The project promotes an increased uptake of high pressure technology (HPC) technology by the sugar sector leading to an annual reduction of more than 2 million tonnes CO$_2$, and helps increase the annual revenue of each of 85 sugar mills by EUR 8.38 million.
The electricity crisis in Pakistan has an adverse effect on employment. The shortage of electricity has resulted in industrial shutdowns and layoffs – creating social unrest in Pakistan industrial centres and productivity issues in the workforce. Moreover, due to increases in international fuel prices over the last 10 years, consumers are facing price increases of 400%. It is imperative to address these issues by ensuring a sustained supply of electricity at reduced costs to both industrial and domestic consumers. Increased uptake of environmentally friendly High Pressure Cogeneration (HPC) technology can reduce the energy price and lead to the development of a green economy and mitigation of climate change. Pakistan’s sugar sector has an annual availability of 4.4 million metric tonnes of bagasse, sugar mill waste. To generate heat and electricity for its energy needs, the sugar sector is currently using inefficient low pressure cogeneration systems, consuming 46% more bagasse compared to HPC.

**Objective**

*HP Cogen-Pak* seeks to promote sustainable growth, contribute to poverty reduction and support mitigation of climate change by enhancing the competitiveness and resource efficiency of the sugar sector through increased uptake of energy efficient and environmentally responsible High Pressure Cogeneration (HPC) technology. The specific objectives include:

- to promote sustainable production of energy, and export surplus electrical power to the national grid, through replication of existing HPC technology in the sugar sector, and
- to promote sustainable consumption of bagasse (renewable sugar mill waste) by supporting sugar mills in the adoption of HPC technology, through technology standardisation, enabling access to finance, and mobilising relevant public sector authorities for the formulation of a conducive regulatory regime for bagasse-based power projects.

**TARGET GROUPS**

- 85 small and medium-sized sugar mills
- Pakistan Sugar Mills Association (PSMA)
- 6 local technology providers
- State Bank of Pakistan (SBP) and 8 financial institutions
- National Electric Power Regulatory Authority (NEPRA)
- Alternative Energy Development Board (AEDB)
- Ministry of Water and Power (MoWP)
- Ministry of Climate Change

**Activities / Strategy**

- **Setting up a National Bagasse Support Cell**
  A self-sustaining National Bagasse Support Cell (NBSC) has been established at PSMA (currently housed by the project office, Lahore), which provides technical, financial and regulatory assistance to its members. It will take the lead in the development of standardised technical specifications based on regional best practice for high pressure equipment design and operation, and preparation of project implementation tender documents based on consultation among technology providers and sugar mills.

- **Building Local Capacities of the Sugar Sector and Technology Providers**
  Through the National Bagasse Support Cell, the project is conducting training sessions in Lahore, Karachi, and Islamabad for the technical staff of sugar mills. They are being trained on the standardised design of HPC, its benefits, how to evaluate different technological offers, and how to select the optimum system for their mill. In-house training programmes are also being provided to six local technology providers, which include a review of design procedure, material selection, fabrication methodology and commissioning procedures.

- **Improving Access to Finance for the HPC Technology**
  The project is working with the State Bank of Pakistan and local financial institutions (FIs) to improve access to finance for bagasse-based HPC systems. The FIs will be trained on bagasse-based power projects, project cycles, and the adoption of credit guarantee schemes into their existing investment portfolio, project risks and potential capital availability at the State Bank of Pakistan and international development institutions. Using financial toolkits developed by the project, the lead time associated with SME loan approval process can be reduced. A study tour to India for participating financial institutions is being organised to encourage peer-to-peer learning.

- **Contributing to a Conducive Regulatory Regime**
  The project is training and building the capacity of NEPRA officials on tariff determination, power generation, transmission and distribution. A comprehensive review is being undertaken of both international policy instruments and the existing policy framework in order to improve the national power policy for enhanced support of bagasse-based power projects. The results of this review will be shared with policy makers in MoWP and NEPRA to develop a conducive policy framework and its implementation at the national and local levels.
Scaling-up Strategy

Creating a Pool of HCP Experts
The National Bagasse Support Cell (NBSC), established at the Pakistan Sugar Mills Association (PSMA), will continue providing assistance to its members beyond the project. NBSC will have a pool of experts available to offer services on a commercial basis regarding various technical, financial and regulatory issues of HPC technology adoption.

Ensuring Affordable Financing Instruments for SMEs
The project identifies existing financial instruments to meet the financing needs surrounding HPC technology and creates linkages between 85 SMEs and five financiers, increasing the total share of SMEs with HPC technology implemented.

Developing Detailed Business Cases for HPC Uptake
The project provides assistance to the sugar sector by preparing detailed business cases for the development of allied industrial units which are electricity intensive (e.g. steel mills, foundries, etc.). Sugar mills can thus evaluate the business viability of HPC technology, adding to their own capacity to look for and identify business opportunities outside conventional sugar milling. This additional activity will create new job opportunities.

Conducting Policy Advocacy
The project facilitates policy advocacy amongst sugar sector stakeholders, NEPRA, and Distribution Companies (DISCOs). By establishing the Private Power Infrastructure Board (PPIB) within the premise of Ministry of Water and Power (MoWP), the project facilitates a multi-stakeholder platform for the public and private sectors.

Pakistan sugar sector is aware of HPC technology, however, its widespread adoption by the sugar sector has been hampered due to its high upfront cost, perceived technological risks, lack of capacity of local technology providers, as well as regulatory issues, coupled with extended licensing period and a non-responsive financial sector. The project addresses these barriers through technology standardisation, enabling access to finance, and mobilising relevant public sector authorities for the formulation of a conducive regulatory regime for bagasse-based power projects.

Mr. Omar M. Malik,
Project Director,
Iqbal Hamid Trust
Results

**Significant Reduction in GHG Emissions**
As a result of an increased use of HPC technology by sugar mills, the saved bagasse can be used for electricity generation and grid export resulting in an overall reduction in GHG emissions. The impact of this renewable energy in the predominantly fossil fuel based national grid of Pakistan is further strengthened by the sugar mills that also use the green energy generated. The adoption of HPC technology by 85 sugar mills will lead to a considerable annual reduction of 2.1 million tonnes CO2 equivalent.

**Increased HPC Market Share and Annual Revenue of Sugar Mills**
An increased total share of HPC technology is realised through the improved capacity of 3-5 local technology providers and 85 small and medium-sized sugar mills, combined with the established linkages between the SMEs and five financiers. Business linkages are also established between local and Indian technology manufacturers, as HPC is a mainstream technology in the Indian sugar sector. It is estimated that, annually, the project will increase the revenue of the 85 sugar mills by an average EUR 8 million per sugar mill from electricity export and a gain of EUR 494 million to the national exchequer from HFO (Heavy Fuel Oil) import savings annually. This revenue is corresponding to supply of 20 MW power to the grid for 165 days of operation at 12 PKR/kWh (EUR to PKR exchange rate taken as 114 EUR/PKR).

**Established a Conducive Financial Environment for HPC Projects**
The level of trust among the project financiers, i.e. State Bank of Pakistan (SBP), international development banks and commercial banks, on the financial and environmental benefits of HPC technology has been increased, resulting in availability of streamlined and less costly project financing opportunities. For instance, the project assisted in revision of the SBP Renewable Energy Refinance Scheme under which financing is provided to interested developers at a 6% interest rate (as compared to an average interest rate of 12%). The revised financing scheme is available at: http://www.sbp.org.pk/smefd/circulars/2016/C3.htm. This will further convince sugar mills to switch to HPC technology.

**Improved HPC Policy Framework through Multi-stakeholder Platform**
Together with Alternative Energy Development Board (AEDB) at the Ministry of Water and Power (MoWP), the project established a multi-stakeholder platform with representatives from the public and private sectors. Led by MoWP, this platform represents the first of its kind in Pakistan, a public-private partnership in the power sector, which will support the national replication of best practice of high pressure technology. Furthermore, a working paper highlighting the impediments in the uptake of HPC technology by the sugar sector provides recommendations for policy level stakeholders to assist increased uptake of the technology.
## Impact in Numbers

### Economic Impact
- EUR 8.38 million saved per SME per year on average for 85 sugar mills adopting HPC technology.
- Additional business opportunities for technology providers (Heavy Mechanical Complex (HMC), The Industrial Enterprises (TIE), Descon Engineering, Fabcon Design & Engineering, Karachi Shipyard) in the sugar sector.
- Created business links for small local companies related to civil works, piping and utilities.
- Due to increased uptake of HPC technology, bagasse is now considered as a commercial product of sugar mills.

### Environmental Impact
- Compared with low pressure technology, HPC technology consumes 45% less bagasse thus increasing resource and energy efficiency.
- HPC saves 60 m$^3$ water per hour for 120 days of crushing season, which equals to 172,800 m$^3$/year for a single HPC plant with a capacity of 30 MW.
- HPC technology reduces waste water discharge.

### Social Impacts
- Created 55 new jobs per sugar mill, on average. This offers job opportunities for local communities.
- Sugar mill staff is trained on operation and maintenance aspects (including environmental aspects) and HP systems.

### Climate Benefits
- The adoption of HPC technology by 85 SMEs is expected to achieve a reduction of 2.1 million tonnes of CO$_2$ equivalent per year.
- The average CO$_2$ reduction per sugar mill is 25,000 tonnes of CO$_2$.
- Promoted renewable energy in Pakistan since the carbon-neutral electricity produced by HPC systems is exported to the national grid.
- The project provides Clean Development Mechanism (CDM) training to sugar mills.

### Green Finance
- The project engaged with the State Bank of Pakistan (SBP) and at least eight financial institutions to identify new financing schemes for SMEs acquiring HPC technology.
- The project supported the State Bank of Pakistan in revising its Resource Efficiency (RE) Financing Scheme which offers soft loans to sugar mills at 6% interest rate as compared to average lending rate of 10 to 12%.
- At least 16 SMEs benefitting from better access to finance.
- Maximum refinance up to PKR 6 billion (EUR 55 million) per project, i.e. sufficient financing is available for implementation of large scale projects.
- Revised RE refinance scheme has been introduced by the State Bank of Pakistan. Increasing numbers of HPC installation projects are submitted under the revised policy; SBP has so far received 16 applications.

### Target Group Engagement
- The project engaged with 55 SMEs and conducted assessments resulting in 25 pre-feasibility reports for sugar mills and 10 detailed feasibility reports, which helped to plan appropriate configuration and feasible size of an HPC plant as well as finance requirements, payback and legal requirements.
- Involved 16 stakeholder groups:
  - Private Sector: sugar mills, Pakistan Sugar Mills Association, Pakistan Society of Sugar Technologists (PSST), financial institutions, donors, expert groups
  - Public Sector: AEDB, NEPRA, MoWP, MoCC, SBP, EPA, CPPA, NTDC, Distribution Companies (DISCOs), technology providers
- 2 capacity building programmes for regulators (NEPRA), and 2 training programmes for 6 local technology vendors.

### Policy Development
- Involved policymakers in dialogues with the representatives from SBP, AEDB, NEPRA, DISCOs, boiler manufacturers, EPC (Engineering-Procurement-Construction) contractors and sugar mills to create an enabling environment for an increased uptake of HPC technology.
- Conducted 2 dissemination seminars on the State Bank of Pakistan’s revised RE Financing Policy to sugar mills and banks.
- Policy recommendations put forward:
  - Revision of spread share between SBP and commercial banks;
  - Revision of upper cap for single RE project (PKR 6 billion / EUR 55 million);
  - Recommendation to increase the upper limit for capacity of RE projects to 50 MW.

### Europe-Asia Cooperation
- The project published a joint publication with Climate and Development Knowledge Network (CDKN) titled “Catalysing leadership on efficient bagasse processing – A Case Study on Pakistan Sugar Industry.”
OBJECTIVES

The project promotes sustainable production of energy through replication of existing High Pressure Cogeneration (HPC) technologies in the sugar sector and sustainable consumption of bagasse by supporting sugar mills in the adoption of HPC technology.

DURATION

02/2014 – 02/2018

PROJECT TOTAL BUDGET

EUR 2 161 785
(EU contribution: 79.80%)

PROJECT CONTACT

Iqbal Hamid Trust
19 Davis Road, Lahore, Pakistan

Mr. Omar M. Malik
Tel.: +92-423-6313235/6
Email: omar.malik@ihtpk.com

PARTNERS

Iqbal Hamid Trust (IHT), Pakistan
sequa gGmbH, Germany
The Energy and Resources Institute (TERI), Pakistan
Pakistan Sugar Mills Association (PSMA), Pakistan