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Reduced availability of gas for power generation led to frequent and prolonged power outages across the country, especially during the peak summer months, adversely affecting productivity in the agriculture sector, as well as in small and medium industries that do not have an alternate power supply.



INDUSTRIAL BEST PRACTICE BENCHMARKING IN BANGLADESH

INTRODUCTION

A well-functioning energy efficiency marketplace requires industries to understand the return on investment (ROI) for energy efficiency improvements and for banks to view them as attractive financing opportunities. Individual improvements vary in cost, achievable savings, and payback periods. However, industries can balance out higher investment costs and achieve significant energy savings by implementing a combination of capital and operating measures together. Grouping technical best practices into portfolios also builds a strong case for investment, reduces transaction costs, and reflects the volume and depth of the opportunity that energy efficiency presents.

In 2012, USAID EECDP conducted an industrial energy efficiency opportunities assessment in Bangladesh on the four major sectors with the greatest potential to show energy savings opportunities: textiles, jute manufacturing, frozen food processing, and steel re-rolling mills. The project developed interventions to foster a critical mass of successful energy efficiency projects that provide evidence of the business case for efficiency in the industrial sector and address identified implementation barriers for cost-effective measures. This was done to strengthen capacity across the target industries to develop energy efficiency project business cases, sell these business cases to management, and then successfully apply to banks for financing, if needed. The project also set out to strengthen capacity within the Bangladesh banking sector to effectively support financing in the industrial sector for energy efficiency, as well as within the service provider sector to develop and deliver successful energy efficiency projects.

Framework Overview

I. Select industrial sectors with opportunities for energy efficiency improvement

Bangladesh is currently experiencing energy shortages due to declining natural gas resources, the inability of generation to meet demand and rapid economic growth. Industries are one of the largest consumers of natural gas and electric energy in Bangladesh. The project initially profiled eight of the top energy consuming industrial sectors in Bangladesh (textiles, jute manufacturing, frozen food processing, steel re-rolling mills, fertilizer, leather and leather goods, tea and ceramics), four of which were selected for energy efficiency benchmarking based on:



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Opportunities to Improve Energy Efficiency

The Bangladesh study showed manufacturing plants to be following only 20 to 75% of technical best practices (TBP) for energy efficiency in their local industry; leaving significant opportunity to lower energy costs.

- Jute Manufacturing: <30% TBPs
- Textile Manufacturing: <55% TBPs
- Frozen Food Processing: 20-45% TBPs
- Steel Re-Rolling: 30-75% TBPs

- Importance to the Bangladesh economy
 - Selected sectors were all major contributors to the countries' GDP.
- Critical sector characteristics
 - Selected sectors had high energy use, were privately owned and export-oriented.
- Public availability of sector data
 - Development of initial sector profiles required publically available data on energy use, demographics (including plant location, size and production output), and expected sector growth.
- Access to sector leads and plant owners
 - All selected sectors had strong industrial associations facilitating access to plant owners.

2. Recruit Industry Partners

After selecting four sectors for further analysis (textiles, jute manufacturing, frozen food processing and steel re-rolling mills), outreach was conducted to select plants for the pilot that were representative of:

- Energy end use profile and implementation of best practices for each sector.
- Small and medium enterprises (SME) and large industry (where size is defined by production volume) for each sector.

3. Perform integrated energy performance benchmarking and savings potential analysis

A “best practice library” of generic building-related efficiency measures was previously developed for buildings in North America. The measures, associated costs and energy savings were modified to fit Bangladesh buildings and climate. A second process-specific best practice library of energy efficiency measures was developed for each of the four industries using local sector data. Once complete, the best practices were used to assess participating facilities in order to:

- Develop baseline energy use profiles and benchmark their performance
 - Enables comparison of plants with the overall industry performance indicators.
 - Provides an overview of how well a particular industrial sector is managing energy.
- Determine energy efficiency and conservation best practices
 - Assess number of best practices used compared to all feasible best practices.
 - Project energy consumption if all technically feasible EE and conservation measures were used in processes, equipment and buildings compared to a Reference Case.
- Determine technical savings potential scenario
 - Estimate savings that would occur if all technically feasible EE and conservation measures were used in processes, equipment and buildings compared to a Reference Case.
 - The technical savings potential scenario estimates that the annual fuel cost savings for 2020 would be 15,157 Million BDT (Bangladeshi Taka).
- Prepare a cost-benefit analysis for the potential opportunities
 - For the most promising practices, define the associated investment costs and evaluate the benefits against the costs.





The Financial Performance Metrics Results

- Investment required: Overall capital cost requirements identified for portfolios of efficiency projects, across all 4 industry sectors, ranged from about \$2.7 to \$75 million USD. The financed cost ranges from \$6 - \$217 million USD.
- Return on Investment (ROI): The analysis shows very attractive ROIs for the portfolios, primarily due to the stream of benefits from the portfolios which will, in most cases, continue after the financing debt has been retired.
- Typical financing terms: The discounted payback acts as a proxy for the number of years it would take to retire a bank financed project. Generally, it suggests that financing could be structured around terms of 2 to 13 years or less, based on 100% debt financing. The financing terms would be shorter if companies committed internal capital for a portion of the investment.

4. Evaluate implementation rate of energy efficiency best practices in each industry

The integrated energy performance benchmarking analysis resulted in the identification of 15 generic TBPs for EE improvements and eight additional sector-specific measures. Using these measures as a comparison, plants were surveyed to gain insight on the degree to which these sectors are employing EE management best practices. The surveys indicated that:

- The jute manufacturing sector has the largest potential to increase implementation of TBPs as none of the plants have implemented more than 30% of the available opportunities.
- The textile manufacturing sector has a maximum of a 55% implementation rate of the technically feasible opportunities.
- The steel re-rolling sector has the largest implementation range. The best performing plant(s) have implementation of 75% of the technically feasible opportunities, whereas more than half of the plants have implemented less than 30% of EE opportunities.
- The frozen food processing sector plants range from 20% to 45% implementation of technically feasible opportunities.

5. Determine financing intervention frameworks and strategies

Financing is often needed to implement high-cost high-return energy efficiency measures. The study developed “bundles” of bankable projects that combined low-cost quick-return opportunities with higher-cost long-term investments. When packaged together for financing, they became more attractive investments to banks and other financial institutions. To determine the capacity of the manufacturing and finance sectors to take advantage of the documented energy cost savings opportunities, outreach was conducted to:

- Assess the barriers impeding EE up-take
 - Companies lack access to credible energy efficiency service providers to provide quality implementation services.
 - Senior decision-makers in companies lack the information, knowledge and tools to make informed judgements to approve EE projects.
- Assess the financial sector
 - The lack of energy efficiency knowledge in the Bangladesh banking sector is a major impediment to EE financing.
 - Companies and plants in the four sectors do not have sufficient capacity and expertise to build and sell the business case for EE investments to investors.
 - Some financing for EE projects is available through domestic, international and regional donor programs.

Project Accomplishments

- Developed energy performance benchmarking and savings potential analysis on four key sectors in Bangladesh, textiles, jute manufacturing, frozen food processing and steel re-rolling mills
 - Jute manufacturing had the greatest opportunity for implementing best practices as no more than 30% of TBPs were in place in plants.
 - Frozen food processing had the lowest opportunity with 45% of TBPs in place.





Energy Savings Potential by Sector

- Textile manufacturing: the largest potential savings are associated with the boilers (38% of total energy savings) and the textile processing (30% of total sector energy savings).
- Steel re-rolling: majority of savings are associated with furnaces (56% of total sector savings).
- Jute: energy lost due to captive power generation accounts for 55% of the sector's potential energy savings; process specific end use accounts for about 20% of the total sector energy savings.
- Frozen food processing: sector HVAC and cooling/refrigeration each accounts for close to 20 % of total sector savings.

- Identified 15 generic TBPs for EE improvements and eight additional measures for each sector that were specific to sector manufacturing processes
 - If all the TBPs were implemented, the four selected industrial sectors' projected total energy use in 2020 would be 181.3 million GJ, or 20 percent (45.4 million GJ) less than projected energy use under the Reference Case.
 - The associated annual reduction in GHG emissions would be 2.83 million tonnes CO₂e, and the annual fuel cost savings for 2020 would be 15,157 Million BDT.
- Prepared cost-benefit analysis for the potential opportunities in the four sectors
 - The textile and steel re-rolling sectors had the most cost-effective process-specific measures.
 - The jute and frozen food sectors were not as economically feasible and showed longer paybacks, respectively.
- Assessed market barriers that prevent EE implementation
 - Opportunity for a variety of activities to change current business culture and practices, including targeted donor activities and promotion of public-private partnerships.
 - Improved outreach to banks and education on the financing opportunity provided by EE projects will increase likelihood of financing opportunities.

Recommendations for Replication and Scaling-up

- Develop training, technical assistance tools and case studies for how to select and implement appropriate TBPs
 - Companies require expertise to identify the technical feasibility of EE opportunities.
 - Senior decision-makers in companies need information, knowledge and tools to make informed judgements to approve EE projects.
- Public recognition can expand outreach and accelerate energy improvements
 - Development of government standards, regulations and “green” awards can foster rapid adoption of energy improvements and mobilize capital to fund projects.
 - Public support of sustainable initiatives can potentially increase product prices and export rates for “sustainably produced” products and can encourage other sectors to participate.
- Establish pathways to address barriers that prevent EE implementation
 - Educate banks on the background and importance of EE projects to increase the likelihood of project financing.
 - Train plant owners on how to build and sell the business case for EE investments to investors.
 - Coordinate with other donor groups to ensure targeted funding through the entire lifecycle of EE projects.