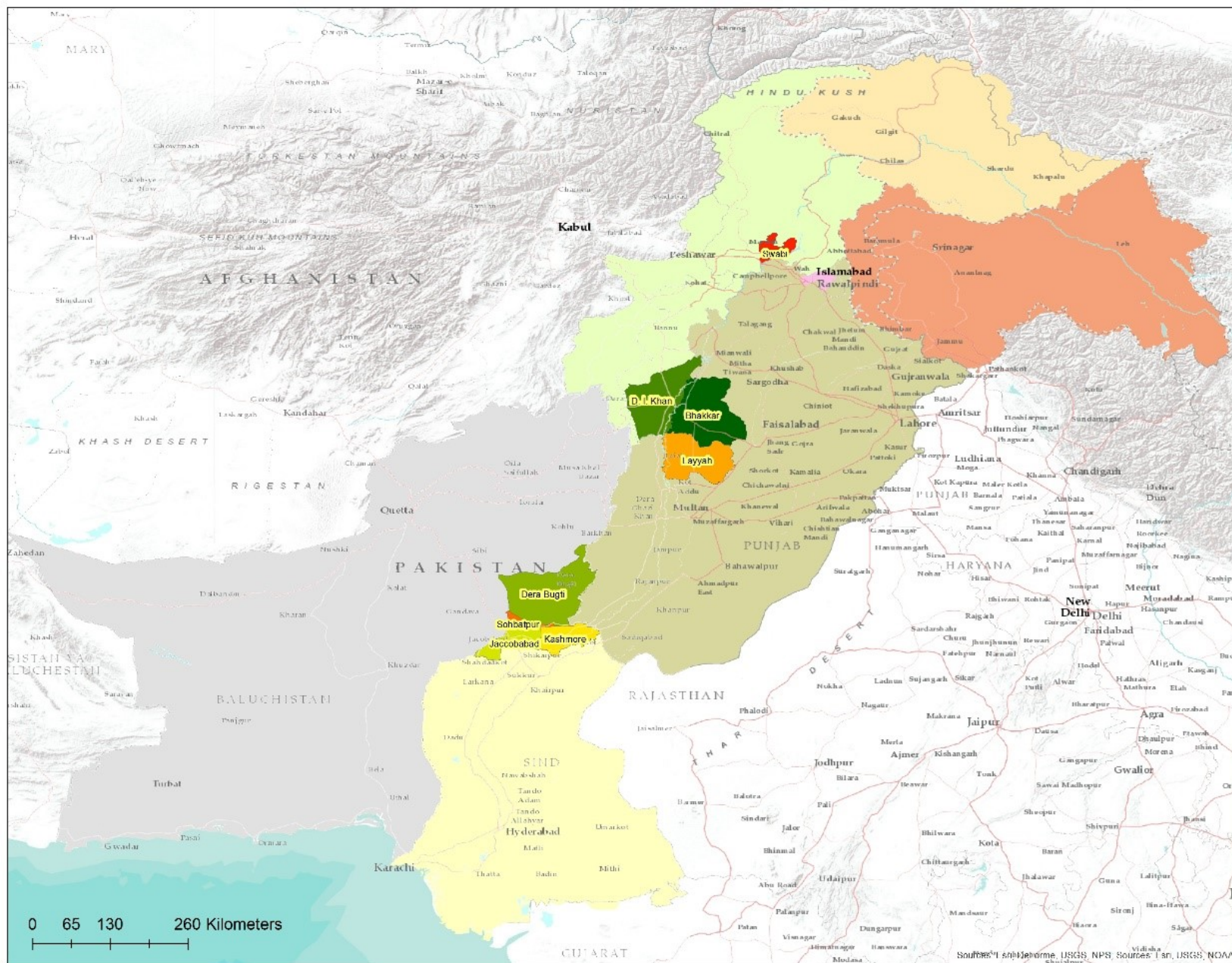
| Name | Position | Ministry | Date |
|-------------------|--------------------------------------|----------------------------|-----------|
| Naheed S. Durrani | National GEF Operational Focal Point | Ministry of Climate Change | 9/18/2020 |

ANNEX A: Project Map and Geographic Coordinates

Please provide geo-referenced information and map where the project intervention takes place

Geo-reference/Coordinates Proposed PASBET Districts

| Province/District | Coordinates |
|---------------------------|---|
| Punjab | |
| Layyah | 31.0998° N, 71.0022° E |
| Bhakkar | 31.8621° N, 71.3824° E |
| Khyber Pakhtunkhwa | |
| Dera Ismail Khan | 31.7448° N, 70.6217° E |
| Swabi | 34.0719° N, 72.4732° E |
| Sindh | |
| Jacobabad | 28.3274° N, 68.6201° E |
| Kashmore | 28.2712° N, 69.3831° E |
| Balochistan | |
| Jaffarabad/Sohbatpur | 28.3009° N, 68.1908° E/28.4871° N, 68.6440° E |
| Dera Bugti | 29.0278° N, 69.0970° E |



1:5,500,000



