

IMPACT SHEET: Implementation of Resource and Energy Efficient Technologies in the Sugar Sector (IREET)

Sugarcane: Accelerating the transition towards a bioenergy circular economy in Pakistan



Promoting sustainable production of sugar through reduction in specific energy consumption of the sugar mill and consumption of bagasse by supporting sugar mills in the adoption of energy efficient and resource efficient technologies.



PROJECT BACKGROUND

Supporting the country in increasing the share of renewable energy in the production of energy, the EU SWITCH-Asia funded project Implementation of Resource and Energy Efficient Technologies in the Sugar Sector of Pakistan (IREET) started in 2018 and successfully concluded in 2022. The project aimed to promote sustainable production of sugar through improving sugar mills' energy consumption practices by promoting sustainable consumption of bagasse (renewable sugar mill waste). It achieved this by supporting sugar mills in adopting energy efficient technical innovations, resource efficient technologies, enabling access to finance for SMEs to invest into Resource & Energy Efficient (R&EE) measures, and mobilising public sector authorities for the formulation of a conducive regulatory regime for the promotion of R&EE in the sugar sector.

CHALLENGE

Inefficient technologies account for higher energy consumption and wastage of energy resource. For example, an average sugar mill in Pakistan consumes about 1250 MJ/ton, which is much higher compared to their Indian counterparts, which consume only about 935 MJ/ton. This translates to respectively higher emissions of greenhouse gases and also economic costs. The IREET project, therefore, sought to promote sustainable production and consumption of energy-sources (bagasse) in the sugar mills.

PROJECT OBJECTIVES

There is significant potential for upgrading the milling processes in the industry to save bagasse, which is generated as a by-product of the cane crushing process, from being burnt inefficiently as fuel in boilers. Approximately 70% of the bagasse produced is currently consumed by the sugar industry itself to meet its energy requirements. Bagasse consumption of sugar mills can be significantly reduced by introducing energy efficient technologies, adoption of best practices and appropriate retrofitting. The saved bagasse can be utilised for power generation, and subsequently exporting the surplus power to the national grid. This project targeted the provinces of Sindh, KPK, and Punjab in Pakistan.

The overall objective of the project was to promote sustainable growth, contribute to economic prosperity and poverty reduction, and mitigation of climate change by enhancing resource efficiency of the sugar sector through adoption of R&EE technologies.

Specific objectives included:

- Promotion of *sustainable production* of sugar, through reduction in specific energy consumption of the sugar mill;
- Promotion of *sustainable consumption* of bagasse (renewable sugar mill waste) by supporting sugar mills in the adoption of energy efficient (technical innovations), and

resource efficient (resource efficiency) technologies through technology standardization, enabling access to finance, and mobilizing of relevant public sector authorities for the formulation of a conducive regulatory regime for promotion of R&EE in the sugar sector.

TARGET GROUPS

- **PSMA:** The project set up a National Support Cell (NSC) in conjunction with PSMA for provision of support to the sugar sector stakeholders. The NSC was a first of its kind initiative by any Industry Association to work on capacity building of the sugar sector.
- **Sugar Mills:** The project prepared individual business cases for 50 sugar mills so that they may evaluate the business viability of R&EE technologies. It worked towards enhancing technical capacities of sugar mills to select R&EE equipment based on standardized technical specifications.
- **6 Solution Providers** had the opportunity to learn from the experiences of their international counterparts with regard to provision of precise R&EE solutions to the sugar sector. This not only increased their technical knowledge but also their management skills to manufacture R&EE equipment.
- **State Bank of Pakistan** - The project undertook risk assessment of EE measures in various industrial sectors such as Sugar, Cement, Textile, and Fertilizer to enable evaluation of such projects by commercial banks. The project worked with the SBP for provision of financing of resource and energy efficient projects.
- **Commercial Bank** – 16 Commercial Banks were appraised about the fiscal and ROI side of typical R&EE projects.
- **NEECA** The Project provided assistance to NEECA for the development of policy in the light of international best practices; NEECA has developed a draft national energy conservation policy and has sought feedback from relevant stakeholders in the government and private sector.

PROJECT ACTIVITIES

Establishment of a Conducive Regulatory Framework

- Establishment of Multi-Stakeholder Platform (MSP) for the promotion of R&EE based projects in the sugar sector
- Orientation of NEECA on regional best practices of R&EE measures in sugar production and their implementation
- Assist NEECA in the revision of the National Energy Conservation Policy to include R&EE initiatives in the sugar sector
- Conduct policy advocacy among sugar sector stakeholders and NEECA by carrying out awareness campaigns on the adoption and implementation of the revised energy conservation policy

Improved Access to Finance for SMEs

- Review of regional and international Clean Financing Instruments (CFIs)/schemes for R&EE projects
- Working with SBP for the development of financing & credit guarantee schemes for R&EE projects
- Training of 5 major FIs in Pakistan on carrying out risk assessment of R&EE projects
- Development of business cases for adoption of R&EE equipment for 50 sugar mills
- Facilitating financial closure for 10 R&EE projects

Enhanced Awareness & Capacity of Sugar Sector, Solution/Service Providers & Farmers

- Establishment of a National Support Cell (NSC) at PSMA, offering technical, financial and regulatory assistance to its members
- Detailed energy audits of 50 Sugar Mills to ascertain their R&EE saving potential, including LCA analysis and assessment of carbon footprint and its reduction
- In-depth energy audits for retrofitting of low-pressure boilers
- In-house trainings and capacity building of R&EE solution providers to develop standardized R&EE solutions for sugar mills
- Development of standardized technical specifications (STSS) based on regional best practices for R&EE equipment design and operation
- Development of case studies for 3 pilot R&EE measures implemented by sugar mills to show case their benefits
- Training of technical staff of sugar mills on technology selection based on standardized design
- Capacity building of service providers on regional best practices for undertaking energy audits of sugar mills
- Awareness raising of sugar mills on carbon footprint labels for promotion of low carbon trade
- Facilitate sustained supply of sugarcane through establishment of contracts between sugar mills and farmers

PROJECT ACHIEVEMENTS

- Avoidance of 600,000 tCO₂.
- Bagasse consumption brought down to 2.41 from 3.01 tonnes / ton of sugar.
- Steam-on-Cane ratio brought down to 46% from existing value of 52%.
- Water Consumption brought down to 0.675 from 0.75 m³ / ton of sugar.
- Overall energy consumption brought down to 12,360 MJ from 14,045 MJ/Ton of Sugar.
- Recommendation for National Energy Conservation Policy on recommendations to NEECA for the development of policy in the light of international best practices.

- Report prepared for R&EE Policy Implementation Challenges
- 50 Energy Auditing and Carbon Footprint reports Developed
- 50 Business Cases Developed for R&EE Projects
- 20 Boiler Retrofit Reports Prepared
- 16 FIs trained on carrying out risk assessment of R&EE projects
- 8 Service Providers trained on energy audits of R&EE equipment
- 6 Solution Providers trained on developing standardized R&EE solutions for sugar mills
- 30 Sugar Mills trained on technology selection based on standardized design
- 30 Organizations trained on carbon foot-printing along with benefits of carbon labeling
- Report prepared for Best Available Techniques for R&EE
- 3 Case Studies on R&EE Pilot Projects Developed

LESSONS LEARNED

It is important to highlight the impact of COVID-19 pandemic on the project as a whole and on specific activities and targets. The action laid the groundwork for the achievement of its objectives during the first two years of implementation; however, in the third year, during COVID-19, it faced several challenges. IREET, nevertheless, realigned its activities and resource allocation to achieve its objectives. Planned international visits had to be cancelled and were replaced with desktop-based studies. Furthermore, wherever possible, training workshops and seminars were conducted in hybrid mode (a mixture of on-line presenters and physically present attendees) to mitigate the impact of travel restrictions.

One of the biggest barriers to the adoption of resource and energy efficiency measures was the access to finance. The project worked with the SBP and developed a draft for a refinancing facility catering to resource and energy efficiency projects. The SBP later included financing of resource and energy efficiency projects into its existing facility.

Although a financing scheme now exists for R&EE projects, proper dissemination will be pivotal for widespread adoption of the scheme.





Qazi Sabir

Project Manager, Iqbal Hamid Trust



Although Pakistan's sugar sector is aware of resource and energy efficient technologies, its widespread adoption by the sugar sector has been hampered due to its lack of clarity of the associated costs and financial returns, lack of funding, perceived technological risks, lack of capacity of local technology providers, as well as regulatory issues, coupled with a non-responsive financial sector. IREET has addressed these barriers through technology standardisation, enabling access to finance, and mobilising relevant public-sector authorities for the formulation of a conducive regulatory regime for resource and energy efficient projects.



Khalid Hayat Khan

COO, Faran Sugar Mills Ltd



We are pleased that our sugar mill had been selected as a partner for the IREET project. I would like to express our appreciation for all the services of the project, especially for the several trainings and development of an in-depth energy audit report, carbon footprint report, and business cases for energy efficient measures in our sugar mill. We are also grateful for the technical, financial and regulatory services being provided to the sugar sector of Pakistan under the project.



Long-term project sustainability

The project undertook several measures to ensure its sustainability beyond the completion date. One of the main focuses of the project was to enhance the capacities of existing stakeholders, i.e., training of service providers on energy audits of R&EE equipment, training of FIs on carrying out risk assessment of R&EE projects, training of Solution Providers on developing standardized R&EE solutions for sugar mills, training of Sugar Mills on technology selection based on standardized design and carbon foot-printing. The project also worked extensively with NEECA and the SBP on the regulatory and access to finance fronts, ensuring that project activities promoting sustainable consumption and production practices will be extended in the future.

Project contributions to Climate Change Mitigation and SDGs



The project is fully aligned with **SDG 12** as sustainable production was the overarching theme of the project. Furthermore, **SDGs 9**, related to building resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation, served as the principal guiding vision for the IREET project.

The project contributed to achieving Sustainable Development Goals (SDGs), specifically **SDG 1** on poverty reduction, **SDG 2** on Clean Energy and **SDG 12** on responsible consumption and production. **SDG 1** is addressed by optimizing resource efficiency and thereby increasing the income of SMEs. **SDG 2** was addressed by increasing the up-take of investments in technologies to generate electricity by burning biomass which is a clean energy source.

Impacts at a Glance

Economic Impact	<ul style="list-style-type: none"> • Reduction of EUR 15/ ton of sugar from the baseline value • Increased demand of resource and energy efficient technologies • Fewer resources being utilized for production of Sugar • Sugar being produced with a lower carbon footprint
Environmental Impact	<ul style="list-style-type: none"> • Water consumption reduction from 0.75 m³ to 0.43 m³ per ton of sugar • Overall energy consumption brought down to 12,360 MJ from 14,045 MJ per ton of Sugar.
Climate Benefits	<ul style="list-style-type: none"> • 621,791 tCO₂/year avoided if all sugar mills adopt R&EE measures • 12% reduction in Energy Consumption
Green Finance	<ul style="list-style-type: none"> • 16 SME-investors engaged • 76 SMEs benefitted from better access to finance • Worked with SBP on development of a refinance facility for resource and energy efficiency
Target Group Engagement	<ul style="list-style-type: none"> • 10 Workshops and Dissemination Events • 50 SMEs engaged in project activities • Stakeholders engaged: Sugar Mills, Financial Institutions, Public Sector Authorities, Service Providers, Solution Providers
Policy Development	<ul style="list-style-type: none"> • Policy recommendation based on regional best practices put forward • Inclusion of Resource and Energy Efficiency Measures from the Sugar Sector in the Draft Revised Policy
Europe-Asia Cooperation	<ul style="list-style-type: none"> • All the SCP related knowledge and experiences were shared by the project at various forums (e.g., networking events held by the Network Facility)



FUNDING

EUR 1,436,160.00
(EU Contribution: 80%)



DURATION

Mar 2018 - Feb 2022



PARTNERS



Iqbal Hamid Trust (IHT)



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