GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET

Naoko Ishii, PhD
*Chief Executive Officer and Chairperson*

1818 H Street, NW
Washington, DC 20433 USA
Tel: 202.473.3202
Fax: 202.522.3240/3245
E-mail: Nishii@TheGEF.org
www.TheGEF.org

April 02, 2014

Dear Council Member:

UNIDO as the Implementing Agency for the project entitled: ***Pakistan: Sustainable Energy Initiative for Industries***, has submitted the attached proposed project document for CEO endorsement prior to final approval of the project document in accordance with UNIDO procedures.

The Secretariat has reviewed the project document. It is consistent with the proposal approved by Council in February 2012 and the proposed project remains consistent with the Instrument and GEF policies and procedures. The attached explanation prepared by UNIDO satisfactorily details how Council's comments and those of the STAP have been addressed. I am, therefore, endorsing the project document.

We have today posted the proposed project document on the GEF website at www.TheGEF.org. If you do not have access to the Web, you may request the local field office of UNDP or the World Bank to download the document for you. Alternatively, you may request a copy of the document from the Secretariat. If you make such a request, please confirm for us your current mailing address.

Sincerely,

Naoko Ishii
Chief Executive Officer and Chairperson

Attachment: GEFSEC Project Review Document
Copy to: Country Operational Focal Point, GEF Agencies, STAP, Trustee

# REQUEST FOR CEO ENDORSEMENT

**PROJECT TYPE: Full-sized Project**
**TYPE OF TRUST FUND: THE GEF TRUST FUND**

## PART I: PROJECT INFORMATION

| Project Title: Sustainable Energy Initiative for Industries | | | |
|---|---|---|---|
| Country(ies): | Pakistan | GEF Project ID: [1] | 4753 |
| GEF Agency(ies): | UNIDO(select)(select) | GEF Agency Project ID: | 100045 |
| Other Executing Partner(s): | National Productivity Organization (NPO), in cooperation with SMEDA (Small and Medium Enterprise Development Authority) | Submission Date:<br>Resubmission date : | 11/20/2013<br>02/20/2014 |
| GEF Focal Area (s): | Climate Change | Project Duration(Months) | 48 |
| Name of Parent Program (if applicable): | | Project Agency Fee ($): | 355,000 |

### A. FOCAL AREA STRATEGY FRAMEWORK[2]

| Focal Area Objectives | Expected FA Outcomes | Expected FA Outputs | Trust Fund | Grant Amount ($) | Co-financing ($) |
|---|---|---|---|---|---|
| CCM-2 | Promote market-based uptake of EE investments in industry | Regulation focusing on EE in industry developed | GEF TF | 1,314,315 | 4,441,667 |
| CCM-3 | Promote investments in RE projects in industry | Regulation on RE in industry developed | GEF TF | 2,235,685 | 26,758,333 |
| | | **Total project costs** | | **3,550,000** | **31,200,000** |

[1] Project ID number will be assigned by GEFSEC.
[2] Refer to the Focal Area Results Framework and LDCF/SCCF Framework when completing Table A.

## B. PROJECT FRAMEWORK

**Project objective:** To reduce energy-related greenhouse gas emissions by facilitating the creation of a market environment to promote the use of RE/EE technologies and measures in the selected industrial sectors of Pakistan.

| Project Components | Grant Type* | Expected Outcomes | Expected Outputs | Trust Fund | Indicative Grant Amount (USD) | Indicative Co-financing (USD) |
|---|---|---|---|---|---|---|
| 1. Develop policy and regulatory framework to support the uptake of EE and RE in industry | TA | Conducive policy and regulatory framework established. | 1.1 Existing policy and regulatory framework reviewed and recommendations made (including financial and non-financial incentives and instruments)<br><br>1.2 Recommendations on improvements in policy and regulatory framework adopted and associated advocacy work<br><br>1.3 Sectoral analysis on EE and RE opportunities, impact assessment and recommended post-project action plan for RE/EE in industry paying special attention to industries that benefit women | GEFTF | 229,023 | 1,000,000 |
| 2. Investments in RE and EE in industry | INV | Investments in RE and EE in pilot demonstration carried out and scaled up | 2.1 Projects on EnMS and Systems Optimization (SO) assessed and implemented in industrial companies in textile (and other sectors)<br><br>2.2 EE and RE technology support in 1 textile unit<br><br>2.3 Projects for deployment of RE technologies assessed and implemented in 2 companies<br><br>2.4 Portfolio of implementation of EnMS/SO and deployment of RE elaborated (incl. finance sources identified) with particular attention to projects that benefit women. | GEFTF | 2,592,352 | 26,800,000 |
| 3. Create platform for promoting investment and sustainability | TA | Investment platform for scaling up investments operational | 3.1 Investment platform to promote RE and EE in industrial companies strengthened (non-grant instruments, banking products; awareness creation)<br><br>3.2 Certification center and textile training facility for experts on RE and EE-EnMs applications established (under NPO) and training and certification programme established paying particular attention to gender mainstreaming<br><br>3.3 Training of experts on EE and RE in industrial applications carried out, with at least 20% being women.<br><br>3.4 National Energy Performance | GEFTF | 496,000 | 2,400,000 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | Award scheme introduced | | | |
| 4. Monitoring and evaluation | TA | Monitoring of results and knowledge disseminated | 4.1 Project monitoring and evaluation, knowledge dissemination to include regular reporting, mid-term and terminal evaluation undertaken | GEFTF | 64,000 | 50,000 |
| | | | Subtotal | | 3,381,375 | 30,250,000 |
| | | | Project management | | 168,625 | 950,000 |
| | | | **Total project costs** | | **3,550,000** | **31,200,000** |

## C. SOURCES OF CONFIRMED CO-FINANCING FOR THE PROJECT BY SOURCE AND BY NAME ($)

| Sources of co-financing | Name of co-financier | Type of co-financing | Co-financing amount (USD) |
|---|---|---|---|
| Nat. government | NPO | In kind | 3,000,000 |
| Nat. government | NPO | Cash | 1,200,000 |
| Private sector | Masood Textiles | Cash – Equity | 5,200,000 |
| Private sector | AB Cottex | Cash – Equity | 1,600,000 |
| Private sector | Solargen (Laraib Energy) | Cash – Equity | 20,000,000 |
| GEF Agency | UNIDO | Cash | 50,000 |
| GEF Agency | UNIDO | In-kind | 150,000 |
| **Total Co-financing** | | | **31,200,000** |

## D. TRUST FUND RESOURCES REQUESTED BY AGENCY, FOCAL AREA AND COUNTRY1

## E. CONSULTANTS WORKING FOR TECHNICAL ASSISTANCE COMPONENTS

| Component | GEF amount($) | Co-financing ($) | Project total ($) |
|---|---|---|---|
| Local consultants | 278,000 | 70,000 | 348,000 |
| International consultants | 213,000 | | 213,000 |
| **Total** | **491,000** | **70,000** | **561,000** |

## F. DOES THE PROJECT INCLUDE A "NON-GRANT" INSTRUMENT? NO

GEF resources will be used as a catalytic grant for the various components. For the realization of the three pilot projects, GEF grant will go towards partly supporting incremental costs (feasibility studies, design, risks mitigation for investment and audits). For the financing of the pilot projects (Component 2), loans from financial institutions will be secured by the projects proponents i.e. the private sector companies, who themselves have agreed to put 20-25% of equity in each of the pilot projects – see endorsement letters. No GEF funds will be used to establish or support and existing 'non-grant' mechanisms with cash. The project will support with technical assistance (TA) the development of a pipeline of investment projects (output 2.4) and seek financing opportunities amongst banking sector (output 3.1) with the technical support of NPO, SMEDA and provincial energy departments/provincial energy ministries such as the Punjab Power Development Board (PPDB). More information on available non-grant instruments is given in Section B.1 of Part II.

## PART II: PROJECT JUSTIFICATION:

### A. DESCRIBE ANY CHANGES IN ALIGNMENT WITH THE PROJECT DESIGN OF THE ORIGINAL PIF (PROJECT OVERVIEW):

The project design is line with the original PIF, however some changes have been introduced, guided by comments received from STAP, new data and information collected in the project design (PPG) phase with inputs provided through consultation with the relevant stakeholders. In particular, the project validation workshop[3] provided all stakeholders to discuss the project interventions closely.

*1. Project management*

In the original PIF, the executing agencies are mentioned as AEDB, ENERCON and SMEDA. After intensive stakeholder consultation in the PPG phase, it was decided that NPO would be the lead national executing agency, supported by SMEDA and AEDB. This is due to NPO's extensive expertise in working with industry and their experience with related activities in RE and EE in industry. Please refer to Section B.1 (pp.29-30) for more details.

*2. Technology choice and identification of pilot projects*

Given the findings of the PPG, the choice of technologies has been narrowed. On one hand, this expresses the interest of industrial stakeholders in those renewable sources of energy that are locally available and can be used economically on-site, namely biomass (crop residues) and solar energy. On the other hand, the choice reflects the concern of the project designers on additionality of the GEF intervention. In the baseline situation, the Government already has regulations that seek to promote grid-connected IPPs (Independent Power Producers), but not on-site applications. Regarding biomass, a GEF-4 UNIDO/GEF focuses on biomass gasification for power generation for small to medium-scale industries. This GEF-5 project supports efficient steam and power generation from efficient biomass combustion. The scale of the interventions under this project is much bigger (over 11 MW) compared to the 1 MW systems under the UNIDO/GEF 4 project. Support for one of the pilot/demo (a grid-connected solar PV plant) is justified by the fact that the project would be the first industrial-scale solar energy facility in Pakistan (run by an IPP).

Regarding energy efficiency, the eventual choice of implementation of EE technologies will be based on outcome of energy audits – Output 2.1. Again with additionality in mind, the project seeks to build on the baseline situation in which NPO and SMEDA (aided by GIZ[4]) have supported energy audits and efficiency improvements in the textile sector. Given the importance of the textile industry, two of the three demo/pilot projects associated with the GEF project are in the textile sector, one company will implement a biomass plant for power and steam (basically on-site), while another will showcase a complete energy efficient production line in combination with harnessing solar energy for its power needs. The project will support spreading EE and RE in the textile sector, while at the same time explore and support options in other industrial subsectors – outputs 2.4 and 4.1 of the project.

Co-financing has turned out to be larger than in the original PIF. This reflects both willingness of investors to be associated with the project and the size (in terms of power capacity and corresponding investment needs).

*3. Outcomes and co-financing*

The three outcomes are basically the same as in the PIF, although the wording has been improved to better reflect the situation on the ground. Some outputs have been added that aim at enhancing 'sustainability and replication of the project, including Output 1.3 (recommended post-project action plan for RE/EE in industry).

[3] See reports on : http://www.thefreelibrary.com/Need+for+ensuring+universal+access+to+sustainable+energy+stressed.-a0310704314 and http://www.npo.gov.pk/_news/16/

[4] Gesellschaft für Internationale Zusammenarbeit (German international cooperation agency)

Correspondence of outcomes with original PIF:

| At CEO Endorsement | PIF |
|---|---|
| 1. Develop the policy and regulatory framework on use of EE and RE in industry | 1. Develop the policy and regulatory framework on use of EE/RE in Industry |
| 2. Investments in RE and EE in industry | 2. Create an investment platform for promoting investments in RE/EE and scaling up the market |
| 3. Create platform for promoting investment and sustainability | 3. Establish an accreditation centre for energy experts on EMS & RE applications in industry |

Correspondence of outputs with original PIF:

| At CEO Endorsement | PIF |
|---|---|
| 1.1 Existing policy and regulatory framework reviewed and recommendations made (including financial and non-financial incentives and instruments) | 1.1. Existing policy and regulatory framework reviewed;<br>2.4. Non-grant instruments for promotion of EE/RE technologies explored. |
| 1.2 Recommendations on improvements in policy and regulatory framework adopted and associated advocacy work | 1.2. Recommendations on possible improvements made<br>1.3. Policy and regulatory framework in place |
| 1.3 Sectoral analysis on EE (and RE) opportunities, impact assessment and recommended post-project action plan for RE/EE in industry | - added - |
| 2.1 Projects on EnMS and Systems Optimization (SO) assessed and implemented in industrial companies | 2.2. Projects on implementation of EnMS/SO in 25 selected companies implemented |
| 2.2 EE and RE technology support in 1 textile unit | 2.3. Projects for deployment of RE technologies in SMEs implemented |
| 2.3 Projects for deployment of RE technologies assessed and implemented in 2 companies | |
| 2.4 Portfolio of implementation of EnMS/SO and deployment of RE elaborated (incl. finance sources) | 2.1. Investment platform to promote investments in RE/EE projects operational; |
| 3.1 Investment platform to promote RE and EE in industrial companies strengthened (non-grant instruments, banking products; awareness creation) | 2.1. Investment platform to promote investments in RE/EE projects operational;<br>2.4. Non-grant instruments for promotion of EE/RE technologies explored. |
| 3.2 Certification centre and textile training facility for experts on RE and EE-EnMS applications established (under NPO) and training and certification programme established | 3.2. Accreditation centre selected and equipped |
| 3.3 Training of experts on EE and RE in industrial applications carried out | 3.3. 30 energy EnMS experts trained<br>3.4. 30 experts trained on installation of RE technologies |
| 3.4 National Energy Performance Award scheme introduced | 3.5. National Energy Performance Award Scheme introduce |
| 3.5 Project monitoring and evaluation, knowledge dissemination | 3.6 Platform for sharing project best practises launched. |

***A.1 National strategies and plans or reports and assessments under relevant conventions, if applicable (i.e. NAPAS, NAPs, NBSAPs, national communications, TNAs, NIPs, PRSPs, NPFE, etc.):***

Pakistan's **Initial National Communication** (INC)on Climate Change' describes the five significant greenhouse gas (GHG) source categories including energy, industrial processes, livestock and agriculture, forestry and land use change, and waste sectors. The energy, industrial processes and forestry and land use change sectors contribute 81%, 12% and 7% of total $CO_2$ emissions, respectively. Though the GHG emission data are outdated (the INC was submitted to the UNFCCC in 2003 based on 1993-94 statistics), it reflects the need to address the issues related to the environment and climate change at national level. Although industry contributes only 12% to $CO_2$ emissions in the country, there is growing recognition that as the economy of the country continues to shift towards a more industrialised status, there will be increased industrial activities and hence increased in GHG emissions, if the power generation status is not changed.

Although Pakistan contributes very little to the overall GHG emissions at the global level, the country is already experiencing the impacts of climate change. Being a predominantly agricultural economy and vulnerable to climate variability, the country has a real interest in protecting itself from the adverse impacts of climate change on one hand but also to meaningfully contribute to global efforts to mitigate climate change. The recent recurrences of extreme weather events such as droughts and excessive floods in the country have raised the urgency required in dealing with the issue.

The **Poverty Reduction Strategy Paper** (PRSP-II) identifies the private sector as the main propellant of growth in Pakistan[5]. It further mentions that "the private sector ranks problems with electricity among the top three or four most important impediments to investment…., Tackling the current energy crisis to avoid stifling of growth by rapidly adding more power while simultaneously conserving energy will be a top priority of PRSP-II"…. Promoting energy efficiency, fuel diversity and interventions that take climate change into consideration transcend the boundaries of energy policy and have a direct impact on the poor".

The **UN Development Assistance Framework** (UNDAF)[6] mentions in its Area of Cooperation III "Improved livingconditionsthroughenvironmentalmanagementforsustainabledevelopment" as one of the main Lines of Action "Support to revised regulatory frameworks and Government and civil society organizations, ecosystem management and development of sustainable energy sources".

In sum, the various policies and strategies do recognise the importance of industrial development on one part, but also the need for promoting renewable energy and energy efficiency to as part of the overall efforts to address the current serious energy supply shortages that the country is facing.

### *A.2 GEF Focal area strategies, eligibility criteria:*

The project is in consistency with GEF-5 Climate Change Focal Area Objectives 2 and 3 aiming at promoting market transformation for energy efficiency in industry and the building sector and promoting investments in renewable energy technologies. It presents a programme that promotes the introduction of energy management systems (EnMS), System Optimization (SO) and selected renewable energy (RE) technologies in industry in Pakistan, focusing initially on the areas where textile and garments companies are located. This will be achieved through a combination of technical assistance and investment activities including (1) establishment of a conducive policy and regulatory framework for the introduction of EnMS/SO and RE applications in industry, (2) capacity strengthening and the establishment of an certification authority for energy experts specialized on EnMS/SO and installation of RE technologies and (3) promotion and up-scaling of investments in energy efficiency (EE) and RE technologies and measures.

### *A.3 The GEF Agency's comparative advantage:*

The GEF Council document GEF/C.31/rev.1 gives UNIDO comparative advantage for this Strategic Program under the Intervention Type - Capacity Building/Technical Assistance. The project has a strong focus on promoting RE/EE in industry. Combining the provision of policy and normative development support services and capacity building for all market players and enablers, UNIDO aims at removing the key barriers to continuous improvement of energy efficiency in industries and increased adoption of renewable energy for productive uses. The UNIDO Energy Programme is structured around four core thematic areas: (1) Energy management and system optimization, (2) Renewable Energy for Productive Uses, (3) Low-carbon and advanced process technologies and (4) Benchmarking, monitoring and verification.

UNIDO is well placed to implement this project because of its experience and expertise in dealing with SMEs and industry as a whole. UNIDO's SME development programme in Pakistan was initiated in 2001 and UNIDO has maintained, since then, an excellent network of all key stakeholders in SME sectors in Pakistan, working extensively on issues relating to skills development, strengthening institutional capacity and job creation all

5 International Monetary Fund; Government of Pakistan (2011); page 118 in Chapter 7 – Pillar IV: Integrated Energy Development Programme

6 For the period 2004-2008, but extended until 2012 and available on : http://undp.org.pk/images/publications/undaf.pdf

with an emphasis and focus on gender mainstreaming. In addition, UNIDO works with industry in areas such as trade and capacity building; business, investment and technology promotion; industrial policy and private sector development and agribusiness development. UNIDO is starting to implement a GEF-4 funded project on the development of gasification in SMEs in Pakistan entitled "Promoting Sustainable Energy Production and Use from Biomass". This GEF-5 Project will link with the other project's implementation and build on activities, such as policy, regulatory framework and capacity building, to avoid any duplication. Regarding biomass, the GEF-4 UNIDO/GEF project focuses on biomass gasification for power generation for small to medium-scale industries. This GEF-5 project, in its RE activities support, will focus on efficient steam and power generation from efficient biomass combustion. In short, this project will built on the substantial experience UNIDO has obtained over the last decade in supporting (small and medium-scale) industries in Pakistan.

***A.4 The baseline situation and the problem the project seeks to address:***

**1) Organizations, plans and policies in energy and industrial sectors**

The power situation in Pakistan is characterized by an increasingly widening gap between demand and supply. In fact, the power situation in Pakistan has of late been described as reaching crisis level with recognition that no quick solutions are possible. The order of magnitude of unmet demand in peak demand months is over 25% of peak demand and rising. This situation adversely affects the economy and the general well-being in Pakistan. The lack of sufficient power is compounded by the high transmission losses of around 30% that include technical (poor quality infrastructure) and non-technical (theft and non-payment due to poor bill collection) losses as well as the problem of ´circular debt´ (see further). Many companies have difficulties in accessing modern energy services due to the frequent electricity supply interruption in the country. This in particular affects the small and medium-sized enterprises (SMEs) that often have to resort to the use of expensive diesel generator sets. The power shortage and interruptions result in lowering of the industries' production, profit, capacity and opportunity to grow. The Government of Pakistan has launched various initiatives with the aim of promoting energy efficiency and the use of alternative and renewable energy in the country. These initiatives have achieved varied results so far.

In 1985, a detailed National Energy Conservation Plan was drawn up and **National Energy Conservation Centre (ENERCON)** was established in December 1986 to serve as the Government's focal implementing agency. In 1992, ENERCON prepared the Pakistan National Conservation Strategy and Plan of Action 1993-1998. Presently, Pakistan National Energy Conservation Policy approved in 2006 provides broad guidelines for enhancing end-use efficiency in various energy consuming sectors of economy. To achieve the goals defined in these policies, the Government has adopted the *EE Sector Roadmap (2010-2019).*For the industry sector, the policy defines short, medium and long term measures for meeting overall policy objectives and goals.

These goals are to be met through the specific initiatives; 1) Promotion of EE&EC (energy efficiency and energy conservation) and improved energy management in all sectors of the economy; 2) Development of EE&EC market and commercialization of relevant products and services; 3) Enhanced utilization of available indigenous energy resources and reduced dependence on imported fuels; 4) Reduced energy intensity through efficient practices, technology upgrades, and waste reduction. Policy instruments mentioned are: (i) better integration of EE in energy policy and the regulatory frameworks; (ii) mainstreaming energy efficiency into national planning; (iii) rationalization of energy pricing; (iv) creation of fiscal and financial incentives; (v) establishing technology standards, certification, and testing regimes; and (vi) improving the information flow on energy efficiency, financing, technology, and support services.

The Government is keen to support EE investments and is looking for flexible public sector financing mechanisms to establish a dynamic EE market to scale up the deployment of proven EE (and RE) technologies in energy supply and use. The Pakistan Energy Yearbook (2009) mentions that the total investment requirement for the demand-side EE sector from FY2010-2019 is estimated at USD 8.5 billion, of which USD 3.5 billion in supply side efficiency improvements and USD 5.0billion demand-side investments[7]. The private

[7] *Source:* Pakistan Energy Yearbook (2009); consultant's report ADB TAADB TA 7060-PAK: Pakistan Sustainable Energy Efficiency Development Program (2009), based on data from Energy Efficiency Investment Plan, Planning Commission

sector (domestic, industrial, agricultural, transportation, oil refining) is expected to finance 45% and borrow commercially for 55% of the investment.

Regarding policy, the power sector is divided into conventional and non-conventional (renewable) energy. The conventional power sector is covered by the *Power Policy 2002*, whereas the renewable energies sector is covered by the *Policy for Development of Renewable Energy for Power Generation* (2006), also referred to as Short-Term Renewable Energy Policy. This policy seeks to establish, among others, investor friendly conditions, such as buy-back guarantees, risks coverage as well as assisting in the preparation of environmental impact assessments (EIAs) and the issuance of relevant government permissions for wind energy power producers. The Renewable Energy Policy aims to mobilize investment from private sector for Independent Power Producers (IPPs) for the sale of power to the grid only, for captive- grid spill-over power projects for self-use and sale to utilities; captive power projects for self or dedicated use; and isolated grid power projects (i.e. small, stand-alone).The Renewable Energy Policy encompasses waste-to-energy, cogeneration, hydro, solar, wind, geothermal, and other non-conventional resources. AEDB is in the process of updating the 2006 Alternative and Renewable Energy Policy. This Policy for the "medium-term"(i.e. five years, 2009-2014), will succeed the current "short term" Renewable Energy policy of 2006. The project's analysis and findings regarding promotion of the use of renewable energy and energy efficiency in industrial companies will help in formulating elements of the 'new' policy. Also, the Government is in a process of decentralization. The project's recommendations will help in designing provincial policies and regulations (e.g. Punjab), while the institutional setup regarding energy and environment will materialize.

The RE policy sets procedures and framework conditions for determining feed-in-tariffs for renewable energy projects, while maintaining most of the incentives of the existing policy. The Policy contains the following provisions:

- Making purchase of electricity by the National Transmission & Dispatch Company (NTDC) from qualifying renewable energy-based generation projects mandatory;
- Permitting an investor to generate electricity based on renewable resources at one location and receive an equivalent amount for his or her own use elsewhere on the grid at the investor's own cost of generation plus transmission charges (wheeling);
- Providing a one-window at federal level of IPPs;
- Allowing net metering and billing so that a producer can sell surplus electricity at one time and receive electricity from the grid at another time and settle the account on a net basis;
- De-licensing and deregulating small scale power production through renewable resources (up to 5 MW for hydro and 1 MW for net metered sales) in order to reduce the transaction costs for such investments;
- Laying down simplified and transparent principles of tariff determination; there is a two-part tariff structure consisting of fixed capacity and variable energy component;
- Insulating the investor from resource variability risk, which is allocated to the power purchaser;
- Facilitating projects to obtain carbon credits for avoided greenhouse gas emissions, thereby helping improve financial returns and reducing per unit costs for the purchase.

All grid-connected power projects are regulated by the Regulation of Generation, Transmission and Distribution of Electric Power Act, 1997 (known as the "NEPRA Act"). It does not regulate the captive power plants and allows the entities and individuals to set up such facilities that are for self (captive) use[8]. NEPRA's primary responsibility is to determine tariffs for generation, transmission and distribution of electric power. NEPRA also

[8] The *Ministry of Water and Power* is responsible for formulation of water and power sector policies, supervision of performance of various power sector companies, planning of projects, budgets and investment. The erstwhile monopoly *WAPDA (Water and Power Development Authority)* has been unbundled into a) the *National Transmission and Dispatch Company (NTDC)* is responsible for transmission system of 220KV and above as well as the National Dispatch Control Centre. It is also responsible for preparation of power sector plans., b) nine distribution companies and c) four generating companies, all under the . *Pakistan Electric Power Company (PEPCO)*. Installed capacity in the WAPDA service area was 17,264 MW (2007). The *Central Power Procurement Agency (CPPA)* acts as agent for the nine distribution companies for purchase of electricity from various power generation companies as well as from Independent Power Producing (IPPs )companies. *KESC (Karachi Electricity Supply Company)* is a majority privately-owned vertically integrated company (Government of Pakistan owns 25.7%) and is responsible for generation, transmission, and distribution of electricity in the Karachi area. Installed capacity was 2.16 MW (2007). The *National Power Regulatory Agency (NEPRA)* regulates the power sector; it issues licenses for generation, transmissions and distribution of power, approves investment programs of utilities and sets tariffs. Of the total installed capacity of 19,420 MW (in both the WAPDA and KESC areas) 6,479 MW was provided by hydropower, 137 MW by nuclear power and 12,478 thermal (of which 5,822 by IPPs). In 2011 it was decided that functions of PEPCO would be taken over by CPPA.

issue licenses for generation, transmission and distribution of electric power. It is mandated to establish and enforce standards to ensure quality and safety of operation and supply of electric power to consumers and approve investment and power acquisition programs of the utility companies. Under the current structure for IPPs, the sponsors file the application with NEPRA for tariff approval. AEDB and the power-off-taker are notified by NEPRA, in case of successful tariff negotiations between all stakeholders and the sponsors. Exhibit 1 below presents the relevant government entities in the energy sector.

The **Alternative Energy Development Board** (AEDB) is an autonomous agency under the **Ministry of Water and Power,** established in 2003 to undertake the following:

- To develop national strategy, policies and plans for utilization of alternative and renewable energy resources;
- To act as a forum for evaluating, monitoring and certification of renewable energy (RE) projects and products;
- To facilitate power generation through alternative or renewable energy resources by:
  - Acting as one-window facility for establishing, promoting and facilitating RE projects based on wind, solar, small-hydro, fuel cells, tidal, ocean, biogas, biomass etc.
  - Setting up RE power pilot projects on its own or through joint venture or partnership with public or private entities;
  - Conducting feasibility studies and surveys to identify opportunities for RE power generation;
  - Undertaking technical, financial and economic evaluation of RE proposals as well as providing assistance in filling of required licensing applications and tariff petitions to National Electric Power Regulatory Authority (NEPRA);
  - Interacting and coordinating with national and international agencies for promotion and development of RE;
  - Assisting the development and implementation of plans with concerned authorities and provincial Governments for off-grid electrification.

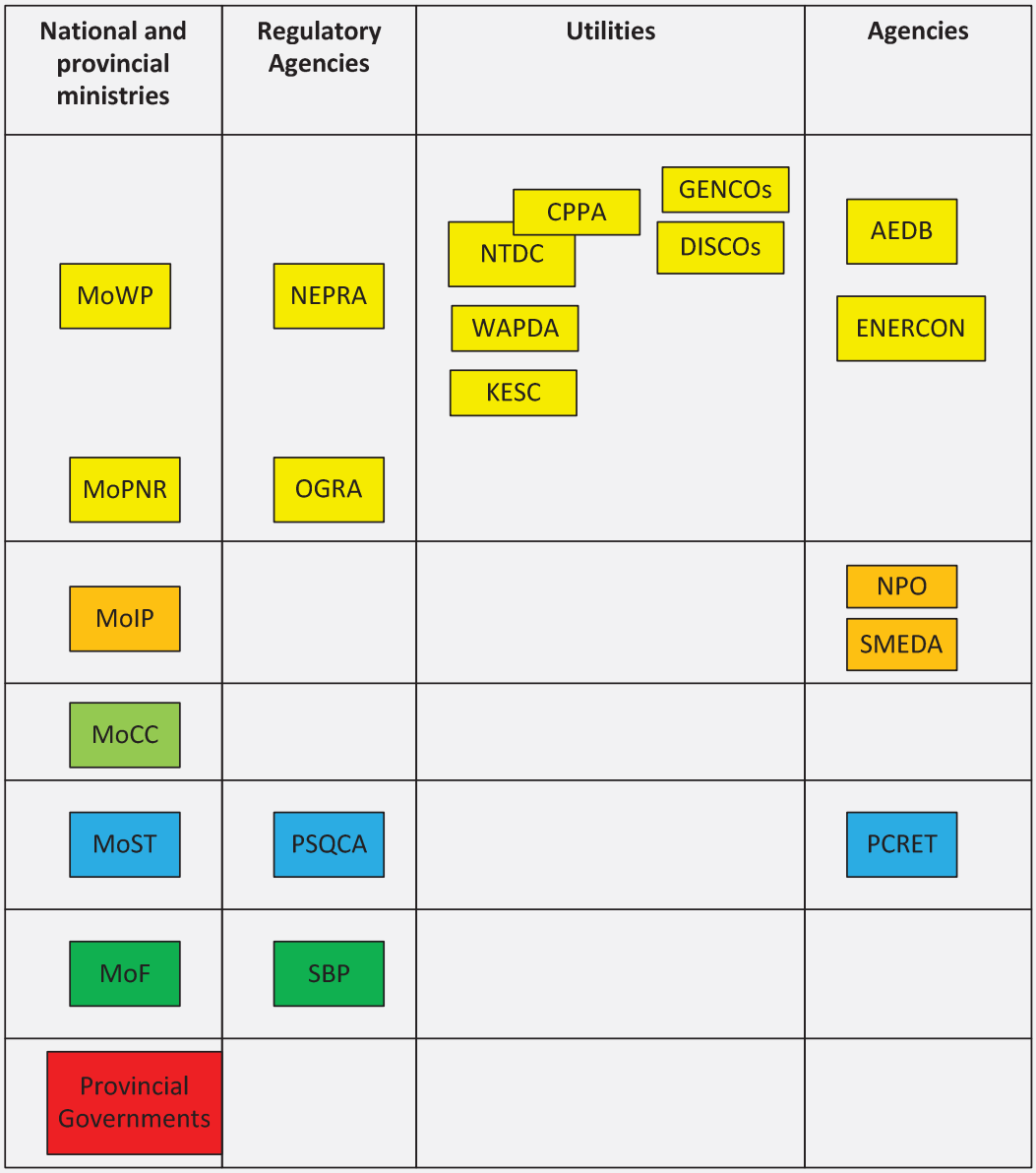
A Ministry of Environment was established in 2002 to handle the subjects of environment, ecology, human settlement and forests in Pakistan. The Ministry was responsible for implementation of the National Environment Policy, planning and international environment coordination. In line with the 18$^{th}$ Amendment to the Constitution (passed in 2010), a redistribution of government powers and function at the federal level is taking place. Provinces are going to handle the business of 17 federal ministries; various federal Ministries have now been devolved to the provinces, including the former Ministry of Environment. The decentralization is still an on-going process, but consequently the project will with work more and more with provincial energy and environmental departments. As the climate change agenda requires strong regulation at the national level, a **Ministry of Climate Change** was formed in 2011. This Ministry is now the GEF Operational and Political Focal Point.

The **National Productivity Organization** is an autonomous organization under the Ministry of Industries and Production (MOIP) to promote productivity consciousness and quality initiatives in compliance with international best practices. Given the price hikes in fossil fuels and big gap in demand and supply, NPO has initiated an energy efficiency programme. The NPO is working as a Liaison Office of Asian Productivity Organization (APO) for the promotion of "productivity & quality" in various sectors of the economy. NPO's programmes like trainings, benchmarking, energy efficiency and auditing; performance and quality award schemes, etc. are improving the competitiveness of the industrial, agricultural, service and health sectors. NPO will be the main executing agency for this project.

The **Small and Medium Enterprises Development Authority** (SMEDA) was established in 1998. Services include:

- Working as an advisory body for the Government (providing policy advice and background studies);
- Facilitating the strengthening of SME-representative bodies associations/chambers;
- Providing business development services for small and medium enterprises (such as training, workshops, facilitating access to finance sources and feasibility studies, networking and institutional support);
- Working with donor agencies for the development of SME programmes and projects.

**Exhibit 1 Overview of relevant government entities**



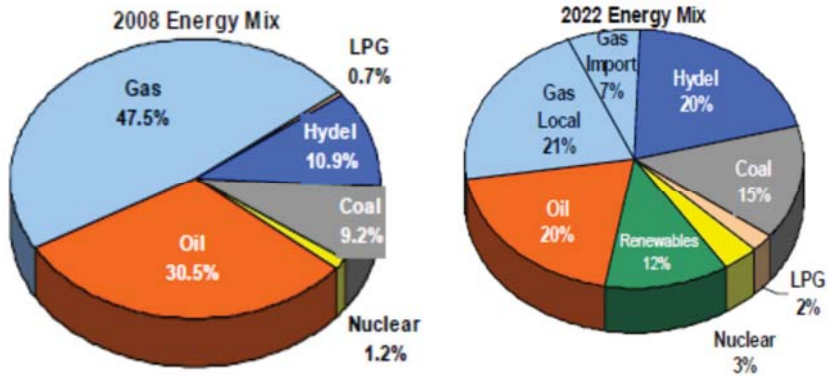

*Energy sector*(yellow)
MoWP: Ministry of Water and Power; MoPNR: Ministry of Petroleum and Natural Resources; NEPRA: National Power Regulatory Agency; OGRA: Oil and Gas Regulatory Agency; NTDC: National Transmission and Dispatch Company; CPPA: Central Power Procurement Agency; WAPDA: Water and Power Development Authority; KESC: Karachi Electricity Supply Company; GENCOs: power generation companies; DISCOs: power distribution companies; AEDB: Alternative Energy Development Board; ENERCON: National Energy Conservation Centre
*Industry sector* (orange)
MoIP: Ministry of Industries and Production; NPO: National Productivity Organization; SMEDA: Small and Medium Enterprises Development Authority;
*Environmental (green)* MoCC: Ministry of Climate Change;
*Technology* (blue): MoST: Ministry of Science and Technology; PSQCA: Pakistan Standards and Quality Control Authority;
*Finance* (light blue) MoF: Ministry of Finance, Revenue, Planning and Development; SBP: State Bank of Pakistan

*It should be noted that only entities relevant to the project and/or referred to in the main text are presented here*

## 2) Energy

The country's pace of economic development is accelerating with annual GDP growth averaging 5.2% over the last five years and per capita income doubling in less than a decade[9]. The significant strengthening of macroeconomic fundamentals and resilience of growth trends even in the face of serious and unexpected challenges, such as record oil import prices and the severe earthquake of 2005 and recent flood of 2010 has underpinned current projections of national economic growth in excess of 8% per year over the medium term and beyond.

**Exhibit 2 Energy mix in 2008 and 2022**




Total energy demand in 2008: 62.90 MTOE; in 2022: 122.46 MTOE (million tons of oil equivalent). Source: *A Roadmap for Energy Efficiency and Conservation in Pakistan,* OICCI

The energy situation in Pakistan is characterized by an increasing gap between demand and supply, high dependence on fossil fuels for electricity generation, and a very energy intensive industrial sector. Total energy consumption in Pakistan is comprised of 66% from commercial energy resources and 34% from non-commercial resources (biomass). Statistics on commercial energy are well-documented, while no recent survey of non-commercial energy resources is available. The total primary commercial energy supplies were comprised of 30.5 from oil, 47.5% from natural gas, 9.2% from coal, 10.9% from hydroelectricity, 1.2% from nuclear, 0.7% from LPG in 2008 (see Exhibit 2). Of the total commercial energy supply, about 25% was imported in the form of oil. This import dependence is rapidly increasing due to increased fossil fuel based power generation (on-grid as well as captive power).

According to government estimates, about 53% of the population has access to electricity. The total supply of electricity by electric utilities was 95.7 TWh (terawatt-hour), while the sale to consumers was 73.4 TWh, the difference being technical and commercial losses. The power systems of PEPCO/WAPDA and KESC have been experiencing extensive load shedding in the range of 3,000 MW to 5,000 MW in the last three years. The order of magnitude of unmet demand in peak demand months is over 25% of peak demand. This adversely affects the economy. While lack of sufficient power is one reason, the problem is much worsened by the transmission losses of 30% due to technical (poor quality infrastructure) and non-technical (theft and non-payment due to poor bill collection) losses as well as the problem of ´circular debt´. Circular debt is the situation in which the state utilities are unable to collect enough revenue from customers, due to losses and to inadequate tariffs, to pay for their fuel and for power from the power producing companies[10]. They, on their turn, are unable to pay for their fuel bills and debt service. When the situation grows severe, generating plants run out of fuel, the utility sheds load, and customers left without power are unable to produce, so they become

[9] *Development Outlook* reports (2010, 2009), Asian Development Bank (ADB), available on http://www.adb.org/publications/series/asian-development-outlook

[10] For example, in 2009/10, the average end-user tariff was about PKR 6/kWh, while the cost of service was about PKR 8.5/kWh. Source: *Integrated Energy Sector Recovery Plan* (ADB, Ministry of Power & Energy; 2010). See also Exhibit 3 for an overview of energy prices.

unable to pay their electricity bills. In 2008, availability of power in Pakistan falls short of the population's needs by 15%. Load shedding and power blackouts have become more severe in Pakistan in recent years.

**Exhibit 3 Energy prices by sector in Pakistan in 2008**

| | Financial | Economic | Unit |
|---|---|---|---|
| **Electricity** | | | |
| Domestic sector | 6,76 | 6.08 | PKR/kWh |
| Commercial sector | 10.30 | 6.08 | PKR/kWh |
| Industrial sector | 7.15 | 6.08 | PKR/kWh |
| Agricultural sector | 5.10 | 6.08 | PKR/kWh |
| **Natural gas** | | | |
| Domestic sector | 151.97 | | PKR/MMBtu |
| Commercial sector | 456.26 | | PKR/MMBtu |
| Industrial sector | 393.74 | | PKR/MMBtu |
| Power plants | 405.49 | | PKR/MMBtu |
| LNG (imported) | 931.03 | 802.61 | PKR/MMBtu |
| CNG | 50.00 | | PKR/kg |
| **Petroleum products** | | | |
| Gasoline | 57.66 | 34.35 | PKR/litre |
| HSD | 57.14 | 30.24 | PKR/litre |
| LDO | 48.00 | 34.49 | PKR/litre |
| Fuel oil | 31,347.00 | 27,023.26 | PKR/tonne |
| **Coal** | | | |
| Indigenous | 5,674.83 | 4892.10 | PKR/tonne |
| Imported | 87.00 | | USD/tonne |

Notes:
- Taken from *Pakistan: Sustainable Energy Efficiency Development Program*, prepared by Haigker Baily/Ecoloner; project ADB TA 7060-PAK (2009)
- USD 1 = PKR 80.00; kWh = kilowatt-hour; MMBtu = 1 million Btu (British thermal unit)

At present, natural gas is used as preferred fossil fuel for heating in industry and power generation. Primary energy sources for power generation (98,384 GWh in 2007) are natural gas (36.4%), hydro (32.5%), oil (28.5%) and nuclear, imported oil and coal (2.6%). Oil is the fuel of the last resort and energy shortages are met by increases in oil imports as natural gas resources get depleted. The total oil bill for 2008-09 was about USD14 billion. According to one estimate, the energy deficit would grow from 29% (18 million tonnes of oil equivalent, TOE) to 62% in the year 2025 (123 million TOE). Natural gas use in 2022 would still hover around 48% of primary energy supply, but of which only 19 million TOE locally produced and 74 million imported (compared with 30 million TOE of locally produced gas in 2007)[11]. Assuming current global oil prices remain unchanged, Pakistan's import bill for its energy needs could easily exceed an unaffordable USD 40 billion in the next decade.

The total primary commercial energy supply in Pakistan was 64.1 million TOE in FY 2008-09 and is projected to increase to 148-198 million TOE by the year 2020-2025. Energy consumption totalled 39.4 million TOE in FY 2008, of which 43% in industry.

Energy supply is becoming a major bottleneck for industry due to the frequent electricity supply interruption in the country. Consequently, industries have resorted to setting up natural gas and fossil-fuelled captive power plants to meet their energy needs. At the national level, the government has to balance between gas supply for industries and transportation with gas supply for the domestic sector. This has increasingly led to gas shortages to industry, as the Government started natural gas rationing for companies and in some cases, quota have been fixed for supplying gas to the industries. This has interrupted the continuous gas supplies to industries and hence not allowing them to run their captive power plants for power generation. In most cases, companies are forced to run their captive power plants on diesel, thereby increasing production costs. The energy shortage results in lowering of their production, profit and capacities and opportunities to grow.

[11] See ADB 4881-PAK: *Final Report* (2009), *Formulation of Pakistan's Mid-Term Renewable Energy Policy; Working Paper 3, Pakistan's Energy Sector: Market Growth and Supply Options.*

Consequently, companies are nowadays actively looking at identifying alternative solutions for power generation and reducing current energy consumption levels so as to reduce exposure to current erratic power supply. Seeing the availability of biomass, organic waste and agriculture waste (see Exhibit 4), as well as other renewable energy resources, such as the abundant solar energy, power generation from renewables seems to be an ideal solution not only to meet the electricity needs of both large companies and SMEs (in addition to what the grid can deliver), but also to become independent power producers (IPPs) and sell (surplus) energy to the grid.

**Exhibit 4 Estimates of crop residue production in Pakistan**

| Country / Province | Crop Production | Residue Production | Residue Collection | Crop Production | Residue Production | Residue Collection |
|---|---|---|---|---|---|---|
| | 000' tons | 000' tons | 000' tons | 000' tons | 000' tons | 000' tons |
| **Wheat - Wheat Straw** | | | | **Cotton - Cotton Stalk** | | |
| Pakistan | 24033 | 24033 | 15621 | 11819 | 50231 | 32650 |
| Punjab | 18420 | 18420 | 11973 | 8751 | 37192 | 24175 |
| Sindh | 3518 | 35189 | 2287 | 2978 | 12658 | 8228 |
| KPK | 1205 | 1205 | 783 | 0.5 | 2 | 1 |
| Balochistan | 868 | 868 | 564 | 89 | 379 | 246 |
| **Rice - Rice Husk** | | | | **Sunflower - Sunflower Cob** | | |
| Pakistan | 6952 | 4637 | 3014 | 421 | 842 | 547 |
| Punjab | 3643 | 2430 | 1580 | 131 | 261 | 170 |
| Sindh | 2537 | 1692 | 1100 | 288 | 577 | 375 |
| KPK | 1205 | 804 | 522 | 1 | 2 | 1 |
| Balochistan | 868 | 579 | 376 | 1 | 2 | 1 |
| **Maize - Corn Cob** | | | | **Rice - Paddy Straw** | | |
| Pakistan | 3593 | 5390 | 3503 | 6952 | 6952 | 4519 |
| Punjab | 2627 | 3941 | 2562 | 3643 | 3643 | 2368 |
| Sindh | 2 | 3 | 2 | 2537 | 2537 | 1649 |
| KPK | 958 | 1437 | 934 | 1205 | 1205 | 783 |
| Balochistan | 6 | 9 | 6 | 868 | 868 | 564 |
| **Sugarcane - bagasse** | | | | | | |
| Pakistan | 46923 | 9866 | 6412 | | | |
| Punjab | 28788 | 6062 | 3940 | | | |
| Sindh | 13639 | 3363 | 2186 | | | |
| KPK | 4676 | 426 | 277 | | | |
| Balochistan | 32 | - | - | | | |

**Source:** *Request for CEO Endorsement, GEF/UNIDO; Promoting sustainable energy production and use from biomass in Pakistan* (2011)*available at http://www.thegef.org/gef/content/promoting-sustainable-energy-production-and-use-biomass-pakistan*

Energy savings

Energy efficiency is a low-cost energy resource for the Pakistan economy, but only if it can be successfully implemented. Significant and multiple barriers will need to be overcome to achieve the massive energy savings that are possible in households, business establishments, factories and public and private organizations. ADB's *Integrated Energy Recovery Plan*, projects that energy savings equal to 15% of total energy consumption (or11

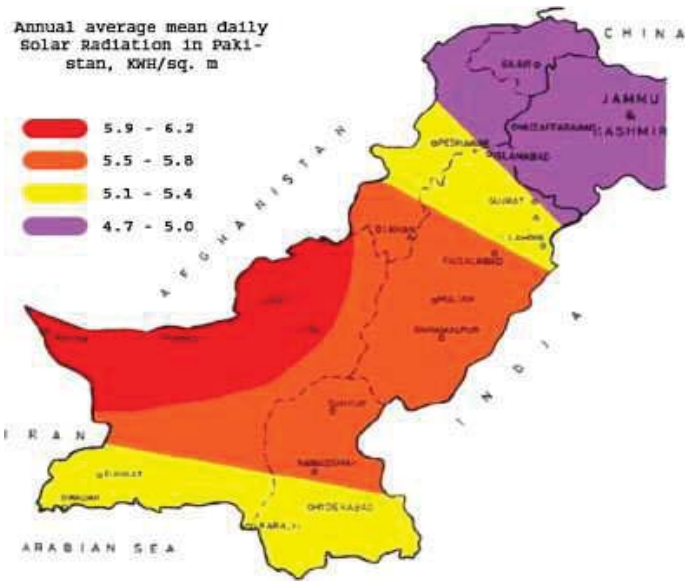
billion TOE) are achievable in Pakistan, implying halving the net oil imports[12]. The same report mentions that the "legislative framework remains weak". In addition, the report refers to the National Energy Conservation Act (since 2009), stating that "few substantial results have been achieved". There are currently a number of institutions involved in energy efficiency, but they often have conflicting mandates and mixed responsibilities. Consequently, implementing energy efficiency has remained limited partly due to the lack of coordination among key stakeholders".

Independent renewable energy production

The Renewable Energy Law (2006) provides for the promotion of the role on Independent Power producers running renewable energy systems. In terms of overall impact, however, the share of renewable energy in the total mix (apart from large-scale hydropower) remains small[13]. The total installed capacity of all different renewable technologies in Pakistan is 41.5 MW as of July 2010 (excluding large-scale hydro). Various private sector investors have made progress in terms of development of wind energy and hydropower projects over 2010-12 (preparation of feasibility studies; over 20 companies have submitted their tariff petition to NEPRA). In contrast, there are only few requests up to now for solar energy and biomass[14]. Solar applications remain largely restricted to off-grid applications (e.g. solar home systems) and solar water heating.

Regarding renewable energy, Government has focussed attention on IPPs that sell power to the grid, basically hydro and wind power, or isolated applications, but hardly on self-generation opportunities. Most companies have their own generation capacity fuelled by natural gas or diesel ('captive power'); at least as back-up for the uncertainty in grid power supply. Given that natural gas is now in short supply and power from diesel generators is quite expensive, companies are now looking for alternative solutions for power generation. Unfortunately, the wind and hydropower resources are often too far away from the centres of economic activity (in desert or mountainous areas) and cannot often be utilised for on-site energy use.

**Exhibit 5 Solar radiation map**




In view of the availability of the biomass, organic waste and agriculture waste (as shown in Exhibit 4) and the abundant solar energy (Exhibit 5), power generation from renewables seems to offer a solution; first, to meet own electricity needs of both large companies and SMEs (in addition to what the grid can deliver), but also to become independent power producers (IPPs) and sell (surplus) energy to the grid.

Solar energy is abundantly available in the country. Pakistan has about 500-3000 sunshine hours per year (4.1-8.2 per day) and 1.9-2.3 MWh per $m^2$. Thus, solar power could be harnessed as an additional source of power, especially in SME with small load requirements and eliminating the need for refining, transporting and conveying fuels over long distances. Recently introduced net metering and sales permit the sale of surplus generation to the grid (when properly developed and paired with suitable end-user financing) could open up a huge market for on-site solar PV

12 Source: *Integrated Energy Sector Recovery Plan* (ADB, Ministry of Power & Energy; 2010) , available at http://www.adb.org/publications/integrated-energy-sector-recovery-report-and-plan

13 Source: *Integrated Energy Sector Recovery Plan* (ADB, Ministry of Power & Energy; 2010)

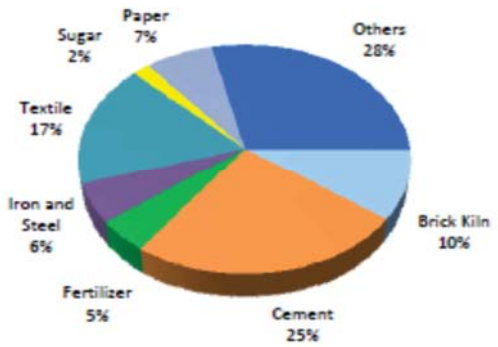
14 In addition to some submissions from the sugarcane industry, only two petitions on biomass were submitted in 2012; one by SJJD (12 MW in MirwanGorchani in Sindh) and one by Lumen Energy (in Jhang, Punjab).

systems in Pakistan. There are no real projections on how RE could penetrate Pakistan's power market, except for wind power expansion. The Medium-Term Wind Energy Development Plan projects installed capacity of 3,850 MW by 2020[15]. The draft Medium-Term RE policy aims at 5% of power generation by renewables in the year 2030. An ADB-commissioned assessment gives an estimate of 10% (or 25,000 GWh/yr) by 2020 as possible[16].

**Small and medium-sized enterprises (SMEs)**

SMEs, including household manufacturing industries do significantly contribute to Pakistan's economy as demonstrated by the fact that 90% of all enterprises in Pakistan are characterized as SMEs, employing 80% of the non-agricultural labour force and contributing 40% to GDP[17]. In rural areas, there are over 290,000 established SMEs that are involved in diverse activities including tobacco curing, *gur* making, blacksmithing, lime manufacture, pottery, rural bakeries etc. These SMEs are viewed as the engine for industrial development and growth of rural Pakistan thereby contributing significantly to poverty reduction and employment creation. The Government of Pakistan's economic survey of 1998-99 showed that SMEs with a mere 20% investment (and with access less than 10% to total formal credit supply) generated 80% of the country's total employment.

**Exhibit 6 Energy consumption by subsector (FY 2008)**




Source: ADB TA-7060 Pakistan Sustainable Energy Efficiency

Although data on the overall energy consumption in SMEs is not readily available, targeted surveys covering specific regions have shown that most SMEs depend on fossil fuel or wood-based based heat and electricity[18]. Many SMEs use large amounts of process heat as part of their industrial operations. Given the readily available biomass resource in rural areas, including organic waste and agriculture waste, biomass gasification seems to be an ideal solution to meet the electricity and heat needs of these SMEs. Penetration of biomass energy technology in energy intensive SMEs of Pakistan will help SMEs to lower down their electricity bills and 24/7 smooth running of their industrial operations without any load shedding.

**3) Industry**

Pakistan's industrial sector accounts for about 24% of GDP (with textile industry contributing 8.5%)[19]. Apart from mining and the energy industries, other important industries, include food and dairy products, fertilizer production, beverages, construction materials, engineering and machinery, pulp and paper, pharmaceutical and chemicals as well as iron and steel.

Total industrial energy consumption amounted to 16.8 million TOE in FY 2008 (see Exhibit 8). Consumption of natural gas was 8.63 million TOE, oil 1.08 million TOE, coal 5.40 (consumed only in cement and brick

15 *Renewable Energy in Pakistan: Status and Trends* (AEDB)

16 Of which:11 TWh small-scale hydro, 2.2 TWh biomethanation and biogas, 4.2 TWh biomass, 4.6 TWh cogeneration, 2.8 TWh wind and 0.2 TWh solar. Source: ADB 4881, Working Paper 4, Study of Costs and Potential Penetration of On-grid RE

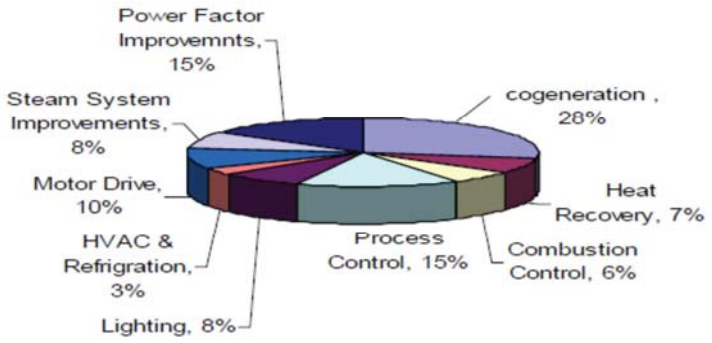
17 *HRM significance and SME sector -Business Recorder* – Articles and Letters; 04-11-2011

18 See, for example, *SME Development in Pakistan: Issues and Remedies;* www.gcu.edu.pk/publications/vc-sme.pdf as well as surveys undertaken by SMEDA (www. smeda.org.pk)

19 *Pakistan Growth and Competitiveness* (World Bank, 2006)

industry) and electricity 1.69 million TOE (or 20.73 GWh). Regarding electricity,[20]6.4% electricity was consumed by steel and iron, 3% by pulp and paper, 27.6% by textile, 0.8% sugar and 62.2% in other industries. Of natural gas, 9.3 % used by steel and iron, 12.9 % pulp and paper, 27.7% textile, 2.6 % for sugar, 9.1 % for fertilizer (fuel), 3.5 % for cement and the remaining 35% for other industry.

**Exhibit 7 Electric energy savings potential in industry**




Source: *Prospects of Energy Efficiency Business in Pakistan*, Energy Associates Pvt. Ltd.

Exhibit 7 provides a breakdown of potential of various energy saving measures in industry. The realizable electricity efficiency (EE) potential in industrial sector is estimated to be about 4%[21]and about12% in natural gas. A summary of the realizable energy savings potential (by 2019) is provided in Exhibit 8.

**Exhibit 8 Energy consumption, realizable energy savings and required investment**

| Subsector | Energy consumption ('000 TOE) | | | | Realizable EE potential ('000 TOE) | Investm. required (USD million) | Payback period (yrs) |
|---|---|---|---|---|---|---|---|
| | Fuels | Electricity | Total FY2008 | Total FY2019 | | | |
| Iron and steel | 610 | 215 | 825 | 1,276 | 21 | 25 | 1.1-1.8 |
| Pulp and paper | 1197 | 47 | 1,244 | 2,517 | 170 | 70 | 1.2-2 |
| Textile | 2519 | 433 | 2,952 | 5,977 | 339 | 109 | 1.2-2.9 |
| Cement and kilns | 5852 | 0 | 5,852 | 11,933 | 476 | 309 | 1.9-2.8 |
| Other industry | 4,929 | 988 | 5,917 | 9,999 | 977 | 1,755 | 0.9-2.9 |
| **Total** | **15,107** | **1,683** | **16,790** | **31,702** | **1,983** | **2,268** | |

Source: Own elaboration based on data in ADB TA-7060 *Pakistan Sustainable EE Development Program* (2009).
Fuel consumption is mainly coal in cement and kilns (5,401,000 TOE) and natural gas in other sectors (8,628,000 TOE), basically for both heat and power.

NPO and SMEDA have initiated a number of energy audits in industrial companies[22]. NPO has undertaken about 60 energy audits in the textile sector, about 13 in the steel sector. SMEDA has carried out about 30 audits in the textile and 12 in other sectors. The NPO audits in 6 textile companies (4 processing and two spinning) showed that at an average investment of USD 100,000, savings could amount to USD 240,000 annually on average with payback times ranging from 3.5 months to 1.5 year. The SMEDA-supported audits show an energy savings potential of about 10-30% in the textile sector (and 5-20% in the other sectors). The results of 25 audited companies show that implementation of simple housekeeping and energy management measures (at no or little investment) would save about 550 MWh/yr per company (with savings of about USD 45,000/yr).Interventions with initial investment (of about USD 54,000) would give savings of 1,500 MWh/yr per company (USD 80,000/yr).

[20] *Pakistan Energy Yearbook* (2009), ADB (2009), quoted in *Dilemma of Third World Countries - Problems Facing Pakistan Energy Crisis a Case-in-Point*, International Journal of Business and Management (Vol.7, No.5, 2012); Consultants' report ADB TA-7060 *Pakistan Sustainable Energy Efficiency Development Program* (2009)

[21] ADB (TA 7060-PAK; Pakistan Sustainable Energy Efficiency, Consultant's Final Report (2009); ENERCON (2009)

[22] Supported by GIZ and the Asian Productivity Organization; source:: www.smeda.org.pk and www.npo.gov.pk

Textile industry

Textile (cotton-based) production and apparel manufacturing are Pakistan's largest industries, accounting for about 66% of the merchandise exports and almost 40% of the employed labour force. Cotton and cotton-based products account for 61% of export earnings of Pakistan. Pakistan is the world's fourth largest producer of cotton and the third largest cotton consumer. The main products of the textile industry, which is dominantly located in Punjab, include cotton yarn, cotton cloth, cotton products, garments, hosiery, blended and synthetic cloth[23]. At present, 521 mills are operating in the country, the majority of which are located in the provinces of Sindh and Punjab[24]. The installed equipment includes spindles (12 million), shuttleless looms (24,000), airjet looms (6,000), auto-power looms (300,000), knitting machines (18,000) and stitching machines (450,000) and a fabric processing capacity of 4.6 billion $m^2$.

The textile industry accounts for a 17% share in total industrial energy consumption (2.95 million TOE), utilizing electricity (16%) and natural gas (82%) as its main energy sources. The remaining 2% is oil, which is utilized as a backup energy source to natural gas. It should be noted that 70% of the total electricity requirement of the textile sector is met by natural gas-based 'captive' generation and the remaining is supplied by the power utilities. Most of the textile industry in the country is privately-owned, and operates in a competitive local and international market environment. There are no public subsidies provided on the energy used by the industry and thus and the industry procures fuel at market prices from local sources.

Due to escalating energy outages and rising energy costs, the textile industry faces significant challenges for its competitiveness in local and international markets. Energy efficiency improvement is needed to help stimulate the future growth of Pakistan's textile sector. Thermal energy savings potential in textile industry can be11-22% and that of electricity 4-7% (technically realizable savings). The total realizable energy savings potential (by FY2019) is estimated at339,000 TOE (see Exhibit 8). The textile industry is located in the main agricultural area where biomass residues are readily available (see also Exhibit 4), but away from the main wind areas (mainly along the coastal areas in the south and desert areas in Punjab and Sindh) and hydropower areas (in the mountainous areas in the northern part of the country).

Other sectors

In addition to textile, food and beverages, steel re-rolling and glass manufacturing are also important industrial sub-sectors requiring support and guidance on energy efficiency. The *iron and steel* industry in Pakistan consists of about 650 steel mills of different sizes, with a total product output of 4.6 million tonnes. The annual demand for iron and steel products in Pakistan has been in the range of 5 million tonnes recently, resulting in a gap between demand and installed capacity that is met by imports. Of the installed capacity, Pakistan Steel Mills in the public sector accounts for 1.1 million tonnes, with the remainder in the private sector. The private sector steel industry in Pakistan predominantly consists of small- and medium-scale production units (steel re-rolling) and where the penetration of energy efficient technologies is relatively low. Induction furnaces installed in the private sector use electricity as an energy source. These furnaces have an average specific electricity consumption of 650 kWh/tonne. There appears to be scope for reducing this consumption by 8% to 600 kWh/tonne, with an $8.8 million investment for the entire industry. Consumption of natural gas is mainly in the rerolling process that has an efficiency improvement potential of 20%.The Pakistani *pulp and paper* industry consist of about 44 manufacturing units of various products and with capacities ranging from 20 to 120 tonnes a day. The paper industry is mainly located in Punjab and NWFP. About two-thirds of companies are operated at efficiency levels below international standards and benchmarks.

[23] Textile industry consists of large-scale companies and cottage/small ones. The textile value chain consists of a) spanning (mainly larger companies with in-house weaving, dying and finished products), b) weaving (mainly SMEs), processing (dying, printing) with SMEs and another part consisting of larger companies), printing and garment manufacturing (over 75% are small-sized companies. Source: *Textile Sector is the Backbone of Pakistan's Economy*, FBR Pakistan.

[24] Economic Survey 2007-2008

## 4) Baseline scenario and barriers

Enterprises have not implemented EE and RE programs despite of large potential of EE improvements and locally available RE resources. Several initiatives have been launched by the government. However, a number of barriers remain that contribute to the slow and failure of the uptake of EE measures in industry and implementation of industrial RE applications.

**Exhibit 9 Overview of barriers and actions proposed for the project to address**

| ***Barrier*** | ***Output in the proposed project that addresses the barriers*** |
|---|---|
| *Policy barriers*<br>• There are many policy and regulatory measures taken by the Government to promote energy conservation and renewable energy in the country. However, these initiatives have resulted in very little achievements in the industry sector because of the lack of targets to improve industrial energy efficiency, the weakness of the existing policy instruments to raise awareness of market players (industries, consultants, equipment suppliers, and banks) on the promotion of EE and RE, and inadequate financing incentives and mechanisms. In addition, the whole industry sector has not embraced the culture of energy efficiency or resource efficiency in general.<br>• The regulatory requirements and procedures to develop a grid-connected RE project getting government approvals have improved but remain lengthy, which deters potential project developers. With only a few biomass energy and solar energy projects submitted, there is no tariff benchmark for such projects. In general, RE policy has focused on on-grid applications (hydro and wind), but has ignored the potential for on-site heat and power applications.<br>On EE, there is lack of a national energy efficiency and strategy of demand-side management which synergizes the activities of all relevant stakeholders.<br>• Regarding EE in industry, there are no real subsector performance benchmarks or compilation of best operating procedures and practices (in countries abroad).There are no systematic methods for highlighting lessons from different experiences, and sharing of knowledge and experiences through modes such as case studies (in other countries). | 1.1 Existing policy and regulatory framework reviewed and recommendations made (including financial and non-financial incentives and instruments)[25]<br>1.2 Recommendations on improvements in policy and regulatory framework adopted and associated advocacy work<br>1.3 Sectoral analysis on EE (amd RE) opportunities and benchmark definition, impact assessment and recommended post-project action plan for RE/EE in industry<br>4.1 Project monitoring and evaluation, knowledge dissemination |
| *Information, awareness and behavioural change*<br>• Information on product specifications (technical specifications, performance parameters, O&M procedures) as well as prices offered by different biomass or solar energy technology suppliers is not readily available in Pakistan; Information and awareness on biomass-based conversion technologies among intermediary stakeholders such as NGOs, industry groups and financial institutions is also limited<br>• Lack of demonstration of successful grid-connected or captive power biomass and solar energy plants of no systematic performance monitoring methods exist<br>• There is a lack of information about available options, best practices, and benchmarks in energy efficiency. There is need of awareness activities to promote Energy Management standards (EnMS) and systems optimization (SO) with comprehensive guidelines and documentation of demonstration | 1.3 Sectoral analysis on EE (and RE) opportunities, impact assessment and recommended post-project action plan for RE/EE in industry<br>2.1 Projects on EnMS and Systems Optimization (SO) assessed and implemented in industrial companies in textile (and other sectors)<br>2.2 EE and RE technology support in 1 textile unit<br>2.3 Projects for deployment of RE technologies assessed and implemented in 2 companies<br>3.1 Investment platform to promote RE and EE in industrial companies strengthened (non-grant instruments, banking products; awareness creation) |

[25] Implementation will by the Government entities, as mentioned in Exhibit 1. Also, the project will work more with provincial energy and environmental departments. The decentralization is still pretty much an ongoing affair and how division of responsibilities between the levels of Government will materialize in the coming years.

| | |
|---|---|
| cases | |
| *Cost and market barriers*<br>• RE technology has a relatively high investment cost, and in the case of biomass also there can potentially be wide fluctuations in supply and price of the biomass resources<br>• Power supply from decentralized sources (IPPs) is addressed in RE Policy (2006, currently under revision). Within regulatory framework, specific regulations to provide incentives for biomass and solar need further development<br>• Most industries have a budgetary disconnect between capital projects and operating expenses (energy investments and maintenance). Life cycle assessment on purchases is rarely considered on industrial energy efficiency projects and low-investment cost is mostly considered when the decision has to be taken to change equipment. Local suppliers of equipment face limited experience and skills in marketing their products and brands to the industry without offering alternatives to improve the system efficiency as a whole. | 2.3 Projects for deployment of RE technologies assessed and implemented in 2 companies<br>2.4 Portfolio of implementation of EnMS/SO and deployment of RE elaborated (incl. finance sources)<br>3.1 Investment platform to promote RE and EE in industrial companies strengthened (non-grant instruments, banking products; awareness creation)<br>3.4 National Energy Performance Award scheme introduced<br>4.1 Project monitoring and evaluation, knowledge dissemination |
| *Technology and operation*<br>• Current practices in the field of energy efficiency tend to focus more on individual system components, than on the whole system. The component level improvement has potential of increasing system energy efficiency of 5-10%. Virtually, there is no focus on improving energy efficiency at the system level which can provide higher savings of up to 20 to 30% in energy consumption and GHG emissions.<br>• Usually energy management is an ad-hoc practice in the industrial sector, especially in small and medium scale enterprises. At the facility or company level, there are no built-in energy management policies and strategies that integrate energy issues in the existing management structure; thus, there is no continuous info gathering and energy management<br>• Users may not have sufficient technical knowledge and information on specific biomass energy technology and often place demands on the system incompatible with design and operating procedures. Problems also arise due to users not being adequately trained to handle system operation and maintenance<br>• There are no institutional mechanisms for interactions and networking among different stakeholders. There is little linkage between R&D and potential equipment suppliers | 2.1 Projects on EnMS and Systems Optimization (SO) assessed and implemented in industrial companies in textile (and other sectors)<br>2.2 EE and RE technology support in 1 textile unit<br>2.3 Projects for deployment of RE technologies assessed and implemented in 2 companies<br>2.4 Portfolio of implementation of EnMS/SO and deployment of RE elaborated (incl. finance sources)<br>3.2 Certificationcenter and textile training facility for experts on RE and EE-EnMs applications established (under NPO) and training and certificationprogramme established<br>3.3 Training of experts on EE and RE in industrial applications carried out |

The first part of the previous section A.4 describes policies that currently exist regarding energy efficiency (EE) and renewable energy (RE). Despite awareness creation efforts initiated by the government in the area of RE and EE, little achievement has been achieved by way of real investments in the energy sector due to a number of interrelated barriers (see Exhibit 9).Implementation has been slow due to limited capacity and perceived lack of access to appropriate financial resources. The EE programs and initiatives in the country have not delivered up to now and there is still need for comprehensive capacity building focused on the industrial sector. Lack of operating, calibrated energy measuring instruments and absence of forms and records for energy of consumption add to awareness problem atplant level. Training materials and application manuals, developed in other countries may not address problems and issues specific to Pakistan industry. Absence of national codes and standards for energy consumption as well as energy benchmarking for energy utilization efficiency in industrial processes limits the market. There is no real incentive or rebate policy offered for energy conservation projects in industry. As a result, there is a limited penetration of energy-efficient measures, alternative energy technologies andenergy management systems in industry.

Based on the observed situation, it is likely that the energy consumption and GHG emissions will continue to increase in the industrial sector if business-as usual scenario persists. Without the GEF project, EE and RE technologies and approaches will not be used extensively by companies until the technical and commercial viability of doing so is proven in selected clusters, such as the textile sector. Sources of external assistance to the energy sector have so far been ADB, World Bank (WB), UNDP, Germany (GIZ) and Japan. Assistance from ADB and WB has been directed to the power and gas sector restructurng. Regarding industry, GIZ and SMEDA have implemented various EE activities (raising awareness on EE; facilitate industrial energy audits; institute training on EE including train-the-trainers activities) and building the capacity of local consultants and ESCOs), starting with the textile sector. The GEF project will build on these energy EE activities initiated by NPO, SMEDA and supported by GIZ. More info on the GIZ-supported initiatives is provided in section A.7.

### *A.5 Incremental /Additional cost reasoning: description of the incremental (GEF Trust Fund) or activities requested for GEF financing and the associated global environmental benefits (GEF Trust Fund):*

This project seeks to address the before-mentioned barriers related to the policy, incentives for development of robust domestic market for delivering technology and management solutions and an enhanced policy and regulatory framework on promotion of RE and EE measures in industry. An integrated and holistic approach that combines demonstration projects that have high replication potential with interventions that seek to establish a market environment conducive to investments in clean energy practices and technologies will be adopted.

The outputs and activities under each component are detailed below.

**Component 1 – Develop the policy and regulatory framework on use of EE and RE in industry**

| Outcome | Outputs |
|---|---|
| • Conducive policy and regulatory framework established | 1.1 Existing policy and regulatory framework reviewed and recommendations made |
| | 1.2 Recommendations on improvements in policy and regulatory framework adopted and associated advocacy work (amongst decision-makers in government and private sectors, NGOs and banks on the benefits of RE and EE in industry) conducted |
| | 1.3 Sectorial analysis on EE (and RE) opportunities in industry and benchmark definition; Assessment (benchmarking and sectorial info gathering; end-of-project impacts) and recommended post-project action plan for RE/EE in industry |

To help achieve the objectives set in its policies, the Government has adopted the Energy Efficiency Roadmap (2010 – 2019) and prepared the Short-Term Policy on Renewable Energy (2006). This has generated a great deal of interest but has not resulted in significant power capacity addition to the national grid. The first Component of the project aims at reviewing the RE and EE policy frameworks and related action plans set to promote EE and RE, looking at the demand-side, in the case of this project, industry, and identify the obstacles preventing the achievement of these objectives. The Government is in the process of implementing certain legislative reforms in the shape of the Energy Conservation Act (ECA), which is pending approval. The project will support these policy-making processes. It will review the applicability of policy instruments, such as feed-in tariffs for other RE (solar energy and biomass[26]) and incentives for 'captive power', $CO_2$ tax rebates, tax and custom exemptions upon import of energy efficient equipment and soft on loans related to RE/EE projects. These measures would provide guidance on the financial incentives to companies to encourage them to invest in RE/EE applications. Other measures encompass introducing mandatory requirements in companies above a

[26] To avoid duplication of efforts, this will be done in close coordination with work under the UNIDO/GEF project on biomass gasification "Promoting sustainable energy production and use from biomass in Pakistan", GEF ID 3921 (Component1; Establishment of policy and associated regulatory framework promoting the adoption of biomass gasification technologies) as well as the GIZ supported "Renewable Energy and Energy Efficiency Programme" (which has an activity on the development and implementation of enabling RE and EE policies and strategies accompanied by suitable economic instruments).

certain size, including carrying out energy audits at regular intervals, energy reporting (consumption, implemented and planned measures) and the appointment of energy managers.

For policy-making purposes, information gathering on specific energy consumption in types of companies (large, medium, small) in various subsectors and comparison with reference values (benchmarking) is another tool. The information obtained will help organizations such as NPO[27], SMEDA and ENERCON in identifying those sub-sectors where most realizable energy savings can be obtained. This will help to define regulations in general and help in this project to define in which subsectors NPO and SMEDA should target their work on supporting audits and assessments as well helping define the potential for RE application.

A list of the recommendations for improvements will be compiled and a roadmap for its integration into the existing policy framework will be developed. Based on these recommendations, an updated framework for industry-relevant policy instruments (including incentives) with an action plan for implementation is expected to be adopted at the end of the project. Overall, the Government of Pakistan has shown to be fully committed to the adoption and promulgation of policies and regulations. This is supported by their commitment to solving the current energy crisis and the various efforts underway. The devolution process will imply that policies and regulation will be done at provincial levels. So far the provinces have indicated that they will be committed to the adoption on new laws as part of efforts to bring new investments to the specific provinces.

**Component 2 - Investments in RE and EE in industry**

| Outcome | Output |
|---|---|
| • Investments in RE and EE in pilot demonstration carried out and scaled up | 2.1 Projects on EnMS and Systems Optimization (SO) assessed and implemented in industrial companies in textile (and other sectors) |
| | 2.2 EE and RE technology support to one textile unit |
| | 2.3 Projects for deployment of RE technologies assessed and implemented in 2 companies |
| | 2.4 Portfolio of implementation of EnMS/SO and deployment of RE elaborated (incl. finance sources) |

The situation of limiting both electricity and natural gas supply to industries has led companies to look for other alternatives and setting up their own captive power generation, usually based on natural gas. As also the supply of natural gas is rationed, they are now looking for alternatives, including locally available renewable sources of energy. Companies are also considering setting up power generation schemes with the purpose of selling power to the grid. Three companies have offered cooperation with the project and set up demonstration/pilot projects that are briefly described below, namely Masood, Cottex and Laraib[28].It should be noted that investments in the pilot/ demonstration plants will be financed by the participating companies, not by UNIDO or GEF. The UNIDO/GEF project will only provide incremental technical assistance with regards to design of power plants etc. The companies will then provide full financing of the pilot projects that include equity and debt. Based on the co-financing letters as in attachment, the companies have committed to provide between 20-40% as equity investments in each of the project and will mobilize finance. Technical details of the proposed pilot/demo project with energy substitution or savings estimates and greenhouse gas reduction estimates are provided in Annex C. UNIDO, through its Business Partnership Unit, or other national experts will conduct due diligence assessments of the companies that will be engaged in this project.

The selection of which demonstration project to support under this project was based on a criteria that was developed in close consultation with all counterparts, especially chambers of commerce in Pakistan. The UNIDO team delivered presentations to various sessions of the chambers of commerce and industry association to invite interested firms to indicate their willingness to partner with the project. The criteria used include 1) sector analysis, 2) need assessment, open invitation, site visits and dialogues with stakeholders on renewable

[27] The information will feed into NPO's Industry Sector Management Information System

[28] The three companies were chosen by the Pakistani counterparts and the UNIDO office in Pakistan, based on their reputation in the business community, track record, willingness to cooperate and share info with the project and, be able to confirm co-financing in terms of investment in RE and/or EE as well as their location to the main industrial centres (in Punjab) or availability of renewable energy resources (hydropower).

energy and energy efficiency options availability and voluntary participation, 3) economic viability and financial credibility of the industries, 4) willingness to provide equity and/or loan arrangements through commercial banks, 5) renewable energy and energy efficient technology replication potential in the selected sectors, 6) availability of renewable energy resources and 7) finally presentation during consultation and project validation workshop for endorsement by the project counterparts including GEF Cell officials and GEF Operational Focal Person Pakistan[29].

It should be noted that GEF funds will not be used for buying equipment, etc., but funding will be directed towards (partly) project support activities like preparatory activities (feasibility plan, design, financial closure and/or commissioning) for these cases and identification and assessment of RE/EE opportunities that may come up during the course of the project (i.e. the energy assessments and project preparatory activities) will lead to a portfolio of implementation of EnMS/SO and RE opportunities in industry (for post-project replication).This GEF TA support is 'additional' in the sense that few or none of such projects have been realized successfully in Pakistan and without this catalytic support such project would not be realised soon or at scale that would trigger transformational change. Biomass is being used in thermal applications in Pakistan, but not much for power generation (except for co-gen in sugarcane sector). So, these projects are 'first of their kind'. By supporting (at least a large part of the cost) of the project preparation phase, the project will attract the 'early birds'. The TA will help the company to design a better project and the project will ask these beneficiary companies to make available information and their experience to other colleague entrepreneurs. In addition, the project will actively use the expertise and experience gained by the companies to influence other entrepreneurs to implement similar projects.

*2.1 Energy assessments and implementation of energy management plans and systems optimization*

Existing ISO standards for quality management practices (ISO 9000 series) and environmental management systems (ISO 14000 series) have successfully stimulated substantial, continuous efficiency improvements within organizations around the globe. The new ISO 50001 Energy Management Standard (abbreviated as EnMS)[30] is expected to similarly achieve major, long-term increases in energy efficiency and associated greenhouse gas emission reductions. UNIDO has supported various projects helping to prepare developing nations adopting EnMS in accordance with ISO 50001.

Traditional energy assessments focus on the performance of the individual system components (such as motors, steam boilers, pumps and compressors). Efficiency of these components can be improved to a high degree. However, often the individual components are not well tuned to each other. Thus, by looking by looking at the system as whole and carefully matching of equipment to demand needs efficiency improvements of 20-50% can be achieved. Payback periods for system optimisation (SO) projects are typically short (from a few months to three years) and involve commercially available products and accepted engineering practices. With all of these benefits, one would expect system optimisation to be standard operating procedure for most industrial facilities. However, most industrial managers are unaware of both the existing inefficiency of these systems or the benefits that could be derived from optimising them for efficient operation. Unlike a pile of waste material that can leave a toxic spill on the floor, energy inefficiency does not leave visible marks, except on the energy bill and high energy bills are frequently accepted if no point of reference exists.

The project will support energy audits organized by NPO and SMEDA in an estimated 130 companies[31]. This not only will lead to suggestions on energy savings and systems optimization and the possible deployment of

[29] Some of the internet links of the validation workshop include : http://www.pakistantoday.com.pk/2012/12/01/news/profit/we-need-universal-access-to-sustainable-energy/ ; http://pakobserver.net/201212/01/detailnews.asp?id=184871; http://www.thefreelibrary.com/Need+for+ensuring+universal+access+to+sustainable+energy+stressed.-a0310704314;

[30] The EnMS provides organizations and companies with a recognized framework for integrating energy efficiency into their management practices. The standard assist organizations in making better use of their existing energy-consuming assets, offers guidance on benchmarking, measuring, documenting, and reporting energy intensity improvements and their projected impact on reductions in greenhouse gas emissions; creates transparency and facilitate communication on the management of energy resources; promotes energy management best practices and reinforce good energy management behaviors; assist facilities in evaluating and prioritizing the implementation of new energy-efficient technologies; and provides a framework for promoting energy efficiency throughout the supply chain.

[31] NPO and SMEDA will select companies for participation. While exact procedures will be determined once the project has been initiated, the selection of candidate enterprises to take part in the Outputs 2.1 is likely to be as follows:

renewable energy technologies, but also serve as primary awareness-raising tools at the company level (providing on-site practical training for local trainees).Out of these, about 75 projects on the implementation of energy management systems (in line with ISO 50001 EnMS) are expected to be implemented and SO will be implemented in 50 selected companies. The annual emission reduction as a consequence of implementing energy savings measures and technologies will be an estimated 76 $ktCO_2$ annually.

*2.2 Energy Efficiency and Renewable Energy demonstration in a textile company*

The proposed demo/pilot activity will be based in the Faisalabad-based textile company Al-Barkat Cottex (AB Cottex), which is defined as a SME. Currently, the company produces socks with old local technology which is quite energy consuming. The proposed investment will consist of two components. The first is the installation of modern socks manufacturing unit, consisting of 100 socks-making machines. Each machine will have a capacity of manufacturing 55 dozen pairs of socks per day. Being state-of-the-art imported technology, the unit would be more efficient than current cotton socks production lines with estimated energy savings of 816 MWh per year. Second, the company plans to install a 200 kW solar PV system for its power supply. This would save an additional 296 MWh per year. Assuming the company would have to generate its power by a diesel generator, the emission reduction due to energy saving measures and utilizing the solar PV facility gives $CO_2$ emission reduction of 1004 $tCO_2$ per year.

*2.3 Biomass power plant (6 MW)*

Masood Textile Mills (Masood TM) is a vertically integrated textile company that manufactures knitted apparel products right from basic to highly fashioned garments[32]. The company has in-house yarn, knitting, fabric dyeing, processing, as well as apparel manufacturing and laundry facilities. The current power demand of 8 MW is met by the grid and back-up power. The company is considering establishing a 6 MW power plant based on biomass to provide heat and power for current and future needs[33]. As fuel, the plant will use a mix of corn stalks and cobs, and rice husks and straw[34]. Given the shortage of natural gas, the alternative would be heating with fuel oil. The proposed plant will provide on-site power, but also sale to the grid could be considered, provided that an acceptable feed-in tariff could be negotiated (see Annex F for technical details). The GEF project will support the pilot phase of the Masood initiative, consisting of the installation of 6MW that would result in the avoidance of 47.3 $ktCO_2$of greenhouse gas (GHG) emissions annually[35].

*2.4 Solar power plant*

The Laraib Energy Group is an entity[36] focusing on grid-connected power generation. Laraib has developing a proposal for a 5 MW photovoltaic power plant, in cooperation with Newcon Energy (Germany), at Kalar Kalar (about 150 km from Islamabad). For this purpose it will set up special purpose/vehicle company Solargen. The project will be implemented, facilitated by regulations under the2006 RE Policy for Power Generation. Annual power generation is expected to be around 7,4GWh. Given the current shortage of natural gas and the size of Pakistan's available coal resources, the likely alternative for the company would be a coal-based facility. The project will help avoid $CO_2$ emissions of 10,6 $ktCO_2$ a year. Although having developed a number of

- Preliminary assessments and consultations (local consultations and workshops; quick energy assessments)
- Regarding RE, a Call for proposals will be issued (guidelines will be formulated on including the eligibility criteria including eligible costs, eligible organizations and eligible actions; information how to apply; the selection and evaluation process etc)
- Regarding EE, an estimate 130 companies will take part (with a similar Call for Proposals) in energy audits, out of which 75 will be implement energy management systems and about 50 systems optimization.

32 Head office is located in Faisalabad. See www.masoodtextile.com. Masood has mills and 7 garment factories in the Faisalabad area. Turnover was about PKR 20 million in 2012

33 The plant will generate power, in which some of the waste heat will be recovered for use on-site (co-generation)

34 The company has carried out an analysis on availability of biomass crops. For example, the annual need for maize stalks would be 92,008 tonnes per year, while availability in Punjab Province would be 986,625 tonnes a year (produced from 394, 650 acres). Similarly, if using cotton stalks annual need would be 80,897 tonnes a year, while availability from Punjab is estimated at 12,516,186 tonnes a year (on 6.258 million acres). The plant will use only 9% of maize stalks and 0.7% and cotton stalks from Punjab Province. This biomass availability analysis is available from the company and will be expanded into a more detailed environmental, production sustainability and financial feasibility analysis of the biomass supply chain.

35 Depending on the pilot phase experience, Masood Textiles will decide on continuing with an additional 6MW. This second phase will be started, but not necessarily completed within the timeframe of the project. Given the Masood has already committed co-financing for both the pilot and the second phase, the resulting emission reductions are counted as "post-project direct"( see Section B.3 and Annex F)

36 Laraib is a subsidiary of The Hub Power Company Limited (HUBCO) which owns 75% of the shares of the Company

hydropower projects, the company has no experience with large-scale grid-connected solar power. In fact, the plant, if constructed, would be Pakistan's first. Hence, technical support from the GEF initiative has been selected to provide technical advice in the design and preparation stage. GEF support will focus on the first 5MW of this plant. The support to the 5MW will then be applied to the rest of the plant to realise the remaining 45MW. While the replication of the project may be initiated during the life of the project, it will only be completed after the end of the UNIDO/GEF project. The replication of the pilot project will depend on the experiences from the pilot project.

*2.5 Sustainability, Scaling up and replication*

The project will build on the recent experience of NPO and SMEDA (supported by GIZ's Renewable Energy and Efficiency Programme, REEE) with carrying out energy audits in the textile sector. Given this experience, it was decided during the formulation of this project, to have demonstration projects of on EE and RE in this subsector (Case 2, described earlier). During implementation, the project will follow a two-pronged approach. It will expand EE and RE implementation in the textile subsector by means of supporting companies and individuals that advise textile units (a number of energy service companies, ESCOs, are operational) as well awareness-raising. Second, it will expand into other sectors by carrying out assessment of the energy savings potential in specific industries (see Output 1.3). The project will built on EE activities by SMEDA supported by GIZ, in which a performance contracting mechanism has been developed for replicating EnMS to other companies, involving commercially operating ESCOs.

It is expected that at the end of the project, it will have supported the elaboration of portfolio of project opportunities in various industries that will be in various stages, ranging from implementation (the above-mentioned RE pilot/demos and the implementation of EnMS and SO), to financial engineering, design, feasibility assessment to first identification[37]. This will also ensure that after the project's end not only the demos/pilots will have been supported, but that a list of pipeline RE and EE opportunities in various stages of realization has been identified and assessed, thus ensuring post-project replication on a commercial basis. This will not only result in improvement in energy intensity of the industry, but will also encourage consultant companies to register as ESCO, because of improved business opportunities, which in turn further increases the availability of qualified energy management services to the industry. To ensure that the pipeline of proposal will be implemented, the feasibility studies (output 2.4) will be supported in their financial engineering (output 3.1) by linking them with financial institutions (that are mentioned in Section B.1) and (in case of RE) apply for the SBP's credit line (for projects up to 20 MW).

Beyond the industrial sector, it is envisaged that success of the project interventions in the industrial sector will see a significant number of industrialists moving as investors to replicate the RE and EE project in other sectors. The owners of the pilot projects under this project have already expressed a desire to diversify their operations into the energy sector where they will invest in RE and EE investment opportunities in other sectors. The shift in focus by industrialists will likely result in more investments in RE and EE project as industrialists can mobilize capital. In addition, local industrialists have a better appreciation of country risk that could be useful in leveraging international investments in these projects.

**Component 3 - Create platform for promoting investment and sustainability**

| Outcome | Output |
|---|---|
| • Investment platform for scaling up investments operational | 3.1 Investment platform to promote RE and EE in industrial companies strengthened (non-grant instruments, banking products)[38] |
| | 3.2 Certification Centre and Textile Training facility for experts on RE and EE-EnMS applications established (under NPO) and training and certification programme established |
| | 3.3 Training of experts on EE and RE in industrial applications carried out |
| | 3.4 National Energy Performance Award scheme introduced |

[37] Scaling up also includes phase 2 of the two pilot projects, i.e. Masood's 6 to 12 MW and Laraib's 5 to 50MW. The scaling up will lead to post-project direct ( bottom-up) emission reductions ( See Annex F)

[38] Cooperation with ENERCON's "Training and Mass Awareness Campaign" activities will be sought

*Investment platform*

Although some credit lines supporting RE/EE projects exist in Pakistan, companies are reluctant to make use of the available funding for a number of reasons[39]. There is a general absence of a culture to consider savings in operating costs and lifecycle costs when making the decision to purchase machinery or set up new installations. Decisions are still mainly driven by the initial cost investment and will not consider payback times over 5 years or so. On the other hand, the companies are not fully aware of the financial opportunities offered by the banking institutions and there is a mismatch between the needs of companies for energy efficiency projects and the financing products offered by banks. Non-grant instruments such as revolving loan programs and risk guarantee programs to scale up investments in RE and EE technologies will be explored.

The project will support existing investment platforms to promote investments in RE/EE projects in close collaboration with national financial institutions, by strengthening existing "business service offices desks"[40] in Pakistani organizations (such as SMEDA, NPO) for by having specific 'energy promoting energy-related investments in industry for energy information supply, best practice disseminations and providing advice on finance opportunities and existing government support instruments (regulations, incentives). The project is not going to offer a financial instrument nor invest funds into any financial instrument but the investment platform will support provide advice on which financial instruments exists, should be adjusted or expanded based on the needs of industry and facilitating access to these funds. Analysis showed that there are existing financing windows and instruments from various development partners but industry is not aware of the condition for accessing these funds and the requisite process. Accordingly, the platforms will advise industry on how to access these financing windows and instruments; they will serve as advising intermediaries between finance seekers and providers (in the area of energy-related investments).

*Awareness creation*

To overcome the informational barriers, this outputs aims to use the established investment platforms to attract the interest of senior management in companies (industrial companies as well as prospective RE/EE technology vendors) by demonstrating the financial and economic attractiveness of EE and RE applications in industry. Activities will include awareness-raising campaigning with workshops and seminars, newspapers ads and info on TV and elaboration of promotional materials. This will be backed up by examples of successful implementation (including the demo/pilots of Component 2) and organization of business seminars with the idea to link up industrial companies with technology vendors and ESCOs.

The project will facilitate matchmaking and technology transfer agreements between manufacturing and distributing companies in Pakistan with renewable energy technology suppliers in selected countries abroad (e.g., China, India, USA, etc,). In Pakistan itself, NPO and SMEDA may consider arranging business-to-business meetings between the SMEs, technology suppliers and R&D institutions[41].

*Training and certification*

The technical knowledge and expertise of energy efficient (EE) and renewable energy (RE) technologies is rather limited. Personnel working in this sector change frequently and lack the necessary qualifications. Further, local manufacturers and equipment suppliers require specific training to support the installation and maintenance of RE/EE technologies in the future. Therefore this component focuses on supporting a 'Training and Certification Centre' under NPO[42] that offers a range of technical trainings on energy management systems, renewable energy installations, energy auditing and systems optimization, etc. The Facility will offer EnMS/SO

[39] For example, the GIZ REEE project has supported the Energy Conservation Fund (ECF) of ENERCON in piloting innovative credit lines for energy efficiency lending in the SME industry sector.

[40] These services to companies (SMEs) include financial and pre-feasibility analysis services, technical services, training services, incubation centres and information desks.

[41] Such as the University of Agriculture (Faisalabad); University of Engineering and Technology (Lahore); NED University of Engineering and Technology (Karachi), Institute of Engineering and Applied Sciences (Islamabad); Pakistan Council of Renewable Energy Technologies (PCRET). The basic idea in this R&D is to investigate how imported technology (e.g. PV) can be best fit into application in certain industries given Pakistani climatic and economic conditions and, second, how technology can be 'indigenized', i.e. how cost reduction can be achieved by local assembly (of parts of) the technology.

[42] The Centre will cooperate with the Pakistan Standards and Quality Control Authority (PSQCA), which is the national standardization body under the Ministry of Science and Technology.

trainings as a business advisory service to guarantee the sustainability and certifies that individuals or companies can competently perform energy-related tasks (e.g. an energy audit).

Project activities will include the design and set up of the qualification programme and equipping the Training Certification centre with the tools and equipment needed to run the qualification programme. Staff of the centre will be trained on preparing feasibility studies for RE/EE projects. The project will establish a qualification programme at the above-mentioned centre for energy experts at the Centre that will be accredited (with PSQCA) to provide the certification services mentioned above. Thus, a new cadre of professional energy managers and ESCOs with formal training in sustainable energy efficiency improvement and renewable energy applications will be available and can be requested by industry on a commercial basis, thus contributing to improved energy management services in the country. UNIDO has wealthy of experience in trade and capacity building and this project will interact be linked to these activities with regards to certification.

In addition, the Centre will offer services in identifying RE/EE investment opportunities. This includes supporting the realization of an expanded project pipeline (see Output 2.4), i.e. preparing RE/EE projects in a bankable format to enable the companies to access financial capital from banks and creating the connection with financial institutions to match the needs of industries. The Centre will work with the investment platforms to compile lessons of good practice examples from projects implemented under this project and disseminated them widely.

While the Training and Certification Centre's mandate would be on industry in general, it was suggested by stakeholders during the project preparation (PPG) phase, in view of the importance and size of the textile sector, to have a training facility for this sector in particular, run by the private sector with SMEDA/NPO support. The Textile Training Facility would ensure the sustainability of the efforts of capacity strengthening after the project of GIZ (REEE) and this UNIDO/GEF project have ended. The training facility will provide training and awareness for middle management, encourage international (South-South) cooperation and support application of EE and RE in the textile sector.

NPO and SMEDA do not carry out energy audits, energy management planning and systems optimization themselves. They support these (financially), while energy experts and energy service companies (ESCOs) provide these services, often on performance contracting basis. Whether or not supported by SMEDA/NPO, it is important for a recipient company to know if the energy expertise has sufficient standard. Hence, there is a need for independent local accreditation. Accordingly, the project will not interfere with already operational local and international consultancy services providers but will focus on standardizing the services they provide through training to ensure quality service delivery and confidence in the consultancy services providers by the recipients.

**Component 4 - Monitoring and evaluation**

| Outcome | Output |
|---|---|
| • Monitoring of results and knowledge disseminated | 4.1 Project monitoring and evaluation, knowledge dissemination to include regular reporting, mid-term and terminal evaluation undertaken |

The implementation of all the activities in this project will comply with relevant GEF policies. In particular, GEF's Communication and Visibility policy (http://www.thegef.org/gef/policy/communication_visibility) will be applied to guide how or when the GEF's contribution, including its logo, will be used in public documents and in outreach materials, including contractual arrangements between UNIDO and the recipients of GEF funds.

### *A.6 Risks, including climate change 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*

The main risks, their rating and mitigations strategy for the project are listed below (in Exhibit 10), while details on risks/assumptions per outcome are given in the results framework of Annex A).

**Exhibit 10 Risk analysis and mitigation options**

| Risk | Rating | Mitigation |
|---|---|---|
| **RE technologies:** RE technology are not technically and/or financially viable | Moderate | The project will focus only on technologies with a well-proven track record and that have been successfully introduced in countries with similar conditions to those of Pakistan. Training will be provided to ensure strict O&M management capacities. The project will focus on power supply with a focus to support revenue generation, by dimishing power supply interrruptions or avoiding expensive diesel-genereated power.<br><br>Financial capacity development and identification of innovative financing will support RE projects in industry to address the economic and financial risks. The project will address investment risk by encouraging the Government to introduce policy incentives such as guarantees, risk insurance and tax exemptions so as to encourage investments. |
| **Importation of natural gas:** New importation of natural gas, set to begin in 2014-5, could affect viability of RE and EE projects | Moderate | The project will focus on the development of RE and EE technologies and services. Natural gas might not be rationed in future, but it will be imported and price is likely to be higher than currently. Given that most of the industry in Pakistan is export-oriented, it is envisaged that the appetite to invest in RE and EE will be boosted by foreign markets increasingly demanding products with low ecological footprints. |
| **EE technologies:** Following the systems EnMS optimization audit and report, enterprises might not be willing to invest and finance the installation of new equipment, even if the energy reduction potential is important. | Low | The project will provide training for enterprises' key personnel, to build their capacity to better understand the value of investing without delay on EnMS and energy management, and the long-term financial benefits it brings. Systems optimization typically focuses on getting the 'low-hanging fruits' in energy savings first (payback times of 0 to 1.5 years), rather than proposing grand schemes that yield large reduction, but at larger investment with longer payback periods. In a participatory approach, the companies will be provided with adequate information packages and training. |
| **Institutional:** Coordination between key agencies and stakeholders (NPO, SMEDA, AEDB, ENERCON as well as with private sector associations) remains weak and SME clusters do not actively participate in the project. In addition, various federal Ministries have now been devolved to the provinces. The | Low | The project will coordinate with executing partners and major stakeholders and its Steering Committee will establish the institutional linkages among the stakeholders, including provincial-level stakeholders. In component 2 a technical working group will guide the work on identification of companies for audits, energy assessments and RE/EE implementation. Decision makers will be engaged early on in the project implementation. A new Mid-Term RE Policy has been proposed and the project will provide essential inputs into its drafting process. |

| | | |
|---|---|---|
| decentralization is still an on-going process, but the project will work with provincial energy and environmental departments | | |
| **Climate Change** - RE sources might be affected by CC as well as fluctuating feedstock (biomass) prices | Low | Detailed RE resource assessment has been conducted, in which information on RE sources and climate historical data will be taken into consideration. For the biomass projects, apart from buying biomass on the market, the prospective biomass user will enter into longer-term supply contracts with various suppliers especially large-scale suppliers. This will guarantee the supplier a certain income, while at the same time safeguarding a feedstock supply. The contracts with supplier will also include price review mechanisms to ensure that should the need for price review arises, a reasonable price will be agreed.Such contracts will be made with various suppliers to mitigate risks with relying on few suppliers. It should be noted that the biomass-for-energy technology users are located in area of high biomass residue (rice, cotton, maize, wheat) as indicated in Exhibit 4. In addition, the plant is a first of its kind and hence it will take a while before other plants are built and compete for the feedstock. |
| **Timeframe coordination with private sector -** The timeframe of preparation, design and implementation of the pilot projects (Component 2) may not coincide with the overall timeframe of the GEF initiative | Medium | All efforts are made that the GEF project will start in 2013. In addition, the investment component will be implemented from the beginning to ensure that the projects are realised by the end of the project. |

***A.7 Coordination with other relevant GEF financed initiatives:***

The project is in line with, UNDAF, MDGs particularly MDG-7 Environment, and One UN Framework in Pakistan. Regarding the latter, the project actively contributes to the objectives of the One-UN Programme within the thematic areas of environmental sustainability and poverty reduction through productive uses. UNIDO will be starting to implement the GEF-4-funded project on the development of gasification in SMEs in Pakistan entitled "Promoting Sustainable Energy Production and Use from Biomass" (GEF ID 3921).

There are some on-going international cooperation programs in place or whose outputs and activities will be synergised with this project:

*Energy Efficiency Initiative by Asian Development Bank*
The Asian Development Bank (ADB) has included Pakistan in its regional Energy Efficiency Initiative (EEI) launched in 2006. The Bank has a framework analysis to help define a future demand-side EE&EC assistance strategy to the country to be financed through a major loan programme. In this respect, national action and investment plans along with project pipelines are slated to be finalized by the ADB for which country level consultations have already begun at the Planning Commission. This project will coordinate with the project, especially in the identification of project pipeline/portfolio.

*Programme on Renewable Energy and EE (REEE) by GIZ*
From 2005 to 2011, the Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) conducted a EUR 3.2 million RE and EE technical assistance with AEDB and ENERCON. For example, the project supported

ENERCON in accordance with the Government's Energy Conservation Policy 2006 to develop a national EE&EC action plan. In 2011 the third phase of the programme started (until 2014), in which focussed switched to the private sector. Working with SMEDA, the programme has supported the successful introduction of energy management systems in the textile sector[43], which is to be expanded to other sectors. The project will link with this initiative to avoid duplication; in particular the project will use the experience of the project in training energy auditors and use their expertise in this project.

*South Asian Regional Initiative by USAID*
USAID has been implementing the South Asian Regional Initiative (SARI) project in several South Asian nations since 2000. Under the current phase (since 2007) of the SARI Energy Cooperation and Development (SARI/Energy) programme, Pakistan has been included as a recipient of technical assistance. The programme focuses on regional approaches to meet South Asia's energy security needs including energy trade, EE, rural energy supply, regulatory issues and energy statistics.

*Bilateral initiatives for EE and RE*
Discussions are also underway between the Government and several bilateral development partners for initiating sustainable energy technical and financial assistance. These include the formation of a US-Pakistan Working Group on RE and EE to design a multi-year cooperation plan as well as expressions of interest by the European Union and the Republic of France for starting energy-focused assistance programmes in Pakistan.

*UNIDO GEF-4 RE project*
UNIDO is starting to implement the GEF-4 funded project on the development of gasification in SMEs in Pakistan entitled "Promoting Sustainable Energy Production and Use from Biomass". Lessons learnt will be instructive to the present Project. In particular, the Project will explore the possibility to link with implementation and build on the GEF activities related to policy, regulatory framework and capacity building.

In sum, this project will be implemented in such a manner to synergise the intervention with activities that are already ongoing, but most importantly, to avoid duplication and build on activities implemented under these initiatives. Where possible, cost sharing possibilities will be explored between the UNIDO/GEF project and these and other initiatives in implementing specific activities.

*UNIDO GEF 5 Clean Tech Project*
In November 2013, UNIDO will be launching the recently approved GEF funded Clean Tech project in Pakistan as part of the global Clean Tech programme. The Clean Tech project seeks to promote clean energy technology innovations in SMEs in Pakistan. Accordingly, the component on policy and regulatory framework will build on the achievements of the GEF 4 project and the policy work under this project. In particular, the National Energy Performance Award scheme under this project will be closely linked to the competitions that will be organised under the Clean Tech programme.

*UNIDO Trade and Capacity Building Activities*
UNIDO works with industry in Pakistan to promote trade related capacity and linking local industries to international markets. As part of this work, UNIDO supports the establishment of quality support infrastructure including quality certification. Accordingly, this project will be linked to these activities especially with regards to quality certification.

The implementation of this project will benefit from UNIDO's experiences with other GEF funded projects in both the RE and EE focal areas. At the onset, the project design has integrated some of the lessons from other GEF funded project where it became apparent that industries took longer to get involved in the project. Accordingly, under this project, we took the time to identify industrialists who are keen to be first movers and whose experience will then be useful in convincing others. In sum, the project will actively interact with other

[43] During the first phase of REEE programme(2005-2011) the EE component has focused on the textile sector to introduce energy efficiency improvement through t h e Energy Management System approach. Energy Management System ( E n M S ) was introduced and disseminated through the implementation partner All Pakistan Textile Mills Association (APTMA) in cooperation with (ENERCON) and the Small and Medium Enterprise Development Authority (SMEDA). To promote implementation of the Energy Management System (EnMS), in the member mills and to train energy managers on energy management techniques, as well as to monitor the EE improvements in the textile industry the Energy Conservation Cell was established in APTMA at Lahore.

ongoing project so as to learn from their implementation experience and increase the cost-effectiveness of its interventions.

## B. ADDITIONAL INFORMATION (NOT ADDRESSED AT PIF STAGE):

### *B.1 Stakeholder involvement and institutional set-up:*

**1) Key stakeholders involved in the project and their respective role**

The two key implementing agencies in Components 2 and 3 will be[44]:

- **National Productivity Organization (NPO):** NPO, under the aegis of the Ministry of Industries and Production, works as a Liaison Office of the Asian Productivity Organization (APO) for the promotion of "productivity & quality" in various sectors of the economy. To date, various energy audits have been conducted, mainly in the textile sector, and some in the steel sector and in other sectors (including public buildings). NPO has developed the Industrial Sector Management Information System. The system calculates the energy consumed per unit production of the particular industry. The system also helps to identify the energy consumption of local industries and benchmark it with the international countries. NPO has been conducting energy conservation trainings in ten major cities of Pakistan to raise energy consumption awareness under Energy Conservation through the Training and Mass Awareness Campaign (TMAC) project of ENERCON;
- **Small and Medium Enterprise Development Authority (SMEDA):** It is a premier institution of the Government under Ministry of Industries and Production. SMEDA was established in October 1998 to take on the challenge of developing SMEs in Pakistan. SMEDA is not only an SME policy-advisory body for the government of Pakistan but also provides practical business development services to small and medium enterprises. Supported by GIZ, SMEDA has focused on the textile sector to introduce energy efficiency improvement through the Energy Management System approach, in cooperation with ENERCON and APTMA (All Pakistan Textile Mills Association).

In Component 1 the following organizations will take an important role:

- The **Alternative Energy Development Board (AEDB)** was established in 2003 to act as a central agency for development, promotion and facilitation of renewable energy technologies, formulation of plans, policies and development of technological base for manufacturing of renewable energy equipment in Pakistan.
- The **National Energy Conservation Centre (ENERCON)** was established in 1986 to serve as the Government's focal implementing agency to promote energy conservation in Pakistan;

The project will be implemented in close cooperation with private sector through chambers of commerce and industries (CCIs), such as the **Federation of Pakistan Chambers and Commerce and Industry (FPCCI)** and local chambers of commerce and industry.

The **Pakistan Council of Renewable Energy Technologies (PCRET)** was established by merging the National Institute of Silicon Technology (NIST) and the Pakistan Council for Appropriate Technologies (PCAT) on May 8, 2001. It is the prime institution in the country for coordinating R&D and promotional activities in different renewable energy technologies.

There are a number of **international and national financial institutions** and banks supporting RE and EE projects in the country. The important international financial institutions include World Bank, and Asian Development Bank (ADB). The national banks include State Bank of Pakistan (SBP), National Bank of Pakistan (NBP), SME Bank Pakistan, Habib Bank, Bank Al Fallah, Pak-Kuwait Equity Ltd., Agriculture Development Bank of Pakistan (ADBP), and Punjab Small Industries Cooperation (PSIC). The State Bank of Pakistan has recently established a credit line to support RE/EE projects up to 20 MW for SMEs in the country. UNIDO has been working with local banks including SBP, NBP and ADBP within various on-going programmes such as the cluster development programme and the CFC Phase out. SBP, NBP, SME Bank and

[44] The Ministry of Industries and Production (MOIP) was established in early 1950s. It acts as the policy formulation agencies and controls the affairs of three Corporations and eleven institutions performing the regulatory, R&D and training, including SMEDA and NPO.

ADBP have expressed interest to offer credit lines to SMEs under the scope of the proposed project. Also, the Punjab Small Industries Cooperation (PSIC) may make available a credit line of up to PKR 20 million for each industry in the future.

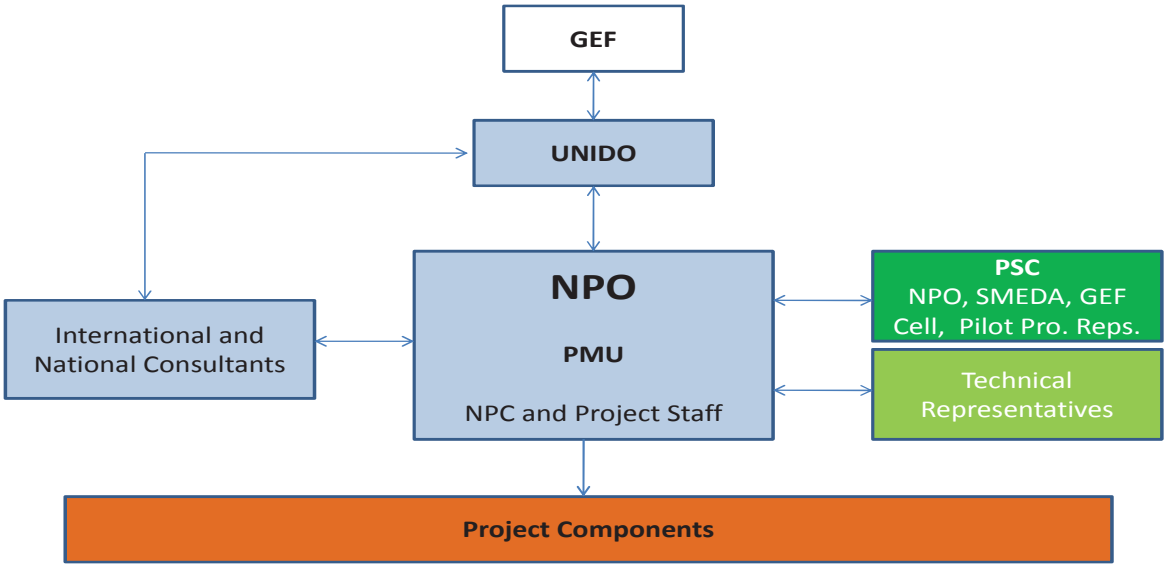
Under the 18th Amendment to the Constitution of Pakistan, the coordination with **the provincial energy departments/ministries** has been foreseen, particularly with the **Punjab Power Development Board (PPDB).** PPDB has proposed to introduce two non-grant instruments to support investments for energy projects in the province of Punjab:

- The *Punjab Power Development Fund (PPDF)* would be dedicated to 'equity participation' with the 'private sector' towards capital cost of the power projects. Initially, the Government of the Punjab will inject an amount of PKR 6 billion in to the fund and it is anticipated to attract an equal amount from international investors.
- The *Punjab Power Guarantee Fund' (PPGF)* is being created with the objective to give assurance by the Government of the Punjab to the developers of off-grid power projects for payment defaults, if any, by the power purchasers (such as industrial estates and/or industrial companies). Provision of money into this Fund will be the sole responsibility of the Government of the Punjab. Therefore, the UNIDO/GEF project would focus to strengthen such initiatives in collaboration with PPDB as well as support to establish such funds, upon request, in other provincial energy departments/ministries.

## 2) Institutional setup

The project will be implemented by UNIDO – see Exhibit 11 below. UNIDO will and manage the overall project budget and report to GEF. UNIDO will be responsible for monitoring the project implementation, timely reporting of the progress to GEF as well as organizing mandatory and non-mandatory evaluations. It will also support in the procurement of the required expert services and other project inputs and administer the required contracts. Furthermore, UNIDO will support the co-ordination and networking with other related initiatives and institutions in the country and in the region. To separate project implementation from project execution, UNIDO has identified NPO as the national executing partner in this project. NPO will be the main executing partner of the project and UNIDO will enter into a contract with NPO to execute the project with clear deliverables and timelines. Exact details will be described in the contractual arrangements with the NPO.

**Exhibit 11 Project Management set-up**



UNIDO will contract a **National Project Coordinator (NPC).** With the Project Manager (responsible for the project at UNIDO HQs.) he/she who will be responsible for overall guidance of the project, including: (i) coordinating the project activities with the stakeholders and industry; (ii) certifying that the expenditures are in line with approved budgets and work-plans; (iii) facilitating, monitoring, and reporting on the procurement of inputs and delivery of outputs; and (v) reporting to UNIDO on project delivery and impact. Exact details will be described in the contractual arrangements with the NPC.

A **Project Management Unit (PMU)** will be set up by UNIDO and the project partners (NPO) that will ensure adequate organizational structure and systems for facilitating implementation. The physical location for the PMU will be determined later, but will likely to be at UNIDO's premises in Islamabad. To ensure national ownership, NPO will designate a senior official as the **Project Focal Point (PFP).** Adequate numbers of technical experts in different disciplines and project management experts/consultants with expertise in project, finance, energy, legal matters, etc. will be associated on a longer-term or short-term basis depending upon the work load. Requirement of additional support staff for fieldwork will be assessed and experts will be engaged on contract/assignment basis as per requirement. NPO will make available staff member as Technical Representatives for the PMU.

A **Project Steering Committee (PSC)** will be established at the inception of the project to monitor the project progress, to guide its execution and to support the project otherwise in achieving its listed outputs and outcomes. The PSC will be made up of representatives of all agencies which are involved in execution directly or which have a legal or regulatory stake in project outcomes or execution. The PSC will be chaired by the CEO of NPO (National Productivity Organization)[45] and will meet quarterly. These agencies are likely to include: Small and Medium Enterprise Development Authority (SMEDA); Ministry of Climate Change; and UNIDO, as well as Alternative Energy Development Board (AEDB) and ENERCON. The final list of PSC members will be finalised at the outset of project operations and presented in the Inception Report. Other members can be invited by the decision of the PSC on an as-needed basis, however, by taking care that the PSC remains operational by its size. As part of the requirements of implementing this project, UNIDO will provide overall management guidance to the project, compile and present progress reports and ensure quality of the different activities. Project management budget is presented in Exhibit 12 below.

**Exhibit 12 Project management budget**

| **Cost Items** | **Total Estimated person weeks (GEF)** | **GEF amount** (USD) | **Co-financing (USD)** | **Project total (USD)** |
|---|---|---|---|---|
| Local consultants | 200 | 141,125 | 440,000 | 581,125 |
| International consultants | | | | |
| Office facilities, equipment, vehicles and communications | | 15,000 | 316,000 | 331,000 |
| Travel | | 12,500 | 44,000 | 56,500 |
| Other cost (UNIDO) | | | 150,000 | 150,000 |
| Total | | **168,625** | **950,000** | **1,118,625** |

[45] In order to ensure a full segregation between Implementing Agency UNIDO and Executing Agency NPO, a contractual arrangement will be considered with NPO, containing clear deliverables. Both NPO and SMEDA will play a key role in providing assistance to SMEs (Outcomes 2 and 3). At Project Inception, the mutual responsibilities vis-à-vis the project execution and implementation of UNIDO and NPO and the role of SMEDA will be clearly defined.

### *B.2 Socio-economic benefits to be delivered by the Project at the national and local levels, including consideration of gender dimensions, and how these will support the achievement of global environment benefits (GEF Trust Fund).*

The project reflects commitment to improve energy use efficiency and increase the use of renewable energy as a pivotal way to meet the climate change challenge. Energy savings will help the country as a whole by lowering their expensive energy imports. Implementation of EE and fuel substitution will help save money on the energy bill of industrial end users and enhance their economic competitiveness. In addition to economic benefits, energy efficiency measures and the adoption on renewable energy technologies have great potential to reduce $CO_2$ emissions and reduce local and regional air pollution. On the longer run, a better functioning industrial sector will be able to create new jobs or increase payment for current skill-enhanced, jobs. In terms of employment creation, this is difficult to quantify at this stage, but employment impacts will be direct (experts trained on RE and EE technology, methods and implementation) and indirect (economically more competitive SMEs will create more jobs on the longer term).

Women are considered as key stakeholder for development of industry, energy and environmental resources and climate change mitigation. Therefore:

- Gender analysis will be carried out as part of sectoral assessments (Output 1.3) at the onset of the project;
- Gender mainstreaming action will be integrated in all stages of a project cycle, including design of interventions, execution, monitoring and evaluation as well as the review of the existing polices and formulation of recommendations on improvements in policy and regulatory frameworks to ensure that women's needs and priorities are addressed. References to gender will be consistent throughout the project approach, the activities, indicators, and budget.
- Female experts will be encouraged to participate in the training and other project activities. The training centres (NPO, textiles) will ensure accessibility to women (in terms of appropriate training materials, location, time). The trainings and award schemes should make special efforts to target women in publicizing these services as men and women tend to network differently. For example, the project will work closely with SMEDA's Women Entrepreneurship Development Cell.

Overall, the power plants to be supported under this project will bring about added social benefits to the localities where these power plants will be based. In the case of biomass power plant, the cotton stock will be bought from local farmers thereby increasing incomes to local farming communities. In addition, increased economic activities in the vicinity of the power plants will result in general social uplift through provision on education to the families of the employees, provision of health services and other social services. However, the project may also have negative social consequences, such as increased incidents of communicable diseases that comes economic affluence. As part of the monitoring and evaluation process, a comprehensive assessment of the socio-economic benefits and challenges will be continuously monitored. In addition, all project activities will comply with local Environmental and Social Impact Assessment guidelines and take remedial action, if needed.

### *B.3 Explanation on cost-effectiveness in the project design:*

With regard to cost-effectiveness of the project approach compared to alternatives, it should be note that in the PPG phase, industry companies have expressed interest for biomass and solar energy that are widely available in the more densely populated areas. A quick analysis (see Annex F for a summary) revealed that these have higher initial cost than diesel-based power generation, but are more cost-effective on a lifecycle basis. Wind and hydro are more of interest to energy-dedicated IPPs for grid-fed power, because the resources often located in less populated (e.g. hydro in mountainous), while the target group (textile and other industries/SMEs) is located in the densely populated areas of Punjab and along the Indus river, where solar and biomass resources are abundantly available. Biomass gasification is subject of the GEF-4 UNIDO/GEF project and therefore the technology is not included in this project

The project would have considerable global environment benefits in terms of GHG emission reduction through substantial reduction in electricity consumption, fuel switching by replacing fossil fuels with renewable energy and by putting in place energy efficiency practices and measures. Exhibit 13 below compares the cost effectiveness of reducing GHG emissions of the project at design stage. Annex F shows estimates for both RE and EE, separately and in details.

**Exhibit 13 Cost Effectiveness at project design**

| | **Cumulative GHG reduction ($ktCO_2$)** | | | **GEF Cost-effectiveness ($USD/tCO_2$)** |
|---|---|---|---|---|
| | **RE** | **EE** | **Total** | |
| Direct emission reductions (2014-2017) | 1,165.115 | 914.423 | 2,079.538 | 1.71 |
| Post-project direct emission reduction | 2,858.442 | | 2,858.442 | |
| *Total direct and post project direct* | 4,023.557 | 914.423 | 4,937.980 | 0.72 |
| Indirect emission reductions (bottom-up) | 12,070.672 | 2,743.268 | 14,813.939 | 0.24 |
| Indirect emission reduction (top-down) | 30,911.495 | 4,346.629 | 35,258.124 | 0.10 |

## C. DESCRIPTION OF THE BUDGETED M&E PLAN:

Project monitoring and evaluation (M&E) will be conducted in accordance with established UNIDO and GEF procedures. The overall objective of the monitoring and evaluation process is to ensure successful and quality implementation of the project by: i) tracking and reviewing project activities execution and actual accomplishments; ii) providing visibility into project progress so that the implementation team can take early corrective action if performance deviates significantly from original plans; iii) adjust and update project strategy and implementation plan to reflect possible changes on the ground, results achieved and corrective actions taken; iv) keep GEF secretariat updated on all project activities.

According to the Monitoring and Evaluation policy of the GEF and UNIDO, follow-up studies like Country Portfolio Evaluations and Thematic Evaluations can be initiated and conducted. All project partners and contractors are obliged to (i) make available studies, reports and other documentation related to the project and (ii) facilitate interviews with staff involved in the project activities.

The Logical Framework Matrix in Annex A provides performance and impact indicators for project implementation along with their corresponding means of verification. These will form the basis on which the project's M&E Plan will be built. The M&E Plan is a detailed monitoring plan for tracking and reporting on project time-bound milestones and accomplishments will be prepared by UNIDO in collaboration with the Project Management Unit (PMU) and project partners at the beginning of project implementation and then periodically updated. Implementation of the M&E Plan will be undertaken by the Project Management Unit (PMU). In particular, the impact and performance indicators as in Annex A will track, report and review project activities and accomplishments in relation to renewable energy generation and GHGs emission reduction realized both directly and in-directly; renewable energy investments realized both directly and in-directly; policy and regulatory frameworks; levels of capacity and awareness; and overall socio-economic impacts of the project to include increase in productivity in the targeted SMEs, increase in access to reliable energy in the selected village, gender mainstreaming etc.

UNIDO will be responsible for overall management and tracking of overall project milestones as well reporting to GEF. The M&E procedure will consist of a) project inception, b) quarterly progress reporting, c) annual reviews, d) independent mid-term and final evaluation. The final project evaluation will be conducted 1 month before the end of the project. The estimated budget is USD 114,000, of which GEF will provide USD 64,000 while UNIDO will provide USD 50,000.

The following table summarizes key M&E activities with GEF budget. More details are provided in Annex G.

| M&E Activity Categories | Feeds Into | Time Frame | GEF Budget (USD) | UNIDO (USD) | Co-Financing (in-kind USD) | Responsible Parties |
|---|---|---|---|---|---|---|
| Measurement GEF Tracking Tool specific indicators | Project management | Continuous | 8,200 | 40,000 | | PMU |
| Monitoring of project impact indicators (as per Log frame) | Project management; | Continuous | | | | |
| Periodic Progress Reports | Project management; PSC Meeting Annual GEF PIR | Semi-annually | | | | |
| Mid-term review/evaluation | Project management; PSC | At project mid-term | 20,900 | 5,000 | | UNIDO PM, PMU and independent evaluator |
| Independent terminal evaluation | Terminal Evaluation Review (TER) conducted by UNIDO EVA and/or GEF EO | Project completion (at least one month prior to the end of the project and no later than six months after project completion) | 34,900 | 5,000 | | Independent evaluator, PMU, UNIDO PM, and UNIDO Evaluation Group |
| | | TOTAL | 64,000 | 50,000 | -- | |

According to the Monitoring and Evaluation policy of the GEF and UNIDO, follow-up studies like Country Portfolio Evaluations and Thematic Evaluations can be initiated and conducted. All project partners and contractors are obliged to (i) make available studies, reports and other documentation related to the project and (ii)facilitate interviews with staff involved in the project activities.

## D. LEGAL CONTEXT:

The following legal context will apply to the project: “The Islamic Republic of Pakistan agrees to apply to the present project, mutatis mutandis, the provisions of the Revised Standard Technical Assistance Agreement concluded between the United Nations and the Specialized Agencies and the Government on 2 July 1956.”

## 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): ):** (See, Operational Focal Point endorsement letter(s)in Annex E)

| Name | Position | Ministry | Date*(MM/dd/yyyy)* |
|---|---|---|---|
| **Mr. Muhammad Ali Gardezi** | Federal Secretary and GEF Focal Point | MINISTRY OF ENVIRONMENT, GOVERNMENT OF PAKISTAN. | 6TH MAY 2013 |

**B. GEF AGENCY CERTIFICATION**

This request has been prepared in accordance with GEF policies and procedures and meets the GEF criteria for CEO Endorsement.

| Agency Coordinator, UNIDO | Signature | Date (Month, day, year) | Project Contact Person | Telephone | Email Address |
|---|---|---|---|---|---|
| Philippe Scholtès Officer-in-Charge Programme Development and Technical Cooperation Division (PTC) UNIDO GEF Focal Point. |  | 02/20/2014 | Alois Posekufa Mhlanga, Industrial Development Officer, UNIDO | +431260265169  | a.mhlanga@unido.org |

**LIST OF ANNEXES**

A – Project Results Framework
B – Response to Project Reviews, including STAP
C – Status of implementation of Project preparatory activities and the use of funds
D – Budget and co-financing details
E – Letter of Endorsement (see separate file)
F – Estimate of energy savings and GHG emissions reductions
G – Monitoring and evaluation
H – Output based budget
I – Timeline of activities
J – Letters of co-finance
K - Terms of Reference of key project staff

## ANNEX A – PROJECT RESULTS FRAMEWORK

| Project Strategy | Indicator | Baseline | Targets End of Project | Source of verification | Risks and Assumptions |
|---|---|---|---|---|---|
| **Project Objective**<br>To reduce energy-related greenhouse gas emissions by facilitating the creation of a market environment to promote the use of RE/EE technologies and measures in the selected industrial sectors of Pakistan. | A. Incremental avoided CO2eq. (tonnes of CO2eq.) | No direct or indirect emission reduction as a consequence of the project | Direct emission reduction:<br>Cumulative reduction of about 2 million $tCO_2$ over the lifetime of the investments linked with the project in various technologies (of which 1.165 million in RE demos and 0.914 million $tCO_2$ in improved energy management and systems optimization)<br><br>Indirect emission reduction: Post-project replication (investment in RE/EE opportunities in industry, influenced in part by the project's interventions) will lead to indirect emission reduction of between 12.07-30.9 MtCO2 (RE) and 2.74-4.35 MtCO2 (EE) | Project progress report<br><br>Demonstration projects validation reports<br><br>End-of-project impact report<br><br>Project website | The Government of Pakistan remains committed to the development of RE/EE in industry in the medium to long-term.<br><br>See Exhibit 10:<br>• RE technology is technically and/or financially viable;<br>• Enterprises are willing to invest and finance the installation of new equipment;<br>• Coordination between key agencies and stakeholders is strong and SME/industry clusters do actively participate in the project;<br>• Prices of biomass and fossil fuels are relatively stable; There are no big changes in availability (high cost of importation) of natural gas; |
| **Component 1: Develop the policy and regulatory framework on use of EE and RE in industry** | | | | | |
| **Outcome 1**<br>Policy and regulatory framework on EE/RE use in industry improved | I. Adoption of policy framework supporting RE/EE technologies in industry | Broad RE law in place and tariff determination defined for IPPs (renewables, but no applications yet for solar and biomass. No real incentives for on-site application for RE and EE in industry | Regulations in the existing policy framework are more geared to grid-connected RE projects (other than hydro or wind) and incentives for on-site RE application in industry and EE audits and investments | Official documents<br><br>Websites of organizations<br><br>Publicity given in media | National (and provincial) governments are willing to adopt specific regulations |

| | | | | | |
|---|---|---|---|---|---|
| **Output 1.1**<br>Existing policy and regulatory framework reviewed and recommendations made (including financial and non-financial incentives and instruments) | 1) Specific regulations that promote solar and biomass power generation by industry and incentives for EE in industry | RE Law exists | Regulations established within the framework of current RE and power sector legislation that specifically focus on biomass and solar-based power generation in industry (both grid and on-site) and EE incentives through various measures like feed-in-tariffs, soft loans or guarantee schemes, tax rebates or exceptions | Technical reports<br><br>Project progress reports<br><br>Workshop proceedings | National (and provincial) governments are willing to adopt specific regulations |
| **Output 1.2**<br>Recommendations on improvements in policy and regulatory framework adopted and associated advocacy work | 2) Adoption of regulations (see Indicator 1)<br><br>3) Number of information events and packages on regulations and policy | N/A<br><br>Info on grid-connected tariff formulation for RE IPPs (in practice focusing on hydro, wind) | Regulations promoting RE/EE in industry are adopted by the Government<br><br>Information disseminated (amongst decision-makers in government and private sectors, NGOs and banks on the benefits of RE and EE in industry); one package elaborated; about 10 events in various parts of the country | Official documents<br><br>Project progress reports<br><br>Workshop proceedings | National (and provincial) governments are willing to adopt specific regulations |
| **Output 1.3**<br>Sectorial analysis on EE (and RE) opportunities, impact assessment and recommended post-project action plan for RE/EE in industry as well as gender mainstreaming | 4) Analysis carried on RE and EE potential in various industrial subsectors with particular attention to project that benefit women.<br><br>5) End-of-project impact assessment carried out<br><br>6) Action plan for post-project actions | ADB-supported studies on EE potential in Pakistan (including industry)<br><br>N/A<br><br>N/A | Based on ADB-supported analysis, at least 5 such subsector studies are carried out plus a review studies on impacts of realized savings based on earlier NPO/SMEDA work in textile sector<br><br>One end-of-project impact study (with recommended actions)<br><br>Plan for post-project actions (based on end-of-project impact study) formulated and discussed at workshop(s) | Technical reports<br><br>Workshop proceedings<br><br>Publicity in media<br><br>Project progress reports | Willingness of companies and organizations to provide info |
| **Component 2 Investments in RE and EE in industry** | | | | | |
| **Outcome 2**<br>Investments in RE and EE in pilot demonstration carried out and scaled up | II. Installed capacity of renewable energy and energy generated from renewable energy in industry<br><br>III. Energy saved by employing EE | Grid-connected IPPs (but few solar or biomass) and no RE captive power applications | Over 11 MW installed biomass and solar technology for on-site and/or grid application with lifetime energy production of 36,722 MWh (biomass) and 7,698 MWh (solar), avoiding 13.54 million GJ of fossil fuels (at total investment of USD 21.5 million)<br><br>Energy savings of 16.56 million GJ | Evaluation reports<br><br>Website of organizations and companies<br><br>Project progress reports | Interest by stakeholders to apply RE and/or EE (especially in the SMEs) exists and can be maintained. |

| | | | | | |
|---|---|---|---|---|---|
| | technologies<br><br>IV. Direct and post-project direct emission reduction | About 130 audits carried out by NPO and SMEDA up to now; Broad energy potential estimates in studies | over the technology lifetimes (due to energy management systems and/or systems optimization interventions) at a total initial investment of USD 5.8 million)<br><br>Resulting direct emission reduction of 1.165 (RE) and 0.914 (EE) million $tCO_2$. Full implementation/replication of the two pilots will result to post-project direct emission reduction of 2.86 $MtCO_2$ | | |
| **Output 2.1**<br>Projects on EnMS and Systems Optimization (SO) assessed and implemented in industrial companies in textile (and other sectors) | 7) Number of plants in which audits/assessment are carried out<br><br>8) Number of energy management plans implemented (in line with EnMS)<br><br>9) Number of plants that implement systems optimization | NPO has supported out about 73 audits and SMEDA about 42, mainly in textile sector. An unknown number has implemented or is about to implement energy management plans and investing in energy improvements | An estimated 130 energy assessment and audits will be carried out, initially in textile sector, but then spreading out in other subsectors (based on analysis in Output 1.3)<br><br>Formulation and implementation of energy management plans in 75 plants (based on energy assessments)<br><br>Implementation of systems optimization in 50 plants (based on energy audits mentioned earlier) | Technical reports<br><br>Project progress reports<br><br>Company information | Interest by stakeholders to apply EE (especially in the SMEs) exists and can be maintained. |
| **Output 2.2**<br>EE and RE technology support in 1 textile unit | 10) EE and RE technology supported in a textile company | N/A | Implementation of a 200 kW solar PV plant and installation of an energy efficient socks producing line (with state-of-the-art technology and energy saving measures) | Technical reports<br><br>Company info and plant visits | Interest by stakeholders to apply RE-EE (especially in the SMEs) exists and can be maintained. |
| **Output 2.3**<br>RE technologies assessed and implemented in 2 companies | 11) Projects for deployment of RE technologies supported (solar, biomass).<br><br>12) Projects for deployment of RE technologies supported (solar & biomass) | N/A | Technical support has been provided to the pilot phase of the biomass power plant ( heat and power on site 6MW); and the solar power plant (5MW, grid-connected)<br><br>Pilot project proponents have (post-project) supported through technical designs and technical services. | Technical reports<br><br>Company info and plant visits | Interest by stakeholders to apply RE (especially in the SMEs) exists and can be maintained. |

| | | | | | |
|---|---|---|---|---|---|
| **Output 2.4**<br>Portfolio of implementation of EnMS/SO and deployment of RE elaborated (incl. finance sources) | 13) Portfolio of implementation of EnMS/SO and deployment of RE elaborated (incl. finance sources) and focus on industries the benefit women. | N/A | List of EE and RE investment opportunities (elaborated based on activities of outputs 1.3 and 2.4) and, if needed, finance sources are identified and financial engineering supported (see output 3.1) | Technical reports<br><br>Project progress reports<br><br>Company information | Interest by stakeholders to apply RE (especially in the SMEs) exists and can be maintained.<br><br>Willingness of Government agencies and commercial banks to support biomass gasification. |
| **Component 3 - Create platform for promoting investment and sustainability** | | | | | |
| **Outcome 3**<br>• Investment platform for scaling up investments operational;<br>• Training centres operational and programmes established;<br>• Monitoring of results and knowledge disseminated | V. Institutional capacity strengthened for scaling-up of RE and EE in industry<br><br>VI. Finance for RE/EE mobilized<br><br>VII. Knowledge on RE/EE in industry disseminated | Organizations such as NPO, SMEDA, ENERCON provide some services, training and advice on EE | • Windows in non-energy organizations (NPO, SMEDA) established (or strengthened in other organizations that promote energy-related investments (RE/EE) in industrial companies, in particular SMEs<br>• Strengthened 'Training and Certification Centre'<br>• Establishment of training institute for textile subsector supported<br>Formulation of financial packages for RE/EE investments with national financial companies (number, amount, type of finance)<br>Awareness raising campaigns carried out; info packages formulated and disseminated; 'best practice' knowledge captured and disseminated | Willingness of Government agencies and commercial banks to support biomass gasification. | Availability and willingness of experts to receive training<br><br>Willingness of importing/manufacturing companies to receive expert training |
| **Output 3.1**<br>Investment platform to promote RE and EE in industrial companies strengthened (non-grant instruments, banking products; awareness creation) | 14) Strengthened 'energy desks' at Pakistani organization that provide info services | Organizations (such as NPO, SMEDA) provide some services, technical training, informational advice on EE | Strengthened 'energy desks' and services delivered (audits support, best practices, grant and non-grant instruments, finance sources) on EE/RE for industry (NPO; SMEDA, associations) | Project progress reports<br><br>Workshop proceedings and websites of organizations | Willingness of institutions to enter into agreements |

| | | | | | |
|---|---|---|---|---|---|
| **Output 3.2**<br>Training and Certification Centre and Textile Training Facility for experts on RE and EE-EnMs applications established (under NPO) and training and accreditation programme established | 15) Certification centre for experts on EE/RE applications established<br><br>16) Training centre for textile industry supported | N/A | Strengthened 'Training and Certification Centre' at NPO<br><br>Establishment of training facility for textile subsector supported | Cooperation agreements<br><br>Organizations´ websites | Willingness of organizations involved to establish such platforms |
| **Output 3.3**<br>Training of experts on EE and RE in industrial applications carried out with at least 20% being women. | 17) Number of experts trained on RE and EE - EnMS/SO applications in industry with at least 20% being women. | Limited training is provided by NPO/SMEDA | At least 120 experts trained and certified | Progress reports<br>Presentations and training materials | Availability and willingness of experts to receive training |
| **Output 3.4**<br>National Energy Performance Award scheme introduced | 18) Award scheme for energy performance in large companies and SMEs | N/A | Award scheme for energy performance in large companies and SMEs and 'awards' provided on an annual basis with associated publicity | Progress reports<br><br>Publicity in media | Interest of companies (especially SMEs) to participate in the Scheme |
| **Component 4 – Monitoring and Evaluation** | | | | | |
| **Output 4.1**<br>Project monitoring and evaluation, knowledge dissemination | 19) Evaluations mandatory under GEF and UNIDO rules c carried out<br><br>20) Experiences and knowledge created by the project captured and disseminated | N/A | One mid-term evaluation and one final (terminal) evaluation<br><br>Regular reporting on project website; Publication on best practices and experiences | Evaluation and progress reports<br><br>Project website<br><br>Publications | Willingness of stakeholders to provide full information |

Note: A) Impact indicator; I.-VII. Outcome indicators; 1 to 20 are output indicators

## ANNEX B – RESPONSE TO PROJECT REVIEWS, INCLUDING STAP

### STAP (January 2012)

The project aims at promoting sustainable energy initiatives for industries in Pakistan. While the project has a very broad objective STAP is supportive of proposal. STAP wishes to suggest the following recommendations that could be addressed during the project preparation stage.

1. *The industrial sector, according to National Communication of Pakistan, accounts for only 12% of GHG emissions. Therefore, the scale of GHG emission reductions achieved by the project compared to the total national emissions could be insignificant.*

*UNIDO response:*
The data referred to is outdated as the INC submitted to the UNFCCC in 2003 is based on 1993-94 statistics. The energy sector contributes 51% of the GHG emissions[46]. Energy consumption totalled 39.4 million TOE in FY 2008, of which 43% in industry. The potential for reduction is considerable. Furthermore, whereas interventions under this project do focus on industrial sector, the design of the project is such that, the interventions can be replicated in other sectors thereby achieving greater GHG emissions.

2. *The PIF has many generic and ambitious statements which require additional clarification and references, such as "implement sustainable energy initiatives for industries in Pakistan", "project will lead to transformation of the market to introduce best practices and technologies", "develop policy and regulatory framework on use of EE/RE in industry", "there is no continuous implementation of energy management", and "usually energy management is ad-hoc".*

*UNIDO response:*
We have tried to be as specific as possible in this CEO Endorsement Request.

3. *The project aims to address both RE and EE at the national level for the industrial sector. STAP suggests this may be trying to address too many issues within one project, which may not be feasible. The rationale for including RE is not clear. What is the potential for RE for industrial applications?*

*UNIDO response:*
The current continuing power shortage hampers industry and some companies lose up to 25-50% of productivity. Many companies have their own generation capacity; larger ones are based on natural gas or fuel oil and smaller ones have to rely on expensive diesel gensets. With now natural gas being rationed, companies start looking for renewable energy as source of energy, in particular biomass residues (from rice, wheat, bagasse, etc.) that is readily available in many areas where the industry of focus in this project is located. In industry, energy substitution will be accompanied with energy conservation; it is often cheaper to save a kWh than to generate one. Each option alone (RE or EE) may not be enough for companies to have their power shortage solved. Given the ever reduction in cost of RE technologies, biomass, solar etc are now cost-competitive in industry. UNIDO's experience shows the feasibility of applying renewable energy technologies (biomass gasification, solar PV and thermal).

4. *The objective, components and outcomes mentioned are very generic and can apply to any country. One of the outputs is expected to be the review of the existing policy and regulatory framework. If it turns out that the country framework is adequate what happens to component 1? A broad overview would have been useful during PIF development.*

*UNIDO response:*
- Adding to the response to STAP question 3, policy on renewables (RE Policy, 2006) has focused on IPPs that produce power to the grid. Several IPPs have presented their projects (mainly wind and small hydro) and these

[46] Climate Change Policy (2012) – available on http://www.mocc.goc.pk and Report by Planning Commission's Task Force on Climate Change - http://www.pc.gov.pk/usefull%20links/Taskforces/TFCC%20Final%20Report.pdf

trying to negotiate a favourable feed-in tariff.; however, there are hardly any proposals in the area of solar and biomass, resources more readily available in the populated areas where industry is located;
- Most industrial companies are not dedicated IPPs and energy is not their core business. It is though one of their core issues (as discussed above). Most will use an on-site power source, supplementing the (irregular) grid supply. Some would invest in power capacity and may sell excess power to the grid, but often do not find the way to AEDB's desk. In short, the current regulations do not particularly serve industrial power producers (as IPPs and captive power) very well and need to be extended. Hence, the need for Component 1.

5. *The PIF is silent on which EE and RE technologies will be promoted. Specific information and barrier analysis is expected at the CEO endorsement stage. Because of the dispersed nature of SMEs and their different adopted technologies, size, stakeholder knowledge and technical capacity as well as energy end-use conditions and SMEs decision-making processes, STAP recommends prioritizing specific sectors and technologies for project interventions using analytical frameworks and keeping in mind cost-effectiveness, GHG mitigation potential, replicability and sustainability of project interventions, social benefits and potentially other than GHG environmental co-benefits.*

   *UNIDO response:*
   - *EE:* In individual companies the eventual EE technologies will be based on outcome of energy audits, but usually a mix as described in Exhibit 4, plus introduction of an energy management system. Baseline activities have started in the textile sector (thus two of three demos of Component 2 are in the textile sector). Under the GEF project, activities will continue in this subsector and extended into other sectors (such as iron and steel), based on the analysis of Output 3.3. SMEs have usually a higher need for assistance than large companies (with easier access to capital), so SMEs will get special attention in this project.
   - *RE:* in PPG phase, industry companies have expressed interest for biomass and solar energy that are widely available in the more densely populated areas. Wind and hydro are more of interest to energy-dedicated IPPs, the resources often being located in less populated (e.g. hydro in mountainous) areas.
   - *GHG mitigation:* detailed calculation on cost-benefits and emission reduction potentials for the three demos (on-site biomass power in a textile company; solar and EE in a textile companies; grid-connected solar) as well as impacts of energy management planning and systems optimization are given in Annex F.

6. *The energy sector options ranked with respect to incremental cost and mitigation potential are for 1993 and 1994; nearly 20 years ago. Accordingly, most of the mitigation options have negative incremental costs. New analysis is suggested considering the latest technological developments.*

   *UNIDO response:*
   The table in the PIF is outdated and has been removed. See the previous response on GHG mitigation (first STAP comment) and the general discussion in Section B (Part II) for more information.

7. *While the proposed project framework of transforming energy management in SMEs in Pakistan (through EE/RE regulatory and policy support for EnMS, system optimization and promotion of RE sources; investment platform and capacity building) seems to be robust, the project's main challenge will be to implement these measures across wide networks of decentralized SMEs in different sectors. The importance of barriers will vary between different sectors and in order to make a measurable impact and long-term sustainability, project proponents should design interventions strategically at the national, regional and individual SMEs levels. It would be useful to understand how this challenge will be met. Can the project take advantage of potential economies of scale by concentrating on certain sector-specific industrial and manufacturing clusters in Pakistan?*

   *UNIDO response:*
   To address these challenges, the baseline activities have started in the textile sector (thus, two of three demos are in the textile sector). Under this GEF project, activities will continue in this subsector and only extended into other sectors (such as iron and steel), based on the analysis of Output 3. The project interventions will have sector specific interventions for the textile sector and only extend to other sectors where similar barriers exist and hence similar interventions exist. By working with SMEDA and NPO, who work with SMEs and industry in general, the project will build on the work by these organisations to ensure cost-effective interventions and impact in the textile

sector first. NPO and SMEDA have sector specific programmes on EE in industry (with energy audits and trainings) and both have a broad network of regional centres and links with local chambers of commerce and industry that would be used in selecting the level and effort of intervening in other sectors with a view to maximise impact and long-term sustainability

8. *Barriers mentioned are very generic. STAP urges country-specific and industry-specific analysis of barriers to target mitigation measures.*

   *UNIDO response:*
   Exhibit 9 in the main text provides a more detailed overview of barriers and how the outputs of the project address these barriers.

9. *The project aims to establish an accreditation centre for energy experts. There may be many European and American or international consultancy agencies already operating in Pakistan offering similar services at competitive prices.*

   *UNIDO response:*
   NPO and SMEDA do not carry out energy audits, energy management planning and systems optimization themselves. They support these (financially), while energy experts and energy service companies (ESCOs) provide these services, often on performance contracting basis. Whether or not supported by SMEDA/NPO, it is important for a recipient company to know if the energy expertise has sufficient standard. Hence, there is a need for independent local certification. Accordingly, the project will not interfere with already operational local and international consultancy services providers but will focus on standardizing the services they provide through training to ensure quality service delivery and confidence in the consultancy services providers by the recipients. The word ‘accreditation’, but is a bit confusing. ‘Certification’ would be a better term, as the Center would certify individuals or companies to perform energy-related tasks (e.g. an energy audit) and it itself would be accredited to provide such certification services.

10. *In promoting EnMS and system optimization, STAP recommends exploring a possibility for generating additional GHG benefits such as reduction in release of unintentional POPs, water use reduction and introduction of different end- of-pipe techniques and technologies reducing negative environmental impacts beyond GHG reduction. STAP's advisory document "Benefits and trade-offs between energy conservation and releases of unintentionally produced POPs" can provide useful advice for exploring these co-benefits.*

    *UNIDO response:*
    The PIF focuses on energy; it is not a multi-area project. The idea is very interesting, nonetheless. In the energy audits and assessments (supported under this project), the three suggestions (unintentional POPs, linking energy with water use and different end-of-pipe technologies that focus on local pollution as well) should be given due consideration where possible and feasible.

11. *Quantitative justification of reduced GHG emissions at the CEO endorsement stage is strongly recommended. Quantification of GHG savings in this document is unexplained.*

    *UNIDO response:*
    A detailed quantitative justification is provided in Annex F.

12. *While the project aims to establish but not operate an investment platform, it is not clear how these efforts will be sustainable in the long-term without helping SMEs to mobilize actual finance. At a minimum, STAP recommends that project proponents explore the possibility to provide SME-targeted capacity building for preparing and structuring investment projects in EE/RE energy and at a minimum attempt to conduct a number of investment feasibility studies.*

*UNIDO response:*
Sustainability of project interventions follows from:

- Investment platforms (EE windows/desk at institutions) will be operated by well-established organization, such as NPO and SMEDA and one task will be to assist recipient companies in seeking support from national financial institutions. NPO and SMEDA would continue this service well after the project;
- Capacity building is provided to RE/EE experts (Output 3.3), while SMEDA per definition provides SME-targeted capacity building
- In carrying out the activities of Outputs 2.1 to 2.4, technical staff of companies will be trained on-site as part of the energy management plan formulation, energy assessment techniques and feasibility studies and investment plans and structuring for RE and EE projects.

13. *The risks with respect to incremental cost and the potential internal rate of return needs are generic in nature and require greater clarification.*

*UNIDO response:*
Risks are detailed in Exhibit 6 and Annex A. On costs and benefits, the reader is referred to the Case studies (solar, biomass, EE methods) of which technical details are provided in Annex F.

**Council Members, Germany (February 2012)**

The scope of the proposed project is relevant to the needs of the industrial sector in Pakistan. It is completely in line with the activities being carried out by the German Development Cooperation, through the GIZ Renewable Energy and Energy Efficiency (REEE) Project. Furthermore, GIZ REEE has been actively working with the three public institutions selected as implementation partners for this project. However, the following issues need to be addressed:

1. The Federal Ministry of Environment (signatory of the PIF) has been dissolved as the provinces are dealing with Environment now.
   As provincial government are now active in developing energy legislation and carrying out RE and EE initiatives at the provincial scale, it may be a good idea to include them in the project activities

   *UNIDO response:*
   In line with the 18th Amendment to the Constitution (passed in 2010), a redistribution of government powers and function at the federal level is taking place. Provinces are going to handle the business of 17 federal ministries; various federal Ministries have now been devolved to the provinces, including the former Ministry of Environment. The decentralization is still an on-going process, but consequently the project will work, more and more, with provincial energy and environmental departments.

2. ENERCON, originally part of the environment ministry and no part of ministry of water and power, is presently a very weak institution with severe lack of technical and managerial staff. Furthermore, a recently submitted bill by ENERCON for the enforcement of an ‘Energy Conservation Act’ was rejected by Parliament

   *UNIDO response:*
   Although suggested in the PIF, ENERCON has not become an Executing Agency of the project, but cooperation on practical matters is envisaged. The revised endorsement letter, which was issued at stage of counterpart endorsement of project document and dated 6th May 2013, approves the new partners at project execution level excluding ENERCON.

3. Since the contribution of the three public sector implementing agencies to the project is ‘in kind’, it is very unclear how the accreditation center would be established and run

*UNIDO response:*
Co-financing by public sector agencies has been revised. Only NPO is now a partner and their co-financing include 1,2 million US$ cash co-financing. The new project endorsement letter that was re-issued after project document validation by counterparts (Annex J) takes note of these changes. The Centre would be under NPO.

4. Soft loans amounting to 9.5 million USD from local banks may not be available for the industry

   Soft loans as co-financing have not been directly included, as the three main pilot project will organize their own debt and equity. However, availability of soft loans will be important for future projects and replication. The project will support setting up investment platforms to promote investments in RE/EE projects in close collaboration with national financial institutions, by strengthening “energy desks/windows” in Pakistani organizations (such as SMEDA, NPO) for promoting energy-related investments in industry for energy information supply, best practice disseminations and providing advice on finance opportunities and existing government support instruments (regulations, incentives). The project is not going to offer a financial instrument nor invest funds into any financial instrument but the investment platform will support provide advice on which financial instruments exists, should be adjusted or expanded based on the needs of industry and facilitating access to these funds. Analysis showed that there are existing financing windows and instruments from various development partners but industry is not aware of the condition for accessing these funds and the requisite process. Accordingly, the platform will advise industry on how to access these financing windows and instruments. There are a number of international and national financial institutions and banks supporting RE and EE projects in the country. The important international financial institutions include World Bank, and Asian Development Bank (ADB). The national banks include State Bank of Pakistan (SBP), National Bank of Pakistan (NBP), SME Bank Pakistan, Habib Bank, Bank Al Fallah, Pak-Kuwait Equity Ltd., Agriculture Development Bank of Pakistan (ADBP), and Punjab Small Industries Cooperation (PSIC). The State Bank of Pakistan has recently established a credit line to support RE/EE projects up to 20 MW for SMEs in the country.

5. The number of persons trained in EnMS over the period of four year by the Accreditation center appears to be very small in relation to the amount of investments the project aims to generate

   *UNIDO response:*
   At least 120 experts are expected to be trained and accredited on RE and EE - EnMS/SO applications in industry

## ANNEX C – STATUS OF IMPLEMENTATION OF PROJECT PREPARATORY ACTIVITIES AND THE USE OF FUNDS

### A. DESCRIBE IF ANY FINDINGS THAT MIGHT AFFECT THE PROJECT DESIGN OR ANY CONCERNS ON PROJECT IMPLEMENTATION.

No findings might affect the project design. The focus has narrowed down to certain RE technologies (biomass combustion and solar PV) and certain industrial sectors (textile and other selected subsectors, such as iron & steel).

### B. DETAILED FUNDING AMOUNT OF THE PPG ACTIVITIES FINANCING STATUS

| ***PPG Grant Approved at PIF:*** | | | |
|---|---|---|---|
| ***Project Preparation Activities Implemented*** | ***GEF/LDCF/SCCF/NPIF Amount ($)*** | | |
| | **Budgeted Amount** | **Amount Spent To date** | **Amount Committed** |
| 1. Collection of Supplementary/baseline data and analysis | 15,000 | 12,000 | 3,000 |
| 2. Stakeholders Consultations | 10,000 | 8,000 | 2,000 |
| 3. Design of Pilot/demonstration projects | 20,000 | 18,000 | 2,000 |
| 4. Project strategy and implementation detailing | 25,000 | 22,000 | 3,000 |
| **Total** | 70,000 | 60,000 | 10,000 |

## ANNEX D – BUDGET AND CO-FINANCING DETAILS

### 1. Overview of UNIDO budget; GEF financing and co-financing

| | | Policy and regulations | Investments systems | Knowledge & centers | M&E | Management | Total |
|---|---|---|---|---|---|---|---|
| BL.11 | International consultants | 15,000 | 48,000 | 114,000 | 36,000 | | 213,000 |
| BL.13-17 | National consultants and project staff | 80,000 | 68,000 | 120,000 | 10,000 | 141,125 | 419,125 |
| BL.15 | Travel | 10,150 | 17,440 | 38,100 | 9,800 | 12,500 | 87,990 |
| BL.21 | Subcontracts | 54,500 | 2,280,000 | 50,000 | 7,500 | | 2,392,000 |
| BL. 30-35 | Training | 55,000 | | 157,500 | | | 212,500 |
| BL.43-45 | Premises / Equipment | 6,000 | 170,000 | 16,000 | | 6,125 | 198,125 |
| BL.51-71 | Miscellaneous / Contingencies | 8,373 | 8,912 | 400 | 700 | 8,875 | 27,260 |
| | **Total GEF** | **229,023** | **2,592,352** | **496,000** | **64,000** | **168,625** | **3,550,000** |
| BL.16 | UNIDO | | | | 50,000 | | 50,000 |
| | NPO (in-kind) | 800,000 | | 1,400,000 | | 800,000 | 3,000,000 |
| | NPO (cash) | 200,000 | | 1,000,000 | | | 1,200,000 |
| | Masood TM | | 5,200,000 | | | | 5,200,000 |
| | AB Cottex | | 1,600,000 | | | | 1,600,000 |
| | Solargen (Laraib Energy) | | 20,000,000 | | | | 20,000,000 |
| | UNIDO in-kind | | | | | 150,000 | 150,000 |
| | **Total co-finance** | **1,000,000** | **26,800,000** | **2,400,000** | **50,000** | **950,000** | **31,200,000** |
| | **Grand total** | **1,229,023** | **29,392,352** | **2,896,000** | **114,000** | **1,118,625** | **34,750,000** |

*Notes to the budget:*

- BL.11: 71 person weeks of international consultants (at USD 3,000 per week)
- BL.17: 128 person weeks of national consultancy at USD 1,000 per week and 300 person-weeks of technical experts at USD 500 per week. GEF funds support the National Project Coordinator with USD 150,000.
- BL.15: Travel for international consultants (to and from Pakistan) as well as internal travel for international and national consultants and staff , based on 25% of fee for international consultant and 8% of fee for national consultants
- BL 21: Subcontracts (USD 2.392 million) include providing technical assistance for pre-feasibility assessment, feasibility analysis, identifying technology providers, design and commissioning and supervision of pilot project implementation as well as energy audits (Component 2, output 2.1); biomass heat and power: USD 225,000 (demo 1, Masood TM, output 2.3); textile demo EE/small PV: USD 450,000 (demo 2, AB Cottex output 2.2);large PV (demo 3 by Laraib , output 2.3); USD 200,000; energy audits: USD 500,000; Similar subcontracts are made available for scaling up further EE/RE pipeline development (output 2.4): USD 905,000 ( including support to phase 2 of Masood and Laraib, if qualified). Additional subcontracts are for sub-sectoral assessments and the end-of-project impact assessment (Component 1, USD 44,500) and providing support to the establishment/strengthening of the textile training Facility and NPO's Training and Certification centre (Component 3, USD 50,000) and organisation of the Inception workshop. It should be noted that in issuing TA subcontracts, the idea that a company (e.g. Masood TM) benefits from a subcontract, rather than issuing the subcontract directly to Masood.
- BL.33: Organization of workshops, trainings and seminars at an estimated 85 event days.
- BL.45: a) Equipment associated with the provision of technical assistance for pre-feasibility assessment, feasibility analysis, identifying technology providers, design and commissioning as well as supervision of demo performance measurements (Component 2) as well as support of the textile training facility and NPO Training and Certification centre; b) automation and furnishing of the project management office as well as for Component 1 (USD 12,125 or laptop, computer, printer, multimedia); and c) Equipment to support TA activities of Components 1 to 3, including: rent/premises (USD 72,000) and vehicle (USD 25,000-60,000).

2. **Consultants and subcontracts supported by GEF funds**

National consultants

| Position title | USD / person week | Estimated person weeks | Total (USD) | Tasks to be performed |
|---|---|---|---|---|
| Sustainable legislation and regulation | 1000 | 6 | 6,000 | Take lead in policy advice on elaboration of policy instruments (component 1) |
| Incentives and finance | 1000 | 6 | 6,000 | Provide advice on incentives linked with innovative finance options (feed-in tariffs, tax incentives, soft loans, etc.) and assist in capacity building events (component 1) |
| Sub-sectoral experts | 1000 | 14 | 14,000 | Provide advice and assistance in demand and energy surveys in various subsectors of industry |
| Project impacts and plan of action | 1000 | 4 | 4,000 | Take lead in the analysis of project impacts. Assist in M&E activities, incl. MTE and FTE (mid-term, final term evaluations) |
| Solar PV experts | 1000 | 8 | 8,000 | Provide assistance and guidance during elaboration (outputs 2.2 and 2.3) and implementation of demo projects; Contribute to sectorial analysis (output 1.3) and assist during training and awareness creation events (component 3) |
| Biomass experts | 1000 | 10 | 10,000 | Provide assistance and guidance during the elaboration of (outputs 2.2 and 2.3) and implementation of demo projects; Contribute to sectorial analysis (output 1.3) and assist during training and awareness creation events (component 3) |
| Energy auditing | 1000 | 22 | 22,000 | Provide assistance and guidance during walk-through and technical audits (output 2.1) ; Contribute to sectorial analysis (output 1.3) with case studies and benchmarking; Assist during training &awareness creation events (component 3) |
| Awareness raising and PR | 1000 | 12 | 12,000 | Assist in the establishment of investment platforms (output 3.1) and assist in training events and other events (outputs 3.2-3.4) |
| Local technical training experts | 1000 | 20 | 20,000 | Training package developers and training providers; Technical experts in energy management systems and energy optimization; Experts in applications of on-site applications of RE in industry |
| Business development | 1000 | 16 | 16,000 | Advice on business aspects of providing and servicing RE technologies (especially biomass); Assist in providing links with technology suppliers and financial institutes (investment platforms, Component 3) and take lead in pipeline development |
| Evaluation experts | 1000 | 10 | 10,000 | Participate in mid-term and final evaluations (Component 3) |
| Technical expert EE | 500 | 100 | 50,000 | Provide overall guidance and support the delivery of technical assistance to all project components including training, institutional strengthening, audits, energy management systems and system optimization |
| Technical expert RE and biomass | 500 | 100 | 50,000 | Provide overall guidance and support the delivery of technical assistance to all project components including training, institutional strengthening, audits, applications of RE (including biomass combustion) |
| Technical experts finance and accounts | 500 | 100 | 50,000 | Provide overall guidance and support the delivery of technical assistance to all project components including training, audits, accounting and financing RE and EE |
| **Total** | | **428** | **278,000** | |

International consultants

| Position title | USD / person week | Estimated person weeks | Total (USD) | Tasks to be performed |
|---|---|---|---|---|
| International experiences RE and EE | 3000 | 5 | 15,000 | Advice on role RE and EE policy in regional and international context (Component 1); Take part in trainings and workshops (Component 3) |
| Biomass energy experts | 3000 | 9 | 27,000 | Provide assistance and guidance during elaboration (outputs 2.2 and 2.3) and implementation of demo projects; Contribute to sectorial analysis (output 1.3) and assist during training and awareness creation events (component 3) |
| Solar PV experts | 3000 | 9 | 27,000 | Provide assistance and guidance during elaboration of (outputs 2.2 and 2.3) and implementation of demo projects; Contribute to sectorial analysis (output 1.3) and assist during training and awareness creation events (component 3) |
| EE audits and systems optimization | 3000 | 10 | 30,000 | Provide assistance and guidance during company energy assessments and systems optimization (output 2.1) ; Contribute to sectorial analysis (output 1.3) with case studies and benchmarking; Assist during training and awareness creation events (component 3) |
| EnMS and energy management | 3000 | 12 | 36,000 | Provide assistance and guidance on energy management systems and EnMS(output 2.1) ; Contribute to sectorial analysis (output 1.3) with case studies and benchmarking; Assist during training and awareness creation events (comp. 3) |
| Technology transfer and training | 3000 | 8 | 24,000 | Assist in providing links with technology suppliers and technology institutes abroad (Component 3), Advice on business aspects in marketing and servicing installed biomass and PV systems |
| Business development and finance | 3000 | 6 | 18,000 | From commercial business point-of-view, assist in feasibility assessment of demo projects (outputs 2.2 and 2.3); Assist in training events and inform on experiences abroad (component 3); Support pipeline development (output 2.4) |
| Evaluation experts | 3000 | 12 | 36,000 | Carry out mid-term and final evaluations of the project (Component 1) |
| **Total** | | **71** | **213,000** | |

Project management

| Position title | USD / person week | Estimated person weeks | Total (USD) | Tasks to be performed |
|---|---|---|---|---|
| National Project Coordinator | 706 | 200 | 141,125 | The Manager is responsible for management and co-ordination; budgeting; forward planning; liaising with project participants and stakeholders; preparation and presentation of project status reports to the Project Steering Committee; preparing subcontractors terms of reference and contracts; supervision of contracts; and project execution of all tasks identified under the project specified in the Project Document |
| **Total** | | **200** | **141,125** | |

Subcontracts

| Position title | Amount (USD) | Tasks to be performed |
|---|---|---|
| Sub-sectoral energy assessments | 29,500 | Detailed analysis of energy consumption and benchmarks in various industry subsectors and for types of companies (large, SMEs) |
| End-of-project impact assessment | 25,000 | Detailed analysis of impacts in terms of energy substitution and/or savings, analysis of remaining barriers and gaps to intro of RE/EE in industry and quantification of end-of-project value of the log frame indicators; Recommendations for further action |
| Feasibility and design, biomass power | 225,000 | Technology providers or consultancy companies to assist in the detailed feasibility analysis to include an integrated environment , socio-economic sustainability study[47] for the feedstock supply systems, technical design and installation of biomass systems (thermal, on-site, grid-connected) |
| Feasibility and design, small PV | 450,000 | Technology providers or consultancy companies to assist in the feasibility analysis, technical design and installation of in situ solar PV (and other) solar applications |
| Feasibility and design, grid PV | 200,000 | Technology providers or consultancy companies to assist in the feasibility analysis, technical design and installation of in situ solar PV (and other) solar applications |
| Scaling up ( expansion of the demos and development of pipeline of new RE/EE projects) | 905,000 | As above, but with focus on project identification and preparation (assessment, feasibility, financing options; design) |
| Energy audits and EE-related investment in companies | 500,000 | Technology providers or consultancy companies to assist in the auditing, C/B analysis, design, installation and monitoring of EE aspects in industrial companies and production lines |
| Support to accreditation | 25,000 | Subcontract to support development energy services certification unit (NPO) |
| Support to textile energy training | 25,000 | Subcontract to support development of textile training centre on energy aspects |
| Inception workshop | 7,500 | Organisation and facilitation |
| **Total** | **2,392,000** | |

## ANNEX E – LETTER OF ENDORSEMENT-( SEE SEPARATE FILE)

1. *At PIF stage dated 14 February 2011*
2. *At counterpart endorsement of draft CEO Endorsement Request dated 6th May 2013.*

[47] Internationally recognized sustainability criteria will be used in this study.

## ANNEX F – ESTIMATE OF ENERGY SAVINGS AND GHG EMISSIONS REDUCTIONS AND SUMMARY OF PRE-FEASIBILITY CALCULATIONS

This Annex first presents the details of the pilot demo projects associated with the co-financing letters provided by Masood Textiles , AB Cottex and Laraib Energy (Outputs 2.2 and 2.3). This is then followed by the calculation of energy and $CO_2$ savings due to the introduction of energy management systems and systems optimization in industrial companies that volunteer to work with project (Output 2.1).

Base data

| *General* | | | | *Comments* |
|---|---|---|---|---|
| Discount rate | 11% | | | |
| Exchange rate | 94 | PKR/USD | | June-Oct 2012, www.oanda.com |
| *Fuels* | *Energy content* | | *Fuel prices, Pakistan* | |
| Diesel | 34.9 | MJ/litre | 0.970 $/litre | June-Oct 2012, www.pakbiz.com |
| Natural gas | 32.6 | MJ/m3 | 4.981 $/GJ | Jan 2012, www.ogra.org.pk |
| Fuel oil | 36.4 | MJ/litre | 0.767 $/litre | May-Sept 2012, www.indexmundi.com |
| Coal | 25.1 | MJ/kg | 102 $/ton | The Nation, prices 2011-2012 |
| Biomass residues | 14.2 | MJ/kg | 46 USD/ton | |
| *Emission factors* | | | | |
| Emission factor grid | 0.4902 | tCO2/MWh | | DNV validation report "Almoiz Bagasse Cogen project" |
| Emissions from diesel | 2.8 | kgCO2/litre | | Based on IPCC reports |
| Emissions from natural gas | 55 | kgCO2/GJ | | |
| Emissions from coal | 2.7 | kgCO2/kg | | |
| Emissions from fuel oil | 3.0 | kgCO2/litre | | |

Pilot demo 1 (Masood Textiles Manufacturing)

Masood Textile Mills (Masood TM) is a vertically integrated textile company that manufactures knitted apparel products right from basic to highly fashioned garments. The company has in-house yarn, knitting, fabric dyeing, processing, as well as apparel manufacturing and laundry facilities. The current power of 8 MW is met by the grid and back-up power. It is considering establishing a 6 MW power plant based on biomass to provide heat and power for current and future needs, which may be expanded to 12 MW. As fuel the plant will use a mix of corn stalks and cobs and rice husks and straw. Given the shortage of natural gas, the alternative would have been heating with fuel oil. The bio-energy plant will avoid an estimated 47.3 $ktCO_2$ (kilo tonnes) of greenhouse gas (GHG) emission annually (direct emission reduction) and 94.7 $ktCO_2$ in its full phase (post-project direct). The plant will provide on-site power, but also sale to the grid could be considered, provided an acceptable feed-in tariff could be achieved.

| **Base data** | | | *Comments:* |
|---|---|---|---|
| Size | 6 | MW | |
| Lifetime | 20 | yrs | |
| Net output | 5.24 | Mwe | Minus auxiliary load of 0.76 MWe |
| Operating hours | 7008 | hrs/yr | Capacity factor 80% |
| Electricity production | 36,722 | MWh-e/yr | |
| Power production efficiency | 23% | | |
| Heat recovery (cogen) | 50% | | |
| Fuel needs | 574,778 | GJ | |
| Biomass residues | 40,477 | ton/yr | |
| **Investment** | | | |
| Equipment and construction | 9,875,000 | | Implying unit cost of USD 1645/kW |
| Develop and advisory | 1,500,000 | | *Based on NEPRA-submitted* |
| Testing | 125,000 | | *proposals by SJDD Energy (2011)* |
| Other cost | 1,500,000 | | *and Lumen Energy (2012)* |
| *Total* | 13,000,000 | USD | |

| | | |
|---|---|---|
| **Costs** | | |
| *Capital cost (annualised)* | 1,632,483 USD/yr | |
| *Annual cost (C )* | | |
| Fuel cost | 1,861,957 | |
| Fixed O&M | 580,654 | 0.0138 USD/kW |
| Variable O&M | 495,404 | 0.0135 USD/kWh |
| *Subtotal* | 2,938,014 USD | |
| *Lifetime costs* | 4,570,498 USD/yr | |
| Cost of self-generation | 0.124 USD/kWh | |
| | | |
| **Benefits** | | |
| *Alternative: power and heat with fuel oil* | | |
| Avoided fuel oil consumption | 15,790,601 litres | |
| Avoided fuel costs (B) | 12,116,232 USD | |
| | | |
| **Indicators** | | |
| Net benefits (B-C ) | 9,178,217 USD | |
| Payback period | 1.42 yrs | |
| Emission reduction | 47,372 tCO2/yr | |
| Cumulative | 947,436 tCO2 | |

UNIDO team visits Masood Textiles plant to discuss project in detail and assess readiness. In the background is the crop waste already procured to supply current boilers.

The company has carried out an analysis on availability of biomass crops. For example, the annual need for maize stalks would be 92,008 tonnes per year, while availability in Punjab Province would be 986,625 tonnes a year (produced from 394, 650 acres). Similarly, if using cotton stalks annual need would be 80,897 tonnes a year, while availability from Punjab is estimated at 12,516,186 tonnes a year (on 6.258 million acres). The plant will use only 9% of maize stalks and 0.7% and cotton stalks from Punjab Province. This biomass availability analysis is available from the company and will be expanded into a more detailed environmental and financial feasibility analysis of the biomass supply chain.

Pilot demo 2 (AB Cottex)

The proposed demo/pilot activity will be based in the Faisalabad-based textile company Al-Barkat Cottex (AB Cottex), which is defined as a SME. Currently, the company produces socks with old local technology which is quite energy consuming. The proposed investment will consist of two components. First will be the installation of a modern socks manufacturing unit, consisting of 100 socks machines. Each machine will have a capacity of manufacturing 55 dozen pairs of socks per day. Being state-of-the-art imported technology, the unit would be more efficient than current cotton socks production lines with estimated energy savings of 816 MWh per year. Total investment cost in the EE socks manufacturing line is USD 4 million, of which EE related cost is USD 1.1 million. Second, the company plans to install a 200 kW solar PV system for its power supply at a cost of about half a million USD; this would save an additional 296 MWh per year. Assuming the company would have to generate its power by a diesel generator, the emission reduction due to energy saving measures and utilizing the solar PV facility gives $CO_2$ emission reduction of 1004 $tCO_2$ per year.

| | | | | |
|---|---|---|---|---|
| **Base data** | | | | *Comments:* |
| Size | | 0.2 | MW | |
| Lifetime PV | | 20 | yrs | |
| Lifetime EE socks | | 15 | yrs | |
| Sunshine hours | | 5.2 | hrs/day | |
| Efficiency factor | | 78% | | |
| Electricity production | | 296 | MWh/yr | |
| | | | | |
| **Investment** | | | | |
| Equipment | | 450,000 | | Implying unit cost of USD 2250/kW |
| Civil works | | 500 | | *Data supplied by project proponent and* |
| Management | | 7,500 | | *based on NEPRA-submitted proposal by* |
| Other / Engineering | | 42,000 | | *Wah Industries in Sanjwal* |
| | *Total* | 500,000 | USD | |
| | | | | |
| **Costs PV** | | | | |
| *Capital cost (annualised)* | | 62,788 | | |
| *Annual cost* | | | | |
| O&M cost | | 5,000 | | 1.0% of investment cost |
| | *Lifetime costs* | 67,788 | USD/yr | |
| Cost of PV electricity | | 0.229 | USD/kWh | |
| | | | | |
| **Socks production unit** | | | | |
| *100 production units* | | | | |
| Baseline consumption | | 2,448 | MWh/yr | |
| Estimated savings | | 816 | MWh/yr | 33% compared with less |
| Net power consumption | | 1,632 | MWh/yr | efficient production unit |
| Investment | | 1,100,000 | USD | |
| Annualised | | 152,972 | USD | |
| Cost of savings | | 0.19 | USD/kWh | |
| Net benefits - costs | | -0.13 | USD/kWh | Benefits (avoided cost of diesel-generated power) - costs of savings |
| | | | | |
| **Investment cost EE and PV** | | | | |
| Total investment | | 1,600,000 | USD | |
| Capital cost (annualised) | | 200,921 | USD | |
| | | | | |
| **Benefits EE and PV** | | | | |
| *Altenative: 200 kW diesel generator* | | | | |
| Avoided diesel-generated power | | 1,112 | MWh/yr | |
| Avoided diesel consumption | | 358,481 | litres | |
| Avoided fuel cost (B) | | 257,375 | USD/yr | |
| Annual cost (C) | | 16,000 | USD/yr | |
| | | | | |
| **Indicators** | | | | |
| Net benefits (B-C) | | 241,375 | | |
| Payback | | 0.8 | yrs | |
| Emission reduction | | 1004 | tCO2/yr | |
| Cumulative (PV) | | 5,345 | tCO2 | |
| Cumulative (EE) | | 11,048 | tCO2 | |

In the analysis, the cost of the solar PV is compared with that of power generation by a typical diesel generator set in that power range. The cost analysis of such a unit (based on the same operating hours) is given below:

| | | |
|---|---|---|
| **Base data** | | |
| Size | 200 | kW |
| Investment cost | 21,000 | USD |
| Electricity production | 1,632 | MWh |
| Generator efficiency | 32% | |
| Diesel consumption | 526,074 | litre |
| Price of diesel | 0.970 | USD/litre |
| | | |
| **Costs** | | |
| Capital cost (annualised) | 3,566 | USD |
| Diesel cost | 510,134 | |
| O&M | 1,050 | |
| Total cost | 514,750 | USD |
| **Unit cost of generation** | 0.315 | USD/kWh |

Pilot demo 3 (Laraib Energy)

The Laraib Energy Group is an entity focusing on grid-connected power generation, in particular hydropower. Laraib has developed a proposal for a 50 MW photovoltaic power plant, in cooperation with Newcon Energy (Germany). For this purpose it will set up the business vehicle Solargen. As with the hydropower facilities, the project would be implemented facilitated by regulations under 2006 RE Policy for Power Generation. The project's pilot phase (5 MW) will cooperate closely with the UNIDO/GEF programme. Power generation is expected to be around 7.4 GWh. Given the shortage of gas and Pakistan's available coal resources, the likely alternative for an IPP such a plant would be a coal-based facility. This implies avoided $CO_2$ emissions of 10.6 ktCO2 a year (direct emissions). Direct and post-project direct emissions would be 10-fold.

| | | | *Comments:* |
|---|---|---|---|
| **Base data** | | | |
| Size | 5 | MW | |
| Lifetime PV system | 20 | yrs | |
| | | | |
| Sunshine hours | 5.2 | | |
| Efficiency factor | 80% | | |
| Electricity production | 7,402 | MWh/yr | |
| | | | |
| **Investment** | | | |
| Equipment | 7,985,000 | | Implying unit cost of USD 1597/kW |
| Civil works | 5,000 | | *Based on NEPRA-submitted proposal by Wah Industries in Sanjwal; Peru 20 MW solar plant (submitted under CDM); Data provided by project proponent* |
| Other / Engineering | 10,000 | | |
| *Total* | 8,000,000 | USD | |
| | | | |
| **Costs** | | | |
| *Capital cost (annualised)* | 1,004,605 | | |
| *Annual cost* | | | |
| O&M cost (C ) | 39,925 | | 0.5% of investment cost |
| *Lifetime costs* | 1,044,530 | USD/yr | |
| Cost of PV electricity | 0.141 | USD/kWh | |
| | | | |
| **Benefits** | | | |
| *Alternative: coal-fired station* | | | |
| Cost of coal-based generation | 0.064 | USD/kWh | |
| Annual cost avoided coal (B) | 476,295 | USD | |
| | | | |
| **Indicators** | | | |
| Net benefits (B-C) | 436,370 | USD/yr | |
| Payback | 18.3 | yrs | |
| Emission reduction | 10,617 | tCO2/yr | |
| Cumulative reduction | 212,334 | tCO2/yr | |

In the analysis, the cost of the solar PV is compared with that of a 50 W coal-fired plant. The cost analysis of such a coal-based plant (based on the same operating hours) is given below:

| | | | |
|---|---|---|---|
| **Base data** | | | *Comments:* |
| Size | 50 | MW | |
| Lifetime | 20 | yrs | |
| Net output | 45 | Mwe | Minus auxiliary load of 5 MWe |
| Operating hours | 7008 | hrs/yr | Capacity factor 80% |
| Electricity production | 315,360 | MWh-e/yr | |
| Power production efficiency | 27% | | |
| Fuel needs | 4,204,800 | GJ | |
| Coal consumption | 167,522 | ton/yr | |
| | | | |
| **Investment** | | | |
| Equipment and development | 65,000,000 | | Implying unit cost of USD 1300/kW |
| Customs and construction | 10,000,000 | | *Source: Upfront coal-tariff 50 MW,* |
| Financial charges | 15,500,000 | | *NEPRA (2012)* |
| *Total* | 90,500,000 | USD | |
| | | | |
| **Costs** | | | |
| *Capital cost (annualised)* | 1,004,605 | USD/yr | |
| *Annual cost (C )* | | | |
| Fuel cost | 17,087,235 | | |
| Fixed O&M | 1,400,000 | | NEPRA (2012) |
| Variable O&M | 800,000 | | NEPRA (2012) |
| *Subtotal* | 19,287,235 | USD | |
| *Lifetime costs* | 20,291,840 | USD/yr | |
| **Cost of coal-based power** | 0.064 | USD/kWh | |

The project preparation timeline is tentatively as follows:

- Feasibility study and approval (Q1-Q3 of Year1)
- Tariff approval (Q3-Q4 of Year1)
- Letter of Support (Q4)
- Financing and other docs(Q1-Q2 of Year2)
- Construction, starting Q2 of Year2

Energy management and systems optimization

The project will support energy audits organized by NPO and SMEDA in an estimated 130 companies. This not only will lead to suggestions on energy savings and systems optimization and the possible deployment of renewable energy technologies, but also serve as a primary awareness raising tools at the company level (providing on-site practical training for local trainees). The cost of these audits can be supported with GEF funds (up to about 30%), NPO and participating companies. Although some financial support can be given, audits and EE implementation will be based on a performance contracting mechanism, involving commercially operating ESCOs and experts.

Out of these, about 75 projects on the implementation of energy management systems (in line with ISO 50001 EnMS) are expected to be implemented and SO will be implemented in 25 selected companies. The annual emission reduction as a consequence of implementing energy savings measures and technologies will be an estimated 76 $ktCO_2$ annually.

| Activity | Aver. investment (USD) | Number of projects | Total investment (USD) | Annual power savings (MWh) | Annual fuel savings (GJ) | Assumed lifetime (yrs) | GHG savings (tCO2) (annually) | GHG savings (tCO2) (cumulative) |
|---|---|---|---|---|---|---|---|---|
| Implemention of EM plans | 7,500 | 75 | 562,500 | 41,250 | 495,000 | 15 | 27,225 | 408,375 |
| Assessments | 13,000 | 130 | 1,690,000 | | | 10 | | |
| System optimizations | 50,000 | 50 | 2,500,000 | 75,000 | 900,000 | 10 | 49,500 | 495,000 |
| **Grand total** | | | **4,752,500** | **116,250** | **1,395,000** | | **76,725** | **903,375** |

Direct and indirect emission reduction

The **direct emission reduction** is estimated by summing up the avoided GHG emission reduction in the three demo projects (Outputs 2.2 and 2.3) and the due to the energy efficiency interventions in several companies (Output 2.1), which gives $CO_{2direct}$ = 947.5+16+212+903 = 2,079.5 $ktCO_2$ over the lifetime of the equipment. **Post-project direct emission reduction** result from the expansion of the biomass (from 6 to 12 MW) and solar PV (from 5 to 50 MW) activities of Masood TM and Laraib companies for which the finance will be made available as indicated in their co-financing letters. Thus, $CO_{2\ post\text{-}project\ direct}$ = 2,858.4$ktCO_2$ over the lifetime of the equipment.

**Indirect emission reductions** are based on the methodology described in the GEF Manual[48]. The range is given by bottom-up and top-down estimates. In the **bottom-up approach**, a replication factor (RF) is used and indirect emission reduction follows from $CO_{2indirect\ BU}$ = $CO_{2\ total\ direct}$ * RF. Total direct emission reduction is the sum of the direct and post-project direct lifetime emission reduction. A replication factor of ´three´ is applied; $CO_{2indirect\ TD}$ = 14,814. In the **top-down approach**, estimates from ADB reports have been used of energy savings potential in industry by 2019 and the possible share of biomass and PV in 2020. Thus, $CO_{2indirect\ TD}$ = 34,283 $ktCO_2$.

Tracking tool – Cost effectiveness for RE and EE and total

| | | RE | EE | Total | | Comments | |
|---|---|---|---|---|---|---|---|
| Installed capacity | | | | | | | |
| - biomass | | 12 | | | MWe | | |
| - solar PV | | 50.2 | | | MWe | | |
| Lifetime energy production | | | | | | | |
| - biomass | | 73,444 | | | MWh | | |
| - solar PV | | 74,318 | | | MWh | | |
| Lifetime fuel avoided or saved | | 42,796,935 | 16,562,700 | | GJ | | |
| Direct emission reduction (cumul) | | 4,023,557 | 914,423 | 4,937,980 | tCO2 | GEF USD/tCO2 | 0.72 |
| Indirect (bottom-up) | | 12,070,672 | 2,743,268 | 14,813,939 | tCO2 | Replication factor ( | 3 |
| Indirect (top-down) | | 30,911,495 | 4,346,629 | 35,258,124 | tCO2 | See explanation below | |
| Calculation indirect (top-down) | | | | | | | |
| EE | Potential savings 2019, industry | | | 98,411,709 | GJ/yr | Source: ADB TA-7060 PAK (2009) | |
| | | | | 78,729,367 | GJ/yr | Causality factor (CF | 80% |
| RE | Penetration 2020, biomass+PV | | | 25,000,000 | MWh/yr | share RE in electricity in 2020 | |
| | | | | 3,300,000 | MWh/yr | share PV and biomass in 2020 | |
| | | | | 1,419,000 | MWh/yr | share industry + bi( | 43% |
| | | | | 1,135,200 | MWh/yr | Causality factor (CF | 80% |
| | | | | | | Source: ADB TA-488 (2009) | |

GEF support to pilot projects and scaling up

The GE/UNIDO programme will make funds available for the providing technical assistance in the design, feasibility analysis, financial engineering and commissioning of the three pilot projects (that yield the direct emission reduction) as well as for the elaboration of a pipeline of (pilot) projects (that contribute to the bottom-up indirect emissions, calculated above):

- Subcontracts to support the pilot phases of demo 1 (Masood, 6 MW), demo 2 (AB Cottex) and demo 3 (Laraib, 5 MW) of outputs 2.2 and 2.3 (USD 425,000)
- Subcontracts to support the identification and implementation of systems optimization and energy efficiency measures of Output 2.1 (USD 450,000)
- Subcontracts to support scaling up by means of expansion of demo project activities of Outputs 1 to 3 (USD 425,000) and identification and assessment of new RE and EE project opportunities (USD 480,000)

[48] Manual for Calculating GHG Emissions of GEF Projects: Energy Efficiency and Renewable Energy Projects; GEF/C.33/Inf.18 (2008)

## ANNEX G – MONITORING AND EVALUATION

### G.1. Project start

A Project Inception Workshop will be held within the first two months of project start with those with assigned roles in the project organization structure. The Inception Workshop is crucial to building ownership for the project results and to plan the first year annual work plan. The Inception Workshop should address a number of key issues including:

- Understand objectives & other outputs and activities
- Assist all partners to fully understand and take ownership of the project. Detail the roles, support services and complementary responsibilities of UNIDO, and of the project stakeholders vis-à-vis the Project Management Unit. Discuss the roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff will be discussed again as needed.
- Based on the project results framework and the relevant GEF Tracking Tools, finalize the first annual work plan. Review and agree on the indicators, targets and their means of verification, and recheck assumptions and risks.
- Provide a detailed overview of reporting, monitoring and evaluation (M&E) requirements. The Monitoring and Evaluation work plan and budget should be agreed and scheduled.
- Discuss financial reporting procedures and obligations, and arrangements for annual audit.
- Plan and schedule Project Steering Committee (PSC) meetings. Roles and responsibilities of all project organization structures should be clarified and meetings planned. The first Project Steering Committee (PSC) meeting should be held within the first 12 months following the inception workshop.

An Inception Workshop report is a key reference document and must be prepared and shared with participants to formalize various agreements and plans decided during the meeting.

### G.2. Bi-annual and annual reviews

Will consist of:

- Summary of progress made during the most recent quarter.
- Based on the initial risk analysis submitted, the risk log shall be regularly updated. Risks become critical when the impact and probability are high.
- UNIDO bi-annual project implementation reports will be prepared in accordance with the guidelines and templates of the Guidelines on Technical Cooperation Programmes and Projects of 2006.

### G.3 Annual review

Annual Project Review/Project Implementation Reports (APR/PIR): These key reports are prepared to monitor progress made since project start and in particular for the previous reporting period. The APR/PIR includes UNIDO/GEF requirements. The APR/PIR includes, but is not limited to, reporting on the following:

- Progress made toward project objective and project outcomes - each with indicators, baseline data and end-of-project targets (cumulative);
- Project outputs delivered per project outcome (annual);
- Lesson learned/good practice;
- AWP and other expenditure reports;
- Risk and adaptive management;

The UNIDO Office in Islamabad will conduct visits to project sites based on the agreed schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress. Other members of the Project Board may

also join these visits. Field Visit Report will be prepared by the UNIDO Project Manager, UNIDO, and will be circulated no less than one month after the visit to the project team and Project Board members.

### G.4 Mid-term evaluation

The project will undergo an independent Mid-Term Evaluation at the mid-point of project implementation. The Mid-Term Evaluation will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term evaluation will be decided after consultation between the parties to the project document. The Terms of Reference for this Mid-term evaluation will be prepared by the UNIDO Project Manager. The management response and the evaluation will be uploaded to the UNIDO Evaluation Group website.

### G.5 End of project evaluation

An independent Final Evaluation will take place 1 month prior to the final Project Steering Committee (PSC) meeting and will be undertaken in accordance with UNIDO and GEF guidance. The final evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the mid-term evaluation, if any such correction took place). The final evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals. The Terms of Reference for this evaluation will be prepared by the UNIDO Project Manager, based on guidance from the UNIDO Evaluation Group. The Terminal Evaluation should also provide recommendations for follow-up activities and requires a management response.

# ANNEX H – OUTPUT BASED BUDGET

| | Funds available (USD) | Component Budget Yr1 | Yr2 | Yr3 | Yr4 | Total |
|---|---|---|---|---|---|---|
| **Project Component 1 -Develop the policy and regulatory framework on use of EE and RE in industry** | | **83,667** | **49,458** | **42,124** | **47,774** | **229,023** |
| Output 1.1 - Existing policy and regulatory framework reviewed and recommendations made (including financial and non-financial incentives and instruments) | *Budget line* | *Yr1* | *Yr2* | *Yr3* | *Yr4* | ***Output total*** |
| | 1100 | 6,000 | 5,000 | | | 11,000 |
| | 1500 | 3,000 | 3,000 | | | 6,000 |
| | 1700 | 6,000 | 4,000 | | | 10,000 |
| | 1705 | 8,333 | 8,333 | | | 16,667 |
| | 2100 | | | | | |
| | 3000 | 5,000 | 5,000 | | | 10,000 |
| | 3500 | | | | | |
| | 4500 | | | | | |
| | 5100 | 1,000 | 1,791 | | | 2,791 |
| | 7100 | | | | | |
| | **Out sub-total** | **29,333** | **27,124** | **0** | **0** | **56,458** |
| Output 1.2 - Recommendations on improvements in policy and regulatory framework adopted and associated advocacy work | *Budget line* | *Yr1* | *Yr2* | *Yr3* | *Yr4* | ***Output total*** |
| | 1100 | | | 4,000 | | 4,000 |
| | 1500 | | 1,000 | 2,000 | | 3,000 |
| | 1700 | | 5,000 | 5,000 | | 10,000 |
| | 1705 | | 8,333 | 8,333 | | 16,667 |
| | 2100 | | | | | |
| | 3000 | | | 20,000 | | 20,000 |
| | 4500 | | | | | |
| | 5100 | | | 2,791 | | 2,791 |
| | 7100 | | | | | |
| | **Out sub-total** | **0** | **14,333** | **42,124** | **0** | **56,458** |
| Output 1.3 - Sectoral analysis on EE (and RE) opportunities, impact assessment and recommended post-project action plan for RE/EE in industry | *Budget line* | *Yr1* | *Yr2* | *Yr3* | *Yr4* | ***Output total*** |
| | 1100 | | | | | |
| | 1500 | 1,000 | | | 150 | 1,150 |
| | 1700 | 5,000 | | | 5,000 | 10,000 |
| | 1705 | 8,333 | | | 8,333 | 16,667 |
| | 2100 | 29,500 | | | 25,000 | 54,500 |
| | 3000 | 10,000 | | | 7,000 | 17,000 |
| | 3500 | | 8,000 | | | 8,000 |
| | 4500 | | | | | 6,000 |
| | 5100 | 500 | | | 2,291 | 2,791 |
| | **Out sub-total** | **54,333** | **8,000** | **0** | **47,774** | **116,108** |
| **Sub-totals for PC1** | *Budget line* | *Yr1* | *Yr2* | *Yr3* | *Yr4* | ***Comp. total*** |
| | 1100 | 6,000 | 5,000 | 4,000 | 0 | 15,000 |
| | 1500 | 4,000 | 4,000 | 2,000 | 150 | 10,150 |
| | 1700 | 11,000 | 9,000 | 5,000 | 5,000 | 30,000 |
| | 1705 | 16,667 | 16,667 | 8,333 | 8,333 | 50,000 |
| | 2100 | 29,500 | 0 | 0 | 25,000 | 54,500 |
| | 3000 | 15,000 | 5,000 | 20,000 | 7,000 | 47,000 |
| | 3500 | 0 | 8,000 | 0 | 0 | 8,000 |
| | 4500 | 6,000 | 0 | 0 | 0 | 6,000 |
| | 5100 | 1,500 | 1,791 | 2,791 | 2,291 | 8,373 |
| | **Comp sub-total** | **89,667** | **49,458** | **42,124** | **47,774** | **229,023** |

| | Funds available (USD) | Component Budget Yr1 | Yr2 | Yr3 | Yr4 | Total |
|---|---|---|---|---|---|---|
| **Project Component 2 - Investments in RE and EE in industry** | | **610,712** | **1,001,837** | **601,948** | **377,854** | **2,592,352** |
| Output 2.1 - Projects on EnMS and Systems Optimization (SO) assessed and implemented in industrial companies in textile (and other sectors) | *Budget line* | *Yr1* | *Yr2* | *Yr3* | *Yr4* | ***Output total*** |
| | 1100 | 6,000 | 6,000 | 6,000 | | 18,000 |
| | 1500 | 1,667 | 1,667 | 1,667 | | 5,000 |
| | 1700 | 3,000 | 4,000 | 3,000 | | 10,000 |
| | 1705 | 4,000 | 4,500 | 4,000 | | 12,500 |
| | 2100 | 100,000 | 200,000 | 200,000 | | 500,000 |
| | 3000 | | | | | |
| | 4500 | 30,000 | 20,000 | 20,000 | | 70,000 |
| | 5100 | 243 | 243 | 243 | | 728 |
| | 7100 | 375 | 1,000 | 125 | | 1,500 |
| | **Out sub-total** | **145,284** | **237,409** | **235,034** | **0** | **617,728** |

Output 2.2 - EE and RE technology support in 1 textile unit

| Budget line | Yr1 | Yr2 | Yr3 | Yr4 | Output total |
|---|---|---|---|---|---|
| 1100 | 2,000 | 2,000 | | | 4,000 |
| 1500 | 1,500 | 1,500 | | | 3,000 |
| 1700 | 500 | 500 | | | 1,000 |
| 1705 | 6,250 | 6,250 | | | 12,500 |
| 2100 | 225,000 | 225,000 | | | 450,000 |
| 3000 | | | | | |
| 4500 | | | | | |
| 5100 | 364 | 364 | | | 728 |
| 7100 | 1,250 | 250 | | | 1,500 |
| **Out sub-total** | **236,864** | **235,864** | **0** | **0** | **472,728** |

Output 2.3 - Projects for deployment of RE technologies assessed and implemented in 2 companies

| Budget line | Yr1 | Yr2 | Yr3 | Yr4 | Output total |
|---|---|---|---|---|---|
| 1100 | 6,000 | 6,000 | | | 12,000 |
| 1500 | 2,000 | 2,000 | | | 4,000 |
| 1700 | 700 | 700 | | | 1,400 |
| 1705 | 6,250 | 6,250 | | | 12,500 |
| 2100 | 212,500 | 212,500 | | | 425,000 |
| 3000 | | | | | |
| 4500 | | | | | |
| 5100 | 364 | 364 | | | 728 |
| 7100 | 750 | 750 | | | 1,500 |
| **Out sub-total** | **228,564** | **228,564** | **0** | **0** | **457,128** |

Output 2.4 - Portfolio of implementation of EnMS/SO and deployment of RE elaborated (incl. finance sources)

| Budget line | Yr1 | Yr2 | Yr3 | Yr4 | Output total |
|---|---|---|---|---|---|
| 1100 | | | 4,000 | 10,000 | 14,000 |
| 1500 | | | 2,500 | 2,940 | 5,440 |
| 1700 | | | 2,800 | 2,800 | 5,600 |
| 1705 | | | 6,250 | 6,250 | 12,500 |
| 2100 | | 300,000 | 300,000 | 305,000 | 905,000 |
| 3000 | | | | | |
| 4500 | | | 50,000 | 50,000 | 100,000 |
| 5100 | | | 364 | 364 | 728 |
| 7100 | | | 1,000 | 500 | 1,500 |
| **Out sub-total** | **0** | **300,000** | **366,914** | **377,854** | **1,044,768** |

**Sub-totals for PC2**

| Budget line | Yr1 | Yr2 | Yr3 | Yr4 | Comp. total |
|---|---|---|---|---|---|
| 1100 | 14,000 | 14,000 | 10,000 | 10,000 | 48,000 |
| 1500 | 5,167 | 5,167 | 4,167 | 2,940 | 17,440 |
| 1700 | 4,200 | 5,200 | 5,800 | 2,800 | 18,000 |
| 1705 | 16,500 | 17,000 | 10,250 | 6,250 | 50,000 |
| 2100 | 537,500 | 937,500 | 500,000 | 305,000 | 2,280,000 |
| 3000 | 0 | 0 | 0 | 0 | |
| 4500 | 30,000 | 20,000 | 70,000 | 50,000 | 170,000 |
| 5100 | 971 | 971 | 607 | 364 | 2,912 |
| 7100 | 2,375 | 2,000 | 1,125 | 500 | 6,000 |
| **Comp sub-total** | **610,712** | **1,001,837** | **601,948** | **377,854** | **2,592,352** |

| | Funds available (USD) | Component Budget | | | | |
|---|---|---|---|---|---|---|
| | | Yr1 | Yr2 | Yr3 | Yr4 | Total |
| **Project Component 3 - Create platform for promoting investment and sustainability** | | **45,299** | **157,533** | **214,034** | **79,134** | **610,000** |

Output 3.1 - Investment platform to promote RE and EE in industrial companies strengthened (non-grant instruments, banking products; awareness creation)

| Budget line | Yr1 | Yr2 | Yr3 | Yr4 | Output total |
|---|---|---|---|---|---|
| 1100 | | 20,000 | 20,333 | | 40,333 |
| 1500 | 2,000 | 6,000 | 6,000 | | 14,000 |
| 1600 | | | | | |
| 1700 | 9,333 | 8,000 | 9,000 | 3,000 | 29,333 |
| 1705 | | 4,167 | 4,167 | 4,167 | 12,500 |
| 2100 | | | | | |
| 3000 | | 20,000 | 20,000 | 22,500 | 62,500 |
| 3500 | | 5,000 | | 5,000 | 10,000 |
| 4500 | | | | | |
| 5100 | | 417 | 417 | 417 | 1,250 |
| 7100 | | | 700 | | 700 |
| **Out sub-total** | **11,333** | **63,583** | **60,617** | **35,083** | **170,617** |

Output 3.2 - Accreditation center and textile training facility for experts on RE and EE-EnMs applications established (under NPO) and training and accreditation programme established

| *Budget line* | *Yr1* | *Yr2* | *Yr3* | *Yr4* | ***Output total*** |
|---|---|---|---|---|---|
| 1100 | | 12,000 | 10,333 | | 22,333 |
| 1500 | | 2,500 | 2,500 | 1,000 | 6,000 |
| 1600 | | | | | |
| 1700 | | 2,500 | 3,333 | 1,500 | 7,333 |
| 1705 | | 5,000 | 5,000 | 2,500 | 12,500 |
| 2100 | | 30,000 | 20,000 | | 50,000 |
| 3000 | | | 7,500 | | 7,500 |
| 4500 | | | 10,000 | | 10,000 |
| 5100 | | 500 | 500 | 250 | 1,250 |
| 7100 | | | | | |
| **Out sub-total** | **0** | **52,500** | **59,167** | **5,250** | **116,917** |

Output 3.3 - Training of experts on EE and RE in industrial applications carried out

| *Budget line* | *Yr1* | *Yr2* | *Yr3* | *Yr4* | ***Output total*** |
|---|---|---|---|---|---|
| 1100 | 6,333 | 12,000 | 16,000 | 12,000 | 46,333 |
| 1500 | 3,000 | 4,000 | 4,000 | 3,000 | 14,000 |
| 1600 | | | | | |
| 1700 | 6,333 | 7,000 | 7,000 | 7,000 | 27,333 |
| 1705 | 3,125 | 3,125 | 3,125 | 3,125 | 12,500 |
| 2100 | | | | | |
| 3000 | 10,000 | 14,000 | 20,000 | 13,500 | 57,500 |
| 3500 | 5,000 | | 5,000 | | 10,000 |
| 4500 | | | | | |
| 5100 | 175 | 175 | 175 | 175 | 700 |
| 7100 | | 1,150 | 1,150 | | 2,300 |
| **Out sub-total** | **33,966** | **41,450** | **56,450** | **38,801** | **170,667** |

Output 3.4 - National Energy Performance Award scheme introduced

| *Budget line* | *Yr1* | *Yr2* | *Yr3* | *Yr4* | ***Output total*** |
|---|---|---|---|---|---|
| 1100 | | | 5,000 | | 5,000 |
| 1500 | | | 4,100 | | 4,100 |
| 1600 | | | | | |
| 1700 | | | 6,000 | | 6,000 |
| 1705 | | | 12,500 | | 12,500 |
| 2100 | | | | | |
| 3000 | | | 10,000 | | 10,000 |
| 4500 | | | | | |
| 5100 | | | 200 | | 200 |
| 7100 | | | | | |
| **Out sub-total** | **0** | **0** | **37,800** | **0** | **37,800** |

**Sub-totals for PC3**

| Budget line | Yr1 | Yr2 | Yr3 | Yr4 | Comp. total |
|---|---|---|---|---|---|
| 1100 | 6,333 | 44,000 | 51,667 | 12,000 | 114,000 |
| 1500 | 5,000 | 12,500 | 16,600 | 4,000 | 38,100 |
| 1600 | 0 | 0 | 0 | 0 | 0 |
| 1700 | 15,666 | 17,500 | 25,334 | 11,500 | 70,000 |
| 1705 | 3,125 | 12,292 | 24,792 | 9,792 | 50,000 |
| 2100 | 0 | 30,000 | 20,000 | 0 | 50,000 |
| 3000 | 10,000 | 34,000 | 57,500 | 36,000 | 137,500 |
| 3500 | 5,000 | 5,000 | 5,000 | 5,000 | 20,000 |
| 4500 | 0 | 0 | 10,000 | 0 | 10,000 |
| 5100 | 175 | 1,092 | 1,292 | 842 | 3,400 |
| 7100 | 0 | 1,150 | 1,850 | 0 | 3,000 |
| **Comp sub-total** | **45,299** | **157,533** | **214,034** | **79,134** | **496,000** |

**Project Component 4 - Monitoring and evaluation**

Output 4.1 Project monitoring and evaluation, knowledge dissemination to include regular reporting, mid-term and terminal evaluation undertaken

| | | | | | |
|---|---|---|---|---|---|
| 1100 | | 18,000 | | 18,000 | 36,000 |
| 1500 | | 4,900 | | 4,900 | 9,800 |
| 1600 | 10,000 | 15,000 | 10,000 | 15,000 | 50,000 |
| 1700 | | 5,000 | | 5,000 | 10,000 |
| 1705 | | | | | |
| 2100 | | | | | |
| 3000 | 5,000 | | | 2,500 | 7,500 |
| 4500 | | | | | |
| 5100 | | 300 | | 400 | 700 |
| 7100 | | 0 | | 0 | |
| **Comp sub-total** | **15,000** | **43,200** | **10,000** | **45,800** | **114,000** |

| | Funds available (USD) | Component Budget Yr1 | Yr2 | Yr3 | Yr4 | Total |
|---|---|---|---|---|---|---|
| **Project Component 4 - Project management** | | | | | | |
| Output 5.1 Project management office (PMO) is established, website dedicated to the project is established and project milestones, reports etc are regularly posted on the website. | | | | | | |
| **Sub-totals for PC5** | Budget line | Yr1 | Yr2 | Yr3 | Yr4 | Comp. total |
| | 1100 | | | | | |
| | 1500 | 3,125 | 3,125 | 3,125 | 3,125 | 12,500 |
| | 1600 | | | | | |
| | 1700 | | | | | |
| | 1704 | 35,281 | 35,281 | 35,281 | 35,281 | 141,125 |
| | 2100 | | | | | |
| | 4300 | 2,500 | 2,500 | 2,500 | 2,500 | 10,000 |
| | 4500 | 5,000 | | | | 5,000 |
| | 5100 | | | | | |
| | 7100 | | | | | |
| | **Comp sub-total** | **45,906** | **40,906** | **40,906** | **40,906** | **168,625** |

| **GEF Project funds** | Budget line | Yr1 | Yr2 | Yr3 | Yr4 | |
|---|---|---|---|---|---|---|
| | 1100 | 26,333 | 81,000 | 65,667 | 40,000 | 213,000 |
| | 1500 | 17,292 | 29,692 | 25,892 | 15,115 | 87,990 |
| | 1600 | | | | | |
| | 1700 | 30,866 | 36,700 | 36,134 | 24,300 | 128,000 |
| | 1704 | 35,281 | 35,281 | 35,281 | 35,281 | 141,125 |
| | 1705 | 36,292 | 45,958 | 43,375 | 24,375 | 150,000 |
| | 2100 | 567,000 | 967,500 | 520,000 | 330,000 | 2,384,500 |
| | 3000 | 30,000 | 39,000 | 77,500 | 45,500 | 192,000 |
| | 3500 | 5,000 | 13,000 | 5,000 | 5,000 | 28,000 |
| | 4300 | 2,500 | 2,500 | 2,500 | 2,500 | 10,000 |
| | 4500 | 41,000 | 20,000 | 80,000 | 50,000 | 191,000 |
| | 5100 | 2,646 | 4,153 | 4,689 | 3,897 | 15,385 |
| | 7100 | 2,375 | 3,150 | 2,975 | 500 | 9,000 |
| Funds available in GF PAKXXXXX | | **796,584** | **1,277,935** | **899,013** | **576,469** | **3,550,000** |

| **XP Project funds** | Budget line | Yr1 | Yr2 | Yr3 | Yr4 | |
|---|---|---|---|---|---|---|
| | 1100 | | | | | |
| | 1300 | | | | | |
| | 1500 | | | | | |
| | 1600 | 10,000 | 15,000 | 10,000 | 15,000 | 50,000 |
| | 1700 | | | | | |
| | 2100 | | | | | |
| | 3500 | | | | | |
| | 4500 | | | | | |
| | 5100 | | | | | |
| Funds available in XPPAK12004 -2012 | | **10,000** | **15,000** | **10,000** | **15,000** | **50,000** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Total Project funds** | | **806,584** | **1,292,935** | **909,013** | **591,469** | **3,600,000** |

## ANNEX I – TIMELINE OF THE ACTIVITIES

| Output | Year 1 | Year 2 | Year 3 | Year 4 |
|---|---|---|---|---|
| 1.1 Policy and regulatory framework reviewed | | | | |
| 1.2 Policy and regulatory framework adopted | | | | |
| 1.3 Assessments and post-project action plan | | | | |
| 2.1 Projects on EnMS and Systems Optimization | | | | |
| 2.2 Demo project 1 (textile unit, EE and PV) | | | | |
| 2.3 Demo projects 2 (Biomass) and 3 (solar PV) | | | | |
| 2.4 Pipeline development | | | | |
| 3.1 Investment platforms and promotion | | | | |
| 3.2 Certificationand training centres | | | | |
| 3.3 Training of experts on EE and RE in industry | | | | |
| 3.4 Energy performance award scheme | | | | |
| 4.1 M&E and project info dissemination | | | | |

## ANNEX J – LETTERS OF CO-FINANCE

NPO
PAKISTAN
CHIEF EXECUTIVE OFFICER

No.3 (03) /CEO/NPO/2010
November 01, 2012

Engr. Shadia Yousif Bakhait,
UNIDO Representative Pakistan,
Serena Business Complex, G-5/1,
Islamabad

Subject: - **Letter of Support (Co-Finance) for UNIDO/GEF Project "Sustainable Energy (EE/RE) Initiative for Industries in Pakistan"**

Dear Mrs. Shadia,

It is pleasure to know that UNIDO Pakistan has been preparing the project "Sustainable Energy Initiative for Indutsrties in Pakistan" under GEF funding in collaboration with Government of Pakistan and appreciate that the National Productivity Organization (NPO), Ministry of Industries, has been decided as the executing partner for the implementation of the project. It is credible that UNIDO being the chair of UN Energy Group recognizes the importance of renewable energy specially energy efficiency for development in all economic sectors, environmental sustainability and poverty reduction through productive uses.

NPO convinced that UNIDO/GEF project has focused the industrial sectors to facilitate the sustainable energy initiatives for promoting investments in RE/EE and scaling up the market through its components including the policy and regulatory framework on use of EE/RE in Industry, creation of an investment platform and an accreditation center for energy experts on EMS & RE applications in industry. This project will definitely be a great step forward in avoiding greenhouse gases (GHG) emissions and removal of risks and barriers towards achievement of Global Environment Benefits.

NPO has already been engaged in promotion of sustainable energy in the industrial sector of Pakistan through renewable energy and energy efficiency measures particularly the Energy Management Standards and System Optimization (EnMS). The project "Sustainable Energy Initiative for Indutsrties in Pakistan" would be significant to NPO's efforts at national level especially in the industrial sub-sectors textile, iron and steel and others.

I am pleased to inform you that NPO hereby commits and proposes a project contribution of US $ 4.2 Million (which includes US $ 1.2 Million in cash through funded and approved projects & US $ 3.0 Million in-kind) during the period of four years of the project. Moreover, NPO being executing partner would like to assist with an active role in the implementation of the project.

NPO earnestly hope that UNIDO/GEF Project meets all success and look forward to a very successful implementation of sustainable energy initiative in the industrial sector of Pakistan.

Yours Sincerely

**Khawaja MUHAMMAD Yousuf**

**National Productivity Organization**
**Ministry of Industries, Government of Pakistan**
**2nd Floor, Software Technology Park (STP) Building, F-5/1, Islamabad.**
**Tel: +92-51-2823304-08 Fax: 2823309, E-mail: info@npo.gov.pk , Website: www.npo.gov.pk**

MASOOD TEXTILE MILLS LIMITED

32-K.M SHEIKHUPURA ROAD,
FAISALABAD PAKISTAN.
POST CODE NO 37631
PH: 92-41-4689470-3
FAX: 92-41-4689469

OUR VISION: TO BE THE WORLD'S BEST TEXTILE COMPANY

November 3, 2012

Ref; MTM/UD/01

Ms. Shadia Yousif Bakhait,
UNIDO Representative Pakistan,
7th Floor, Serena Business Complex,
Khayaban-e-Suhrawardy, G-5/1,
Islamabad

Subject:- Letter of Support (Co-Finance) for UNIDO/GEF Project "Sustainable Energy Initiative for Industries in Pakistan"

Respected Madam,

Please reference to the project "Sustainable Energy Initiative for Indutsrties in Pakistan" that UNIDO Pakistan has been preparing under GEF funding in collaboration with Government of Pakistan and we appreciate that UNIDO has considered the initiative of Masood Textile Mills power plant of 12 MW on Biomass being one of the pilot projects.

Masood textile Mills is one of the leading hosiery manufacturers in Pakistan. Our current power consumption is 8 MW that is being met through national grid. However, the present energy crisis in the country has been impacting our productions as well as cost. Therefore, the management has decided to introduce alternative energy generation through 12 MW Biomass Power Plant that would contribute in both electrical and thermal energy needs of the industries. Moreover, this project will definitely address the climate change challenges by reducing greenhouse gas (GHG) emissions and fossil fuels substitution through biomass introduction.

We are pleased to inform you that Masood Textile Mills (MTM) hereby commits a project contribution of US $ 5.2 Million in cash in the form of equity i.e. 20% of the total cost of the 12 MW Biomass Power Plant and sustainable biomass supply chain management for the power plant. We anticipate a very proactive role through the UNIDO/GEF project regarding alternative energy promotion in the industrial sector of Pakistan.

We look forward for approval of the project by the GEF and a very successful celebration for its implementation with UNIDO

Yours Sincerely

Shahid Nazir Ahmad

CEO

Masood Textile Mills Ltd.

Masood Textile Mills Ltd. Faisalabad.

**Web site:** www.masoodtextile.com **Email:** hrmills@masoodtextile.com

AB Cottex
Al-Barkat Cottex (Pvt.) Limited
Manufacturer of Quality Socks Products

2-K.M. JARANWALA ROAD,
KHURRIANWALA, FAISALABAD,
PAKISTAN.
PH: 92-41-4361387
FAX: 92-41-4361122

Reference: AB/UN-01/2011
November 5, 2012

Ms. Shadia Yousif Bakhait,
UNIDO Representative Pakistan,
7th Floor, Serena Business Complex,
Khayaban-e-Suhrawardy, G-5/1,
Islamabad

Subject: - **Letter of Support (Co-Finance) for UNIDO/GEF Project "Sustainable Energy Initiative for Industries in Pakistan"**

Dear Ms. Shadia,

It is our pleasure to know that UNIDO has been preparing the project "Sustainable Energy Initiative for Indutsrties in Pakistan" under GEF funding to promote EE and RE technologies. We request you to kindly include A B Cottex as one of the contenders for demo textile unit being one of the pilot projects to demonstrate energy efficient technology coupled with solar PV technology in the textile sector of Pakistan.

A B Cottex is classified under SME with small fragmented socks manufacturing units. Presently we have employed local socks manufacturing technology with high energy consumption and low productivity at high costs. Therefore, the management is convinced to establish an integrated new facility to introduce latest state of the art energy efficient socks manufacturing unit coupled with 0.2 MW solar PV technology that would contribute to achieve high quality products at low cost. Moreover, the project would have catalytic impacts in the industrial sector of Pakistan to tackle the climate change issue by reducing greenhouse gas (GHG) emissions through demonstration of energy efficient technologies.

We are pleased to inform you that A B Cottex hereby commits a project contribution of US $ 1.6 Million in cash in the form of equity to establish the model textile industry with energy efficient socks manufacturing unit coupled with 0.2 MW solar PV power plant. We expect a very positive role through the UNIDO/GEF project for sustainable energy promotion in Pakistan.

We anticipate the approval of the UNIDO project by the GEF and a very successful corporation for its realization with UNIDO.

Yours Sincerely

Ahmad Suhail Pirzadah
Director Operations

AB
www.abcottex.com
Email: info@abcottex.com

# SOLARGEN PRIVATE LIMITED

November 6, 2012
Ref: 210903/Solarg/2012

Ms. Shadia Yousif Bakhait,
UNIDO Representative Pakistan,
7th Floor, Serena Business Complex,
Khayaban-e-Suhrawardy, G-5/1,
Islamabad

Subject: Letter of Support (Co-Finance) for UNIDO/GEF Project "Sustainable Energy Initiative for Industries in Pakistan"

Respected Madam,

We refer to the "*Sustainable Energy Initiative for Indutsrties in Pakistan Project*" that UNIDO Pakistan will implement under GEF funding in collaboration with Government of Pakistan and we appreciate that UNIDO has considered to support the "50MW grid-connected Solar Power Project" (the "Project") being implemented by the Laraib Group, its associates and partners (the "Sponsors").

Laraib Group is a multi-disciplinary business house with tight focus on power projects development and advisory. The Group leads the private hydropower sector in Pakistan and has the proven capability to manage the development, financing and construction of power projects. The Group has been responsible for all stages of project development - from concept to construction start for the "84MW New Bong Escape Hydropower Project", the first private hydropower project in the Country.

We are pleased to confirm commitment by the Sponsors of the Project for equity contribution amounting to some US$ 20 million being 25% of the total Project cost. The Project will be implemented through a special purpose vehicle i.e. "Solargen (Pvt.) Limited" incorporated under the prevailing corporate laws in Pakistan.

We would appreciate approval of the Project by the GEF and look forward to successful collaboration with UNIDO for the Project.

Yours sincerely,

K. Faizi

Khalid Faizi
*Chief Executive Officer*

**50C, Margalla Road, F-8/2, Islamabad, Pakistan. tel: 92 51 285 2127; fax: 92 51 285 2129; email: solargen@laraibgroup.com**

| IH&SMEFD Circular Letter No. 01 of 2012 | January 18, 2012 |
|---|---|

All Banks/DFIs,

Dear Sirs,

## Scheme for Financing Power Plants Using Renewable Energy

Please refer to SMEFD Circular No. 19 dated December 01, 2009 on the captioned subject.

2. In terms of existing instructions of above Scheme, financing is available to sponsors for setting up of 10MW Power Projects using different types of renewable energy source (i.e. wind, hydel, biogas, biofuels, bagasse cogeneration, solar power and geothermal as fuel).

3. It has now been decided that banks /DFIs can also consider financing requests of the sponsors for setting up Power Projects up-to a maximum capacity of 20 MW in cases where only **Biomass/Biogas is used as renewable energy source**, keeping in view the terms & conditions of the Scheme.

4. Other instructions on the Scheme shall remain unchanged.

Yours faithfully,

Sd/-

(Mohammad Mansoor Ali)
Director



**State Bank of Pakistan**
I.I. Chundrigar Road, Karachi, Pakistan.
Phone: 111-727-111, Fax: (92-21) 9212440
www.sbp.org.pk

## ANNEX K – TERMS OF REFERENCE OF KEY STAFF

| ***Designation*** | **National Project Coordinator** |
|---|---|
| Qualifications | - Minimum of University degree in Science or Engineering and post-graduate Master's Degree in Management or a Master's in Business Administration<br>- Minimum 7 years of experience and minimum 4 years in managing a regional/local energy-related or industry-related organization/agency or program<br>- Extensive knowledge of energy efficiency and of industry in Pakistan<br>- Knowledge of UNEP/GEF facility as well as associated GEF Climate Program priorities, project preparation, work planning and implementation mechanisms would be an advantage.<br>- Knowledge and experience in working with government, private sector and NGOs in industry in Pakistan<br>- Demonstrated ability in managing a multi-disciplinary team<br>- Excellent oral and written communication skills in English and Urdu<br>- Ability and willingness to travel at short notice<br>- Adequate computer literacy. |
| **Responsibilities** | - Overall management as well as review of activities and monitoring of key project consultants, staffers and sub-contractors.<br>- In charge of coordination the compilation and updating of annual reports, half yearly reports and financial reports (work plans, progress reports), as mentioned under Monitoring and Evaluation)<br>- Review and provide key input of key outputs of the project, as detailed in the Project Document<br>- Responsible for reporting to UNIDO and as well as to the PSC.<br>- Provides direction and overall management to the PMU<br>- Take overall responsibility for the management and execution of the project<br>- Ensure that the activities are carried out according to the project design and the outcomes and outputs/deliverables are achieved within the approved timeframe and budget<br>- Support the organization of training programs, ensure adequate participation and quality of reports |