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INDUSTRIAL DEVELOPMENT ORGANIZATION



GLOBAL ENVIRONMENT FACILITY  
INVESTING IN OUR PLANET

# Sustainable Energy Initiative for Industries in Pakistan

Promoting a market environment to stimulate investments in  
Renewable Energy and Energy Efficiency projects to avoid GHG emissions





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## UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

The United Nations Industrial Development Organization (UNIDO) is a specialized agency of the United Nations works to promote and accelerate sustainable industrialization in developing countries and economies in transition. The mandate of the UNIDO is to eradicate poverty through inclusive and sustainable industrial development (ISID), attuned to the new global development agenda and manifested in the 2013 Lima Declaration. The importance of ISID is underscored in Goal 9 of the Sustainable Development Goals (SDGs), which calls to build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.

UNIDO focuses on three thematic priorities to support countries in their efforts to achieve ISID, namely poverty reduction, advancing economic competitiveness, and safeguarding the environment. This is carried out by UNIDO's specialized technical departments and widespread field presence.

The UN General Assembly established UNIDO as an autonomous body in 1966 and converted to a "specialized agency" in 1985. In the subsequent decades, UNIDO was geared towards private sector development and refined its expertise and unique positioning in driving forward sustainable industrialization. Today, 50 years since its creation, UNIDO remains fully committed to using its technical expertise to assist countries in growing their industrial potential to eradicate poverty and decouple economic growth from environmental degradation.





## GLOBAL ENVIRONMENT FACILITY

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The Global Environment Facility (GEF), established in 1991, is the largest fund dedicated to financing environmental protection. So far, the GEF Trust Fund replenishments have leveraged USD 20.65 billion in funding and further multiply the amount by facilitating co-financing in a 1:5 ratio through multi-stakeholder alliances. It acts as a catalyst for action by allocating strategic investments to its partners. The GEF is set up as a partnership network of 18 implementing agencies, including UN bodies, multilateral development banks, national entities, international NGOs, and its donor and recipient countries.

The GEF serves as a financial mechanism for the Minamata Convention on Mercury, the Stockholm Convention on POPs, the UN Convention on Biological Diversity (UNCBD), UN Convention to Combat Desertification (UNC-CD), and the UN Framework Convention on Climate Change (UNFCCC). To achieve the goals set out in the multilateral agreements, the GEF2020 Strategy provides a blueprint to tackle the drivers of environmental degradation with integrated solutions and innovative pilots. The mobilization of local and global stakeholders, higher operational efficiencies, and stronger results management are foreseen to deliver cost-effective, high-impact results. Its interventions include biodiversity, chemicals, waste, forests, international waters, land degradation, and climate change. Beyond providing direct support to the Conventions through its focal areas, the GEF is also developing a series of Impact Programs under GEF-7 that correspond to country priorities and provide holistic and integrated approaches for greater transformational change.

# Project Overview

Sustainable Energy Initiative for Industries in Pakistan, also known as the Renewable Energy and Energy Efficiency (REEE) project, is funded by the GEF and implemented by UNIDO with the aim to avoid greenhouse gas (GHG) emissions by developing and promoting a market environment to stimulate investments in renewable energy and energy efficiency in industries which, in order to support Inclusive and Sustainable industrial development in Pakistan. The REEE project promoted the adoption of renewable energy and energy efficiency technologies and services in industries.

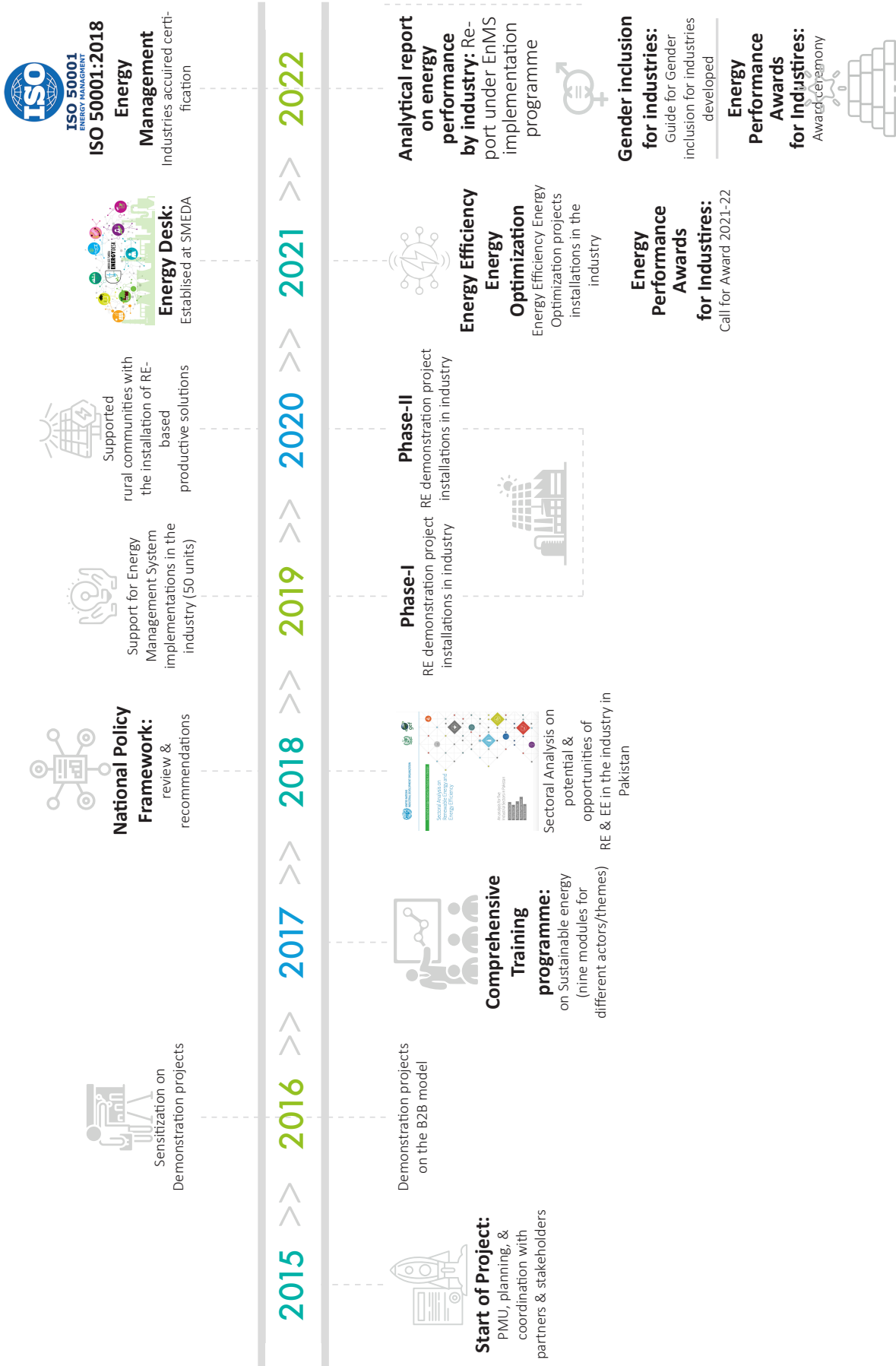
The project consists of three major components which include:

- Developing policy and regulatory framework to support the uptake of EE and RE in the industry
- Promotion of EE and RE investments in industries
- Create a platform for promoting investment and sustainability

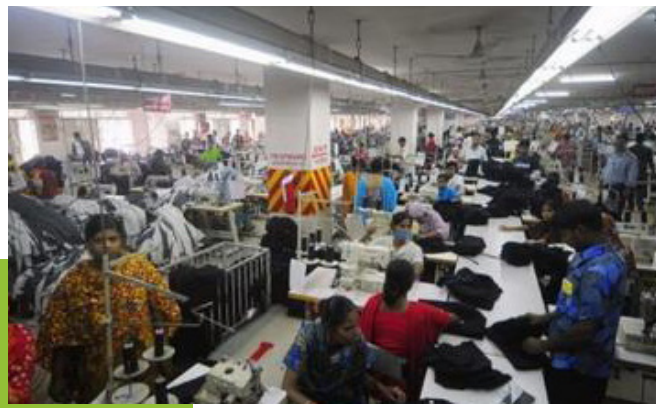
UNIDO collaborated with the Ministry of Climate Change along with government institutions including the Small and Medium Enterprise Development Authority (SMEDA), National Productivity Organization (NPO), National Energy Efficiency and Conservation Authority (NEECA), and Alternate Energy Development Board (AEDB) and has achieved many successes. The project has worked in synchronization with both the primary target groups of the project which are the institutions mandated for the development of REEE including government policy-making and implementing institutions, and with primary project beneficiaries such as industries, energy consultants, professionals, suppliers, and academia.

The REEE project has reduced carbon emissions by more than 17,000 Metric tons of Carbon Dioxide (CO<sub>2</sub>) over its lifetime besides the other indirect emission reductions related to post-project replications. The project has helped the industrial sector through the development of a policy regulatory framework on RE/EE, capacity development of energy consultants, conducting energy surveys, implementation of Energy Management Systems, and development of demonstration projects on RE to help built replicable models. The project has generated multiple benefits for different players and stakeholders within Pakistan and at the global environmental level. In addition to environmental benefits, energy efficiency measures and the adoption of renewable energy technologies have greatly reduced operational overhead costs. On a futuristic note, the project is leaving a legacy of contributing its fair share to a better functioning industrial sector that will help and trigger the creation of new jobs or increase in pay for current skill-enhanced jobs. Some of the REEE project achievements are highlighted in this brochure.

# Results Timeline









# Success Stories





## UNIDO supported the development of National Policy Frameworks on Energy Efficiency and Renewable Energy through a study conducted in 2017

To promote the adoption and utilization of RE and EE technologies in the industrial sector of Pakistan, an analysis of the required set of policy frameworks was needed which could help industries achieve sustainability while lowering their dependence on fossil fuels for their energy requirements. A study was conducted in the year 2017 under one of the project components: “Developing a policy and regulatory framework for incentivizing and promoting RE and EE application in the industrial sector of Pakistan”. This study aimed to develop and propose a set of appropriate RE and EE policies and their implementation roadmap, which could be included in existing government policies and regulatory frameworks or form a basis for formulating new legislation for promoting RE and EE in the industrial sector of Pakistan. This study focused on the state policies, i.e., REEE policies and regulatory framework (laws, regulations, decisions, guidance, plans, strategies, etc.,) promulgated by government authorities. Furthermore, emphasis was placed on policies that impacted REEE adoption in the industrial sector.

The study was conducted by consortia of international and local consultants and undergone several levels of activities such as:

- A Comparative Review of the existing RE and EE regulatory frameworks in Pakistan with that of five other countries
- Consultations with project partners and key stakeholders
- Implementing Rules and Regulations (IRRs) and an Implementation Roadmap for these recommended policies
- Conducted National Stakeholder Workshop
- Final Report handed over to relevant public sector partners.
- Advocacy for the suggested recommendations

Alternative Energy Development Board (AEDB) and National Energy Efficiency and Conservation Authority (NEECA) are two federal authorities of Pakistan mandated for initiating, catalyzing, and coordinating all RE and EE-related activities in different sectors of Pakistan. The two separate volumes of Reports were developed for each of these two agencies and handed over to the relevant ones.

UNIDO team remained in contact with the technical teams of AEDB and



NEECA, for advocacy and technical support on the policy recommendations. For advocacy of the policy recommendations on a larger scale, among other activities, a special Consultative workshop was organized in collaboration with the PM Taskforce on Energy. The main objective of the workshop was to brainstorm and devise the national energy efficiency strategy focusing on five thematic areas including but not limited to:

- Energy Efficiency Standards & Labelling
- Building Codes
- Energy Efficiency in Transportation
- Energy Efficiency in Power Grid
- Energy Management and Benchmarking

While AEDB has formulated its ARE Policy in 2019 and NEECA is working on its NEEC Policy 2022, both policies do reflect the work of UNIDO, as UNIDO's recommendations have been duly considered and most of these are incorporated as measures to overcome the barriers to sustainable energy development in Pakistan. Based on the recommendations, AEDB took many initiatives, some of which are:

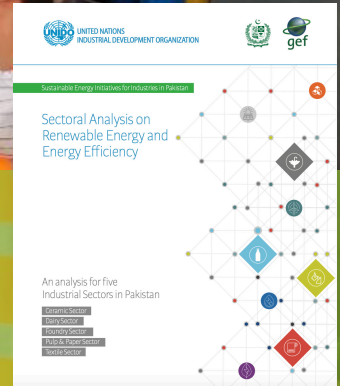
- conducted resource assessments limited to the economic potential. It conducted assessments on new micro-grid and mini-grid market models to incorporate them on an industrial level.
- Upgradation of substations and modernization of existing grids is being done. Automation of existing grids and generation side is also in the plans and activities are done in this regard.
- New appropriate tariff-related mechanisms for RE-based power generation and cogeneration projects in the industrial sector are being developed in the wholesale market policy. Up to 25kW net metering license is relaxed and the new policy will simplify the licensing regime
- A wholesale market is being formed where all regulatory authorities will work from one desk to incorporate B2B models and Bulk electricity consumers to promote net metering and self-generation.

NEECA also incorporated many suggestions into its Policy some of which are:

- developing mechanisms for liaison with provincial governments for the establishment of its provincial designated agencies;
- developed a national EE&C Action Plan for the next five years based on the programs identified in strategic guidelines for the key sectors of the economy;
- Following policy instruments for financing, EE&C is proposed; Innovative financing for energy efficiency; Exemption of customs duties and taxes on energy efficiency equipment; Easy and equitable access to capital; On-bill financing schemes; Measures for financial sustainability
- Promoting and developing Energy Management Systems that include data collection and analysis of energy consumption; efficiency indices; energy efficiency potentials.

The document is available at the website <https://unidogefpakistan.org.pk>.

## First Major Study on EE and RE Potential and Opportunities in the energy-intensive industrial sector of Pakistan



The project conducted a baseline study on the Potential and Opportunities for Renewable Energy and Energy efficiency technologies in the industrial sectors of Pakistan. The study was one of the start-up activities for the larger project, providing major input for the policymakers and the implementers alike, in wake of the local perspective and energy status.

Pakistan has gone through several ups and downs, as far as industrial growth is concerned, well connected with its political traumas, and fight against terror. However, the resilience of the nation has been one of the most encouraging aspects, which has kept floated the economic infrastructure despite all the odds. However, it has always strived on the ingenuity of the individuals rather than the effectiveness of organizations. That is why, even after surviving global challenges and local barriers, our industrial sector has not been able to generate a collective knowledge-based platform, to judge its own sector-level performance within and outside its organizational domain.

UNIDO has tried to give impetus to start such activity, to generate performance-related data on energy, for a few selected sectors in the industry. For this, it was necessary to first assess the available information, for its appropriateness and suitability. However, it was found that due to the above-cited reasons, only below-par information was available when both primary and secondary sources of information were approached. This was due to the following factors:

- Putting the energy efficiency issue as one of the lowermost items on the priority list in the industrial sector, generally prevailed over by energy security issue.
- Lack of awareness about the usefulness of energy data culminates in absence of an energy monitoring system in the industry.
- Lack of capacity and resources in sector associations for collecting such information from their member factories, in whatever available form.



- Lack of government departments' capacity entrusted with industrial development research, statistics, and other initiatives, to collect and manage systems to maintain easily retrievable data for other research and evaluative initiatives.

All these factors can be accounted for the dismal performance of our industrial players in coming up with a real picture of the industrial performance on the energy efficiency front. It is astonishing to see that even some progressive industrial units, that have been managing their own energy monitoring systems to improve their in-house production costs, are still yet to be noticed by both the private and public sector



The Study was presented and shared with stakeholders in two separate workshops in the year 2017. The objective of the two workshops was to validate the sectoral study reports on five industrial sectors in Pakistan prepared by consortia of international consultants and local partners, for the identification of the potential of Energy Efficiency (EE) and Renewable Energy (RE) measures and existing and future opportunities of RE and EE technologies, as well as to take comments from relevant stakeholders for the finalization of the study.

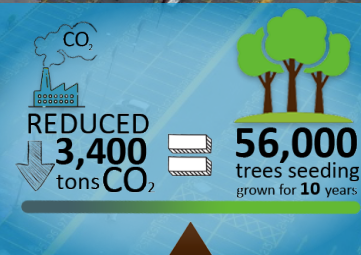
entities to step forward and promote and replicate the successful models of implementation, not entirely in the same way, but somehow in more simplified and cost-effective ways, to start with.

The sectoral study was thus a most needed activity to initiate and to build upon it, the other project activities, as well as to provide baseline information for the development of evidence-based policy and regulatory framework on the use of EE and RE in the industry. By identifying and quantifying potential EE and RE opportunities in industries, particularly in the five main energy-intensive industrial sectors, the study provided a detailed description of best practices for the industries from the local perspective.

The “Sectoral analysis report” was the initiative under the project’s first component, whereby International Consultants and their local partners conducted the study through secondary information review and first-hand information gathering from visits and meetings in the major industries. A qualitative and quantitative analysis was done based on the findings and the industrial sectors were chosen for the sectoral study, namely ceramics, food processing, foundries, pulp and paper, and textile.

This document presents a first insight into the energy-saving and renewable energy potential which needs to be studied further. This is the first serious attempt of such nature and scope, which can be a springboard for next-level study in the energy-intensive industrial sector. The report is available at the project website <https://unidogefpakistan.org.pk>.

## UNIDO supported energy transition for green and clean industrialization in Pakistan:



**With UNIDO technical assistance on B2B Model, industries are generating 6 MW clean energy through this approach**

The biggest challenge faced by the industry to access clean, green, and reliable energy is the lack in capacity for carrying out investments. Apart from the setup cost, the lack of expertise to install and operate the power plant is one of the main challenges which is hindering Renewable Energy (RE) penetration in the industrial sector. Addressing the rising challenges, the REEE project promoted a business approach which is an innovative finance mechanism to support the energy transition where the developer invests in the Renewable Energy power plants at commercial and industrial sites and operates them for 20-25 years selling electricity to the site owners at a discount to the grid. Shams Power Limited, a new solar power developer and solution provider in Pakistan, was selected as a private sector implementing partner and was given a partial grant in the form of financial assistance to cater to the cost of 6 MW cumulative capacity solar energy projects installation. The REEE project's grant enabled Shams Power Limited to secure corporate Power Purchase Agreements (PPA) for the implementation of solar projects at 12 commercial and industrial sites, with zero capital and operational costs. These sites included seven branches of Metro Cash & Carry, Packages Mall, Maxim Agri Khanewal, Nishat Hyundai Faisalabad, and Akzo Nobel Pakistan. Shams Power provided these customers with clean solar power on a long-term agreement basis, at pricing below the grid/diesel rates. The solar power plants will be handed over to the customers at the end of the term. Customers made no investment, took no equipment or solar risk, paid nothing for the operations and maintenance of these Solar Power Plants, but received economically priced green and clean energy. The B2B Sales model has transformed the industrial sector approach to increase their dependence on Renewable energy sources rather than relying on conventional sources of power.

Now, through a net metering facility with the support of the project's counterpart AEDB, the excess energy generated from solar power systems



is being fed and sold to the national grid. Shams Power Limited, with UNIDO's support, has set a benchmark in Pakistan in Solar Power generation by acquiring the first Distributed Generation License granted by National Electric Power Regulatory Authority (NEPRA). This B2B approach has been a success and is being followed by other companies. At the moment in Pakistan, there are five companies that have acquired Distributed Generation License followed in the footsteps of Shams Power.

The generation of 7,000 MWh of clean energy annually through this initiative is contributing to mitigate climate change. The GHGs emissions reduction is approximately 68,000 tons of CO<sub>2</sub> over the lifetime, which is enabling the associated industries to go carbon neutral.

Sustainable business and environment protection are key elements of METRO Group's strategy that has been successfully implemented in Pakistan as part of the Sustainable Development Goals, specifically SDG7 i.e., affordable and clean energy. I am proud that most of METRO Stores in Pakistan are now using solar energy after successful collaboration with Shams Power through UNIDO and GEF that will allow METRO Pakistan to save 2,639 tons of CO<sub>2</sub> every year.

— Marek Minkiewicz, Managing Director Metro Cash and Carry




UNIDO and GEF's Sustainable Energy Initiative has been instrumental in creating market-based adoption of RE technologies and measures in the industrial sectors of Pakistan. Our goal is to scale up and replicate this concept throughout Pakistan's Commercial and Industrial sites. We believe that we have developed the right expertise and experience with the support of UNIDO that will lead to sustainable clean and green industrialization.

— Omer M. Malik, Director Business Development Shams Power



In addition, the B2B approach has led to approximately USD 4.2 Million in investment in the renewable energy sector. The increasing reliance on renewable energy will lead to 30-40% savings in energy costs for industrial consumers amounting to approximately USD 200,000 annually. This initiative is also paving way for new avenues of opportunities for young engineers and technicians including women energy professionals who have been trained under capacity-building programs organized by UNIDO and its implementing partners.

The success of this project has served as an impetus for other industries to enter this market to scale up the solar deployment on a Build-Own-Operate-Transfer basis. So, essentially UNIDO and the GEF have not only strengthened the capacity of Shams Power to get started with this approach but initiated an energy transition for green and clean industrialization in Pakistan.



## UNIDO contributed in consolidating new and innovative industrial applications with renewable technologies

In pursuit of its goal to support the industry, UNIDO with innovative technologies evolved its strategy from selecting a few bigger RE projects to a relatively large number of beneficiaries with a mix of small and large capacity projects. This strategy was based on the fact that all initially selected large projects, backed off from their commitments, either due to financial constraints or change in priority of the management or even due to the fact that some projects became unfeasible and/or unviable due to fluctuating energy prices and bottlenecks in the availability of energy sources, as in the case of biomass projects. This change in the strategy was extremely fruitful for the REEE project and it supported 10 industrial entities to have captive power generation based on Solar installations. The selection process was meticulous and only one industrial entity backed off, while all others fulfilled their commitments.

The REEE project achieved and exceeded the target of RE by installing more than 12 MW projects cumulatively in industrial sectors which included: 1.45 MW of captive RE projects in the Textile Sector, 2.7 MW of Solar Power plants installed in the Food Processing Sector, and around 1 MW installed in the Ceramics industry. This project generates 14,455 MWh of clean energy every year. This has resulted in the reduction of industrial CO<sub>2</sub> and other GHG, contributing to the Climate Action Goals by avoiding more than 200,000 Metric tons of CO<sub>2</sub> emissions over the lifetime.

The REEE project also promoted new commercial approaches and models. The business-to-business (B2B-PAYG) market approach for introducing the latest RE technologies to industries was ground-breaking. With UNIDO's financial and technical support Shams Power, a joint venture of two of Pakistan's leading energy companies (PITCO and Orient Operating Company), offered economically priced solar power on a Build Operate Own and Transfer basis to the industries for the first time in Pakistan, where a negotiated energy price tariff less than the national tariff was offered. UNIDO's grant enabled Shams Power to secure corporate power purchase



agreements for the implementation of solar projects at 12 commercial and industrial sites including Metro Cash & Carry, Packages Mall, and Akzo Nobel in Lahore. The B2B Sales model has transformed the industrial sector approach to increase their dependence on RE sources rather than relying on conventional sources of power, without incurring the investment cost and without worrying about technical capability gaps of their own.

Another innovative initiative of the REEE project was to provide ideas like Energy Storage systems for RE on a large scale and some customized unique solutions for individual industries that can be replicated elsewhere. The 2.7 MW Battery Energy Storage Solution (BESS) integrated with the solar system and synchronizing Gensets with Solar in the textile industry to reduce a very high opportunity cost associated annually due to unplanned generator shutdowns were few of the unique solutions provided. An imitable case also needs mentioning in a food processing industry where the longstanding weak roof of the shed, unable to provide support to the solar panels, was reinforced by a specialized roof reinforcement technique to support load for 1.7 MW of Solar panels. A similar case in the ceramic industry was to avoid the long shutdown of the industry by using a specialized Ballast type Structure, which enabled the even distribution of a load of solar panels to the rooftop. Thus, UNIDO has effectively contributed in providing technical and financial support for the promotion of advanced techniques to supplement RE technologies, which will also be a good lesson for other industries to learn and replicate.



The REEE project through its GEF grants has been able to encourage the industry to put in a sizeable amount of investment as co-financing. A total of USD 570,000 was granted by UNIDO-GEF and the industry invested USD 11 million as the co-financing. Thus, UNIDO has been able to contribute its part in promoting applicable Solar technology and commercial model for industrial manufacturing base-load, with new advancements, which was not envisaged earlier by industrial entrepreneurs.





## UNIDO empowered rural communities to adopt clean and sustainable energy technologies for better livelihood:

©UNIDO/Mr. Qazi Ameer Bux from Rahim Yar Khan smallholder farmer received assistance from UNIDO

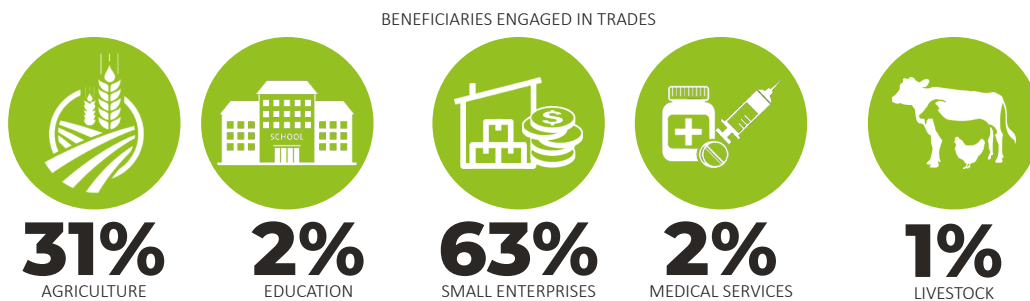
### Installation of total 1.3 MW Solar PV-based productive solutions under interest free-micro financing scheme for small businesses and micro-enterprises

Renewable Energy investment projects support for small businesses and micro-enterprises, is one of the important components of the GEF-funded project: Sustainable Energy Initiatives for Industries in Pakistan implemented by UNIDO. The project promoted the productive use of energy-efficient technologies and reduce greenhouse gas emissions, while supporting achieving Sustainable Development Goals (SDGs), to encourage gender equality and decent work for economic growth. UNIDO engaged the National Rural Support Program (NRSP), one of the major micro-financing entities in Pakistan, to outreach to the communities that were involved in small businesses and agriculture with limited access to resources. This project provided subsidies in terms of interest-free loans to the beneficiaries for procurement and installation of RE solutions for productive use along with post-installation maintenance support.

The 10-month-long project, which started in April 2021, received a large number of applications till June 2021. In 20 districts, from four regions in Punjab and Sindh provinces namely Lahore, Rahim Yar Khan, Sargodha, and Hyderabad 474 applications were processed for the provision of RE solutions to farmers and small enterprises including women-owned businesses, with a cumulative capacity of 1,321 kW. The project contributed in improving the livelihood of small working communities which include 21 women and 453 men (ranging from 19 to 60 years in age) engaged in businesses such as agriculture, education, small enterprises, medical services, and livestock. Under this project, 102 small-scale vendors were registered to

extend their businesses in remote areas and provide free-of-cost after-sales services from one month to one year. The project has been able to build the trust of communities with vendors. The vendors regularly visit the community for the maintenance of the installed solar systems, which allows them to introduce the latest technologies and products according to the community's needs.

Through this initiative, UNIDO enabled small businesses and farmers in rural areas of Pakistan to enhance their productivity and improve their livelihood both in terms of cost reduction and the increase in productive time available to them, with no fear of power outages. The electricity cost has drastically dipped after the installation of Renewable Energy Sources for the project beneficiaries. According to the Post-Installation Impact Study conducted by NRSP, 80% of respondents reported savings up to PKR 15,000 per month, while the remaining 20% reported saving more than that. The collected responses revealed saving amounts ranging from PKR 1,500 - 70,000. Now communities are relying less on costly sources such as diesel for generators. Moreover, 46% of the project beneficiaries engaged in agriculture have reported having the highest saving i.e., more than PKR 20,000 after replacing diesel/ petrol-powered pumps with solar systems to irrigate their fields.



These communities have installed a cumulative capacity of RE solutions amounts which was more than double the initial target of 600 kW, capable to produce 1,825 MWh of clean energy every year. UNIDO promoted the reduction of industrial Greenhouse Gas Emissions (GHGs) by contributing to the Climate Action Goals by avoiding more than 827 Metric tons of CO<sub>2</sub> emissions annually.

Through this initiative, UNIDO has not only enabled small businesses and farmers in rural areas of Pakistan to enhance their productivity but also set a benchmark for future endeavours. It also capacitated the micro-financing entity like NRSP, to work in the area of RE technologies, as they had never engaged in this sector. Now NRSP, with added capabilities and knowledge, is endeavouring to launch similar kinds of projects to replicate this model of micro-financing.





## UNIDO has broken the glass ceiling for promoting Inclusive and Sustainable Industrial Development in Pakistan:

### UNIDO advances gender equality in the energy sector through the REEE project

UNIDO recognizes that gender equality and the empowerment of women are key to achieving Inclusive and Sustainable Industrial Development. Although there have been significant achievements over the last decades globally, women's socioeconomic disadvantage is still reflected in pervasive gender inequalities in earned income, access to productive resources such as credit and assets, educational attainment,

liberty to pursue a profession, and time-use, specially in Pakistan. Ensuring inclusivity, UNIDO has supported the industries to achieve important energy performance milestones. This support has been provided through a number of key initiatives, one of which was capacity improvements for the industrial organization as well as for relevant service providers and public and private stakeholders in the energy sector. UNIDO conducted many internationally acclaimed professional training courses. Women professionals were encouraged to take part in capacity-building activities, in which more than 100 women energy professionals were trained in 20 different types of training stretched over one day to three days. Seven women energy professionals undertook the training on Certified Energy Manager (CEM) and Certified Energy Auditors (CEA) and four women achieved the certification. However, it was for the first time in Pakistan that any women professional underwent such high-level international certifications.

UNIDO in collaboration with National Rural Support Program (NRSP) supported 21 women small business entrepreneurs belonging to the rural communities to improve their livelihood by providing subsidies in terms of interest-free loans to the beneficiaries for the procurement and installation of RE solutions for productive use along with post-installation maintenance support for reaching out to the communities in remote areas of Punjab and Sindh provinces. Achieving gender equality and empowering women in the energy sector, UNIDO, through the funding from the GEF, under its REEE



&gt;100

IN 20 DIFFERENT TRAININGS

WOMEN TRAINED

7

IN CEM &amp; CEA

5

in ISO 50001:2018  
Lead Audit Course

project aimed to achieve SDG 5.

However, it would be pertinent to know the challenges that were faced during the project to achieve these objectives. The lack of knowledge about gender mainstreaming in industrial development strategies constrains the gathering of gender-disaggregated data and the development and implementation of gender-responsive industrial policies and programs. Even the Sectoral Report preparation and compilation were affected by the unavailability of the disaggregated data on women in industry relevant to energy. The presence of women energy professionals is very low in Pakistan and their engagement levels were limited.

In addition, the project is developing a guideline report for the industry, as to why and how to improve gender mainstreaming in the industry.

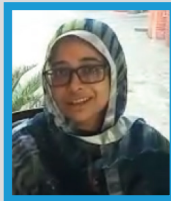
Some of the women energy experts professionals, who were trained to build their capacity, which enables them to be placed at leading positions in progressive industries supported by UNIDO:



MS. MEHDIA NAQVI  
ENERGY TEAM LEAD  
EBRAHIM TEXTILE MILLS



MS. AYESHA OBAID  
ASSISTANT MANAGER HSC&E  
KSB PUMPS COMPANY LIMITED



MS. MUBASHRA  
Business Planning Manager  
RAVI AUTOMOBILES PVT. LTD



MS. ANILA TANVEER  
ENERGY ENGINEER  
ARTISTIC FABRIC MILLS



MS. AYESHA ZAHEER  
MANAGER COMPLIANCE  
QARSHI INDUSTRIES (PVT.) LTD.

Inclusivity of women is challenged in most sectors, especially at the technical level and senior management level. However, the project was successful in mobilizing available women's resources and has been able to create an impact in building capacities of the women in energy efficiency and renewable energy providing opportunities to excel in their careers and earn a better living.



## **Instilled a sustainable energy approach in all professional segments and created a critical mass of young Certified Energy Professionals for Industries**

### **A comprehensively designed standardized Training Program by UNIDO**

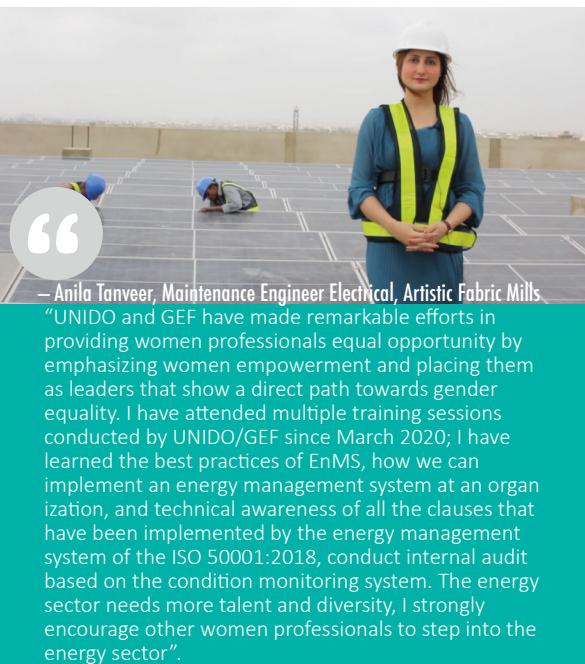
UNIDO is applying critical approaches to bring innovation within Pakistani industries, one of which is to increase its technical capacity as well as that of the service industry, in the sphere of EE and RE, through tested global training approaches so that appropriate and skilled human resources could be made available. A comprehensive training program on Energy Management Systems based on ISO 50001:2018 and Energy Optimization was thus designed and conducted, whereby International Certification Agencies and their acclaimed international trainers were engaged with local industrial partners and consultants.

REEE team designed the training program based on the findings of the Sectoral analysis of RE and EE, pinpointing the energy-intensive industries in Pakistan that had great potential to improve their energy performance. This training program included all major stakeholders and imparted tailor-made training to each one of them. Association of Energy Engineers, AEE USA, the leading energy training certifying body was engaged to introduce and conduct the certified energy courses locally to cater to the needs of industry professionals. UNIDO organized international certification courses: Certified Energy Manager (CEM) and Certified Energy Auditors (CEA), which were held in industrial cities i.e., Lahore, Faisalabad, and Karachi. More than 50 industrial professionals attended these certification courses including seven women professionals out of which 30 professionals achieved certification.

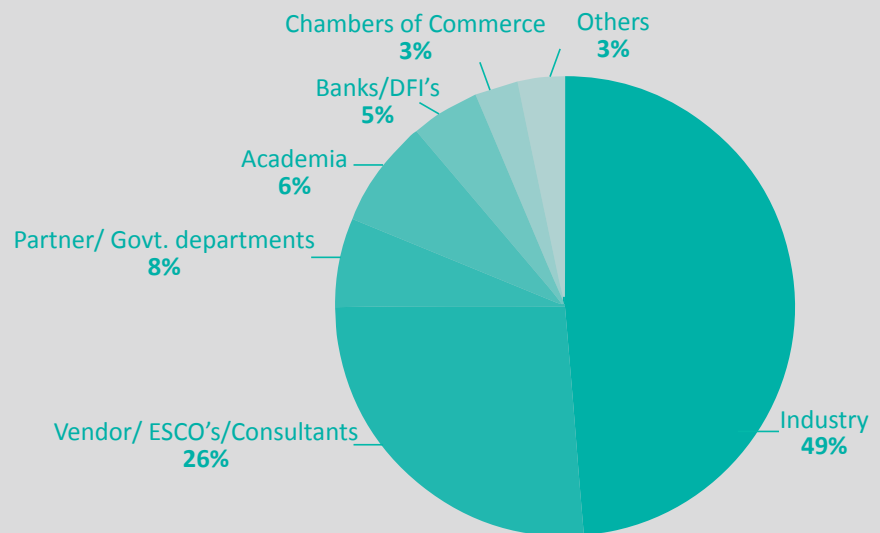
The main strategy to increase the impact and outreach of these training was to engage diverse stakeholders such as academia, industry, and chamber of commerce that were motivated to conduct these courses within their premises. This approach induced a sense of collaboration and generated interest and awareness among the students, staff, and officials of these

organizations.

Besides the training program conducted in 2017-18, UNIDO also maintained continual capacity-building activities carried out during the Energy Management System (EnMS) Implementation phase. UNIDO hired consultants for handholding the industry and conducted these training sessions on various EnMS clauses and themes for their client industrial units. Hence, professionals and staff of more than 50 industrial units under the EnMS Program got further training from these consultants, who mostly had capacitated by attending the Training of Trainers (ToT) courses during earlier UNIDO training sessions. Those desirous organizations that wanted to avail grants to achieve ISO 50001-2018 certificates, under EnMS programs, were made to ensure at least one Certified Lead Auditor for ISO 50001-2018 in their Energy Teams. This resulted in adding 22 new certified professionals (including four women professionals) in the industry, which helped their respective organizations to pass the certification bodies' compliance audits and ultimately achieve the certification. The faculty members of academia partners who attended ToT sessions arranged sessions for their students, which extended the outreach of the program.



#### Distribution of Participants-Sector Wise



The training program from UNIDO has been highly appreciated by all quarters as it has benefited many professionals and organizations in improving the energy performance of industries and the competencies of individuals. The industry is now fully geared for innovation in technology and results are already being realized.



## UNIDO created valuable academia-industry collaborations to promote advanced energy efficiency approaches in Pakistan



Academia and industry both play a vital role in the development of technology and innovation in a country and their strong linkage has a long-term synergic and sustainable effect. These linkages are instrumental in advancing research and knowledge and creating a skilled workforce. The REEE project has supported establishing remarkable collaborations between industry and academia to promote improvement and innovation in the energy sector. Bridging the disconnectivity between theory and practice these collaborations brought changes such as including technical support in advanced curriculum design and development, modern training, and skill development, basic and applied research, technology development, and transfer, only possible through mutual engagements between industry and academia. On one hand, faculty members and students drew inspiration from actual practical engagements in industrial applications, the industry took advantage of applied research in modernizing their operations and learning modern techniques. At least three mainstream public sector academia institutions, the National University of Science and Technology (through USPCASE-Advance Energy Center), University of Engineering and Technology Lahore (through Al-Khwarzami Institute of Computer Science), and University of Engineering and Technology Peshawar, entered a partnership with UNIDO to provide services of its faculty members as Consultant, who were trained by international experts of UNIDO and were engaged in the EnMS Implementation Program for 50 industrial units.

Besides EnMS training, the internationally acclaimed certified training such as “Certified Energy Auditor (CEA), Certified Energy Manager (CEM), and Certified Lead Auditor courses were conducted locally by foreign qualified trainers which produced a critical mass of newly learned energy professionals from Academia, who later served as consultants for industry and Trainers of Trainees (ToT) for other young students. These activities enabled academia staff to learn to do third-party energy audits and to help the industries in achieving international standards. This exposure has contributed in enhancing the skills and knowledge of the faculty members, students, and graduates at large, specially by getting knowledge of international standards and emerging market demands, which also contributed in better employment opportunities.

UNIDO through certified training under the Association of Energy Engineers AEE-USA, has been able to induce the interest of Academics and other

energy professionals to establish a local Chapter of AEE-USA. This chapter is registered with AEE USA and is the first RE and EE society in Pakistan, working solely to promote new ideas and concepts for industry.



UET Peshawar supported 10 UNIDO/GEF assisted Industrial Units

**ISO 50001**  
IMPLEMENTATION  
across KP & Balochistan provinces

TRAINED  
**625**  
PROFESSIONALS

TRAINED  
**30**  
WOMAN PROFESSIONALS



Dawood University modifies courses to include the concept of **ISO 50001:2018 Energy Management**

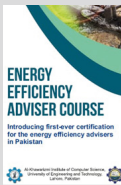
Students of Dawood University were engaged to conduct **Energy Audit**



NUST collaborates with industries for improvement & innovation in R&D. Energy Eyer is a product of such collaboration which is an Artificial Intelligence based Integrated Energy Management Systems for process industries in Pakistan, which is developed by a research team from the National University of Science and Technology (NUST).

I am immensely thankful to FSL Group of companies for facilitating and investing in this research and development which would help to bring the advanced technology on a national platform. I really appreciate UNIDO and Fazal Steel for joining hands with NUST for this wonderful initiative.

— Pro-Rector NUST, Air Vice Marshal, Dr. Rizwan Riaz, S.I. (M)



UNIDO's technical assistance adds value to the energy efficiency adviser course for industrial professionals at UET Lahore

From the industry's point of view, these linkages are a win-win situation. Their gain is large; research and development improve productivity which is cost-effective and efficient. Response from the industry on these linkages has been positive yet challenging. One of the biggest challenges is the unavailability of funds for R&D activities. This is where UNIDO catalyzed the situation through the REEE project funded by the GEF. With well-defined projects and measurable KPIs, the REEE project has benefited both the industry and academia. With this value-creating collaboration, UNIDO with the funding from the GEF has ushered in an era of academia and industry collaboration to start an inclusive and sustainable industrial development process.



## **UNIDO's contributions in boosting Energy Efficiency in the Industries in Pakistan through Energy Optimization Benchmarking**

UNIDO has conducted an analytical study to collate the received industrial first information data on the energy consumption patterns, trends, and development of benchmarks and other useful indicators of energy performance across the industrial sectors. The data has been captured into a framework to develop an understanding of the current state of energy performance in the industry in Pakistan, as well as to quantify energy efficiency improvements that were achieved through this project.

According to the baseline audits conducted in 50 industrial units under the Energy Management Programme, the total quantified recommended energy-saving opportunities were around 200 GWh per year, at an energy cost-saving potential of PKR 1.54 billion per year. After implementation of the Energy Efficiency Measures (EEMs), performance reports showed actual savings of 428 GWh per year (equivalent to the annual energy consumption of 955,000 Pakistani people), at an energy cost saving of PKR 3.8-billion per year. Thus, it was realized that the industry not only worked on the recommendations but also become sensitized and motivated to initiate their own additional interventions derived from these recommendations. Another factor in these extended savings was the use of alternative resources for energy generation. The percentage of EEM savings for the 50 sites was 8.1% of the total energy consumption baseline. The cumulative savings over the next 10 years due to these EEM implementations, was PKR 64 billion.

Among the total energy-saving measures from the 50 industrial units, four major energy sources were focused on, i.e., steam, compressed air, natural gas, and electricity. The most saved resource was natural gas consumption as 25.24% of natural gas was saved during the project. The others included 5.44% of electrical unit consumption, 2.26% of steam, and 5.68% of compressed air reduced.

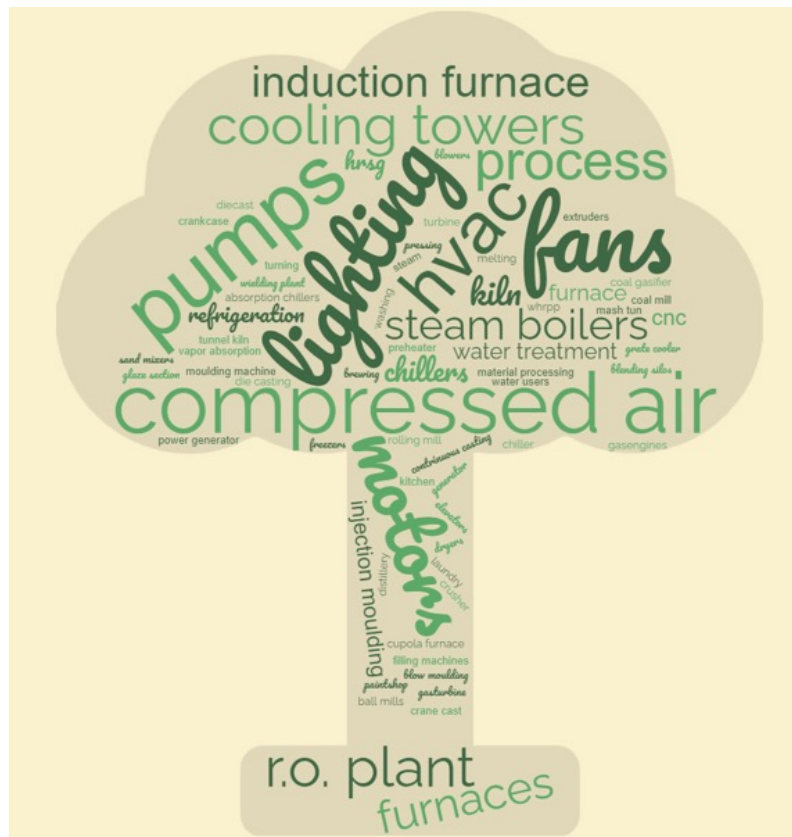


The implementation potential investment costs for EEM from the audit reports were PKR 3.26-billion per year, and actual implementation costs from the performance reports were PKR 3.09-billion per year. The implemented EEM savings realized a total simple payback of 0.87 years, ROI of 115%, NPV of PKR 9.69-billion at 12%, and an IRR of 112%.

The total implementation cost for all Energy Efficiency measures was PKR 2.417 billion. Here highest investment was made in Electrical Energy Efficiency measures (PKR 1,663 million), followed by Natural Gas EEMs (542.70 million PKR), steam EEM (PKR 125.61 million), and Compressed air EEM (PKR 85.07 million).

A total of 163,238 tCO<sub>2</sub>e GHG emissions were saved per annum from total emissions of 601,733,424 kWh eq units. The main reduction of GHG was possible from Natural gas-based EEM, as a saving of 83,524 tons of CO<sub>2</sub> emissions was possible, followed by GHG savings from Electrical EEM of 65,530 tons of CO<sub>2</sub> emissions per year. Steam and compressed air saving were able to reduce 13,704 and 480 tCO<sub>2</sub> emissions per year respectively.

The Significant Energy Uses (SEUs), a term from the ISO 50001:2018 standard, refers to energy systems or equipment consuming considerable energy or which is critical to plant operation. During the review of the audit reports, all SEUs per site were captured and are depicted in the below word cloud figure. For each site where a certain SEU is relevant, e.g., lighting, the size of the word in the word cloud increases.





## ISO 50001:2018 Energy Management System - implementation and certification: A step towards sustainability

### UNIDO benchmarks efficient use of energy in the industrial sector in Pakistan

For the first time in Pakistan’s industrial sector, United Nations Industrial Development Organization (UNIDO) promoted awareness of clean energy and the development of an international EnMS standard. UNIDO with its public sector partners bridged the gap in policy frameworks and mechanisms to promote and achieve improved energy efficiency in the industrial sector.

Launched by UNIDO, with funding from the GEF, the EnMS Program provided technical assistance to 50 energy-intensive industries across Pakistan, which helped to establish processes to improve energy performance. This assistance includes training, and international certifications including Certified Energy Auditor (CEA) and Certified Energy Manager (CEM), energy audits, grants, guidance on company energy policy, energy audits, EnMS implementation, etc. Consortia of 10 consultants, comprising energy management consultants, academia, and energy auditors, were formed to support these industrial units for EnMS implementation by enabling them in defining their scope, energy policy, conducting internal energy audits, and EnMs documentation, expert advisory services to address energy-related queries. UNIDO aligned the competencies of the consortia groups by organizing regular training workshops. This has enabled the industries

UNIDO IS PROVIDING  
TECHNICAL ASSISTANCE TO

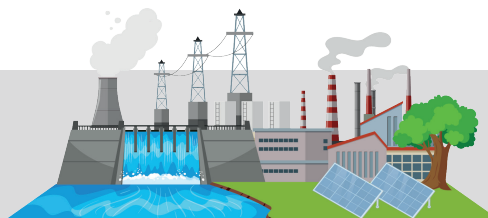
**50**

ENERGY INTENSIVE  
INDUSTRIES

THROUGH SUPPORT OF

**10**

CONSORTIA CONSULTANTS



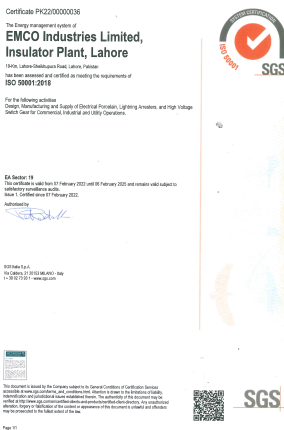
TO IMPROVE

**ENERGY PERFORMANCE**



to develop a continuous process of energy management within their organizations leading toward energy system optimization (SO).

UNIDO has successfully induced a momentum by creating a culture of EnMS and investments in RE and EE in Pakistan. Out of those 50 industries, 11 industrial units have further improved their clarity on energy performance concepts, have developed their policy for more efficient use of energy, set targets to meet that policy developed monitoring systems to measure energy losses, used their data for efficient energy use, and have successfully acquired ISO 50001 certification. These industrial units include Artistic Fabric Mills, Fazal Steel, Serena Hotel, Bulley Shah Packaging, Ebrahim Textile mills, United Refrigeration Ind., Power Cement, Iqbal Rice Mills, EMCO Industries, Dawlance Industries, and Crescent Textile.

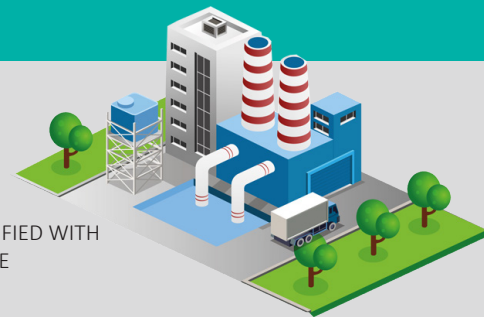


EMCO Industries Limited, Lahore, Pakistan is an ISO-50001:2018 certified company after successful implementation of “Energy Management System”. We have improved a lot from this project in terms of Energy Efficiency, saving potential, and reducing energy consumption. In our energy team, we have two ISO-50001:2018 certified lead auditors and our energy team is committed to work on energy optimization projects to enhance energy efficiency in the industry. It’s the start of a new era for us. We are thankful to UNIDO and the GEF for the continuous encouragement and support to implement the Energy Management System which has already shown unprecedented results in our industry.

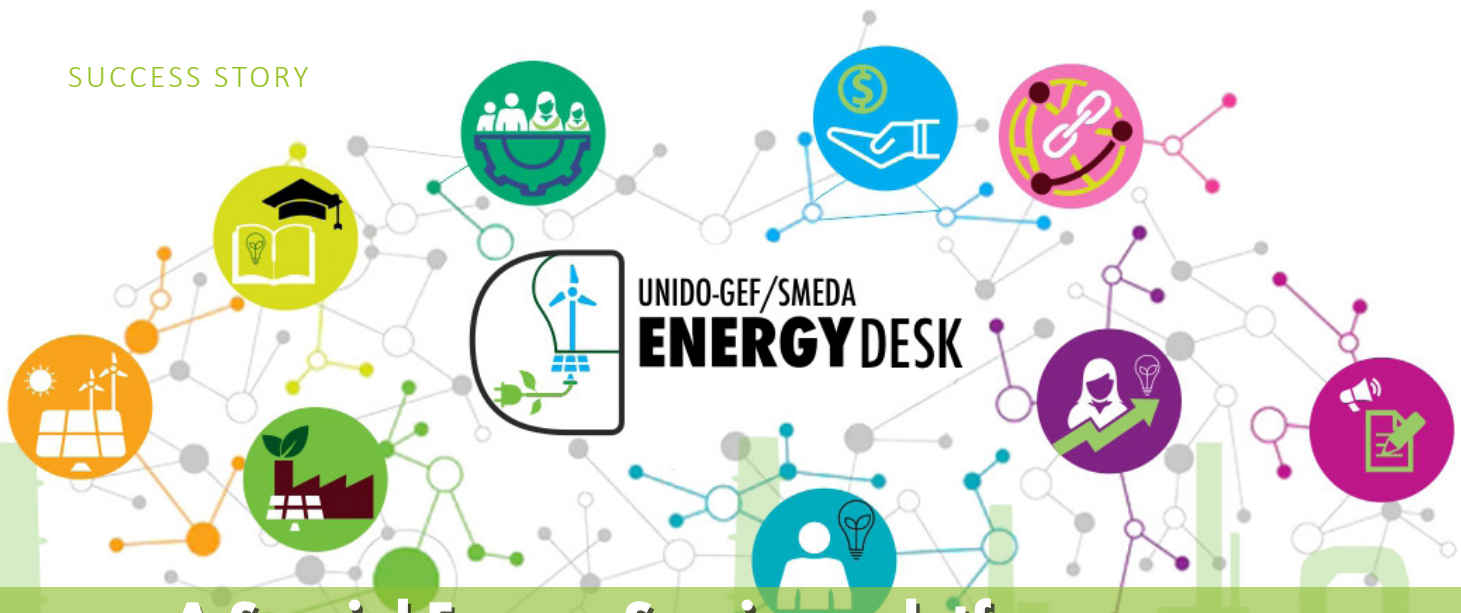


11

INDUSTRIAL UNITS ISO 50001:2018 CERTIFIED WITH UNIDO’S TECHNICAL ASSISTANCE



UNIDO created a snowball effect by supporting the industrial sector in Pakistan to adopt a systematic approach for achieving energy efficiency measures to reduce energy consumption, lower operational costs, and ultimately contribute to lowering GHG emissions. Thus, UNIDO is leading an industrial culture for productive use of affordable and clean energy technologies and gradually attaining Sustainable Development Goals.



## **A Special Energy Service e-platform established at “Small and Medium Enterprise Development Authority-SMEDA” for industrial sector SMEs**

Complying with the REEE project’s framework, the Energy Desk has been established in collaboration with SMEDA with the prime objective to provide a one-window platform to facilitate the promotion of RE and EE technologies and investments in small and medium enterprises in Pakistan. The primary aim of the Energy Desk is to counsel and guide the SMEs regarding the adoption of EE and RE technologies and provide information on market players including service providers, technology suppliers, financing facilities options, and regulatory updates.

### **Activities and Impacts**

The energy desk is a multi-purpose platform that is successfully serving SMEs through facilitating the following activities:

#### **Registering, Counselling, and Information dissemination:**

To reach out to the targeted audience which includes primarily SMEs and to develop their linkages with various organizations, the team of Energy Desk has interacted with relevant organizations including academia, chamber of commerce, and trade associations. Energy Desk has been introduced to 24 Punjab-based organizations that include five academic institutes, 11 Chambers of Commerce & Industry, and eight trade bodies until now, resulting in Network meetings with seven organizations including three Chambers of Commerce & Industry, one industrial association, and three academic institutes to discuss the mutual efforts for the promotion of Renewable Energy and Energy Efficiency technologies. As a result of linkage with Chambers, helpdesks were conducted at different Chambers of Commerce and Industries such as those of small cities of Sahiwal, Sheikhpura & Haripur.

Energy Desk portal disseminates information related to Renewable Energy and Energy Efficiency that includes training resource material, contact details of energy service providers & technology suppliers, technical guides, best practice manuals, and energy self-assessment tools. Overall, the contact information of 171 technology suppliers and 60 technical energy experts is available on the Energy Desk data management system portal until now.

### **Capacity Building:**

Energy Data Management System/ Portal has been developed and is fully functional. More than 1,100 visitors have already visited the Energy Desk (ED) portal. The Energy Desk Data Management System has more than 6,169 page views.

The training of Energy Desk Staff was conducted on operating ED Data Management System/Portal. For external stakeholders, 13 training sessions have been organized with more than 350 attendees.

### **Technical Assistance:**

The Energy Desk has responded to a total of 52 technical queries. Moreover, to enhance the outreach, Energy Desk conducted one-to-one interaction sessions (Help Desk) with SMEs in collaboration with the

Chamber of Commerce at Sahiwal, Sheikhpura, and Haripur to address the queries of small and medium businesses regarding the RE and EE. Commercial banks are also engaged in this activity to brief the SMEs about the financing options related to the adoption of RE and EE technologies.

### **Gender Mainstreaming:**

The energy desk is facilitating women entrepreneurs in training participation and adoption of EE and RE solutions. Energy Desk organized webinars conducted by women energy experts on

“Energy Saving Opportunities in Electric Motors” and “Energy Expert – A Promising Career for Women”. Moreover, two training programs were exclusively conducted for the women professionals which were attended by 23 participants.

### **Post-COVID Response Measures for SMEs ‘Recovery:**

SMEDA has surveyed to identify areas where SMEs require support to revive their businesses after the COVID-19 hit. In the light of the finding of this study, facilitation programs will be developed.



## The journey towards creating a competitive environment for energy improvements in the industrial sector in Pakistan

UNIDO has just completed a ground-breaking project through trailblazing initiatives to improve energy efficiency in Pakistan's industrial sector. With the continuing climate crisis and growing demand for energy, the REEE project has enabled progressive industry players to gain a special status in the country with its unique, innovative, and game-changing initiative i.e., implementing the EnMS.

Engaging progressive and energy-intensive industries to pursue energy efficiency, UNIDO provided technical support covering technical and financial aspects of Renewable Energy and Energy Efficiency Investments. Special training modules related to preparing bankable projects as well as appraisal methodologies for assessments of 50 industries in Pakistan were conducted. These industries dedicatedly worked together with the support of the UNIDO's consortia of consultants which includes academia, industries, and public sector organizations to achieve their collective goal i.e., implementing EnMS.

The industrial units progressed to various phases of implementation of EnMS. While many successfully implemented the Energy Management System, 11 industrial units achieved ISO 50001:2018 certification. UNIDO recognizes and acknowledges the effort of the industries and the consortia of consultants for extensive involvement in the implementation of Energy Management Systems.

One of the components of the project was creating a sustainable platform to motivate and incentivize the industries. UNIDO then involved the public sector organizations such as National Energy Efficiency and Conservation



Authority (NEECA) to collaborate in piloting an Energy Performance Awards scheme, which allows industries, consultants, and individuals engaged in energy management system implementation to compete. A very competitive criterion was set to assess both the process and the results; where process refers to the methods an organization adopts in implementing energy performance improvement; results refer to the organization's outcomes in achieving reducing energy costs.

In 2021, UNIDO announced the call for first-ever energy performance awards in Pakistan for four categories namely: best organization award - energy performance in industry, best consultant Firm Award-Energy service delivery (Energy Efficiency), best energy professional, and best woman professional in the energy sector. A large number of entries were received against all the categories which were closely scrutinized and assessed fairly and transparently during the judging activity spread over two phases. During phase I, the evaluation of applications was carried out based on information provided in the application along with evidence and documents by a panel of international experts. These experts selected the best performing candidates for phase II. In phase II, all the shortlisted candidates were given an equal and fair opportunity to present their performance using a predefined template. This phase involved experts from four relevant public sector organizations for the final assessment. The final results were determined using the accumulated scores of the two phases and were locked for energy performance awards.

## Energy Performance Awards in Industry



### Category-I:

Best Organization Award - Energy Performance in Industry

### Category-II:

Best Consultant Firm Award-Energy Service Delivery

### Category-III:

Best Energy Professional

### Category-IV:

Best Woman Professional in the Energy Sector

As a successful pilot scheme, UNIDO's Energy Performance Awards have set a platform for a regular national-level event to motivate the industrial sector to contribute toward a sustainable, clean, and green Pakistan.


# Sustainable Energy Initiative for Industries in Pakistan was aligned with







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INDUSTRIAL DEVELOPMENT ORGANIZATION

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