सूक्ष्म, लघु एवं मध्यम उद्योग
MICRO, SMALL & MEDIUM ENTERPRISES

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

GLOBAL ENVIRONMENT FACILITY
INVESTING IN OUR PLANET

ENERGY IS LIFE
CONSERVE IT
Bureau of Energy Efficiency

Ministry of New and Renewable Energy

# "Promoting Energy Efficiency and Renewable Energy in selected MSME clusters in India"

With an aim to develop and promote a market environment for introducing energy efficiency and enhanced use of renewable energy technologies in process applications in the selected energy-intensive MSME clusters, United Nations Industrial Development Organization (UNIDO), in collaboration with Bureau of Energy Efficiency (BEE), is implementing a project titled "Promoting Energy Efficiency and Renewable Energy in selected MSME clusters in India" funded by Global Environment Facility (GEF) and co-financed by Ministry of Micro, Small and Medium Enterprises (MoMSME) and Ministry of New and Renewable Energy (MNRE). The project supports MSME units in implementing various energy conservation measures and thus result in reduced energy consumption and Green House Gas (GHG).

**A GEF-UNIDO-BEE Project**

## Electricity Generation by Installing Back Pressure Turbine

### Company Profile

**Sumul Dairy** or The Surat District Co-operative Milk Producer's Union Ltd., located at **Surat, Gujarat,** is one among the 17 district unions which acts as manufacturing units of dairy products for Gujarat Co-operative Milk Marketing Federation Limited, the marketers of 'Amul' brand of products.

### Objective

Utilization of excess pressure energy available in steam to generate electricity

### Intervention

Installation of back pressure turbine in steam line to produce electricity instead of using Pressure Reducing Valve (PRV) to reduce high pressure to low pressure.

### Outcomes

- Electricity generated: 400 kWh /day
- Monetary savings: ₹ 12.41 lakhs/annum

**Activity implemented by unit, disseminated by project**

### Principal

- The plant is generating steam at a pressure of 8 to 17.5 kg/cm$^2$ depending upon boiler size and steam is being used in different processes at different pressures. Generally the plant installs Pressure Reducing Valve (PRV) to reduce the high pressure steam to low pressure steam. Due to PRV, a significant amount of useful energy is lost during the conversion from high pressure to low pressure steam.
- Back Pressure Turbine (BPT) can be used as alternative to PRV, where useful energy available with high pressure steam can be converted into electricity and also generate low pressure steam (There is a small amount of enthalpy drop in steam, but the quantity is negligible).

### Implementation

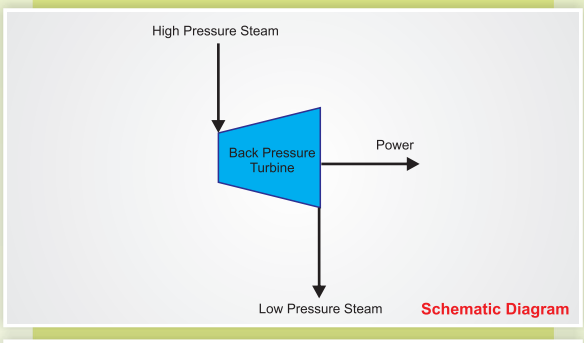
- Except powder plant and some small processes, the actual steam pressure requirement in the dairy is 3 kg/cm$^2$.
- The plant has installed back pressure turbine in low-pressure process steam line (10.5 kg/cm$^2$) header to produce electricity and reduce steam pressure to 3 kg/cm$^2$ in place of pressure reducing valve.

## Cost-Economics

| | |
|---|---|
| Boiler capacity | 10 TPH |
| Fuel | Natural gas |
| Input steam pressure to the BPT | 10.5 kg/cm$^2$ |
| Output steam pressure from the BPT | 3 kg/cm$^2$ |
| Average electricity generation by BPT | 400 kWh/day |
| Total generation per annum | 146000 kWh |
| Cost of electricity | ₹ 8.50/kWh |
| Nos. of working of days per annum* | 360 days |
| Expected savings per annum | ₹ 1241000 |
| Investment | ₹ 3350000 |
| Payback period | ~ 33 Months |

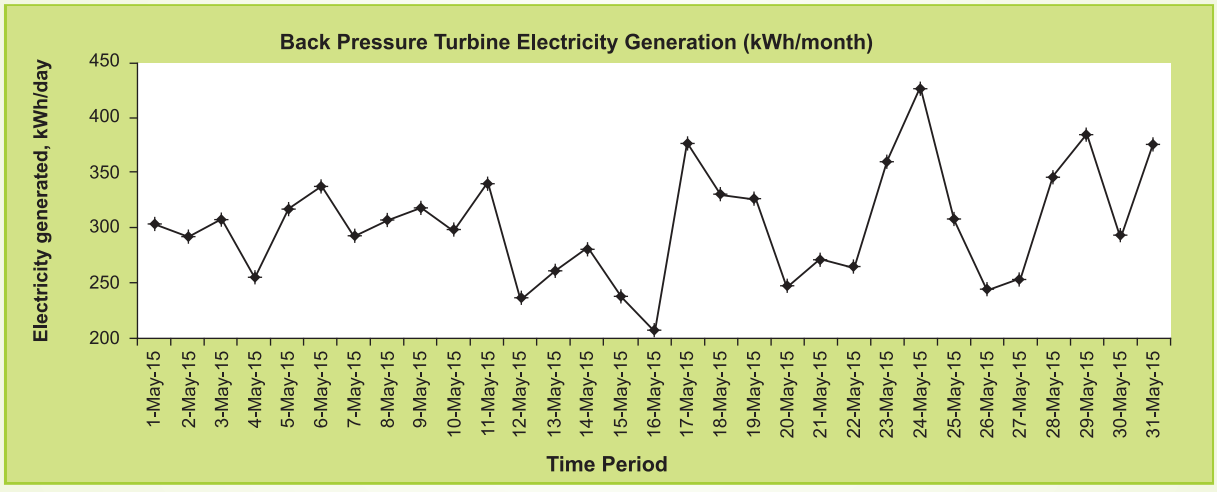
** Assumption*

### Back Pressure Turbine



Schematic Diagram


BPT installed in plant




## RESULTS

Efficient way of converting high pressure steam to low pressure steam and also utilizing useful energy content in steam

With the help of BPT, around **146000 kWh/annum** electricity generated worth **INR 12.41 lakhs.**

Also helps to reduce **120 tonnes of $CO_2$** emission/annum.

## Replication Potential

- This type of measure can be implemented where PRV is being used for reduction of high presure steam to low presure steam
- BPT technology is very well proven and there is no risk involved in implementation of this measure but it is advised to assess the suitability of BPT to the field conditions

## CONTACT DETAILS :

**Unit:**
Sumul Dairy (The Surat District Co-operative Milk Producer's Union Ltd.)
Surat, Gujarat - 395008
Contact Person : Mr. J. P. Ganatra
Mobile: +91 9979888020
E-mail: jpg@sumul.coop

**Cluster Leader:**
Mr. Falgun Pandya
Cluster Leader,
Gujarat Dairy Cluster,
GEF-UNIDO-BEE Project
E-mail: falgun.bee@gmail.com
Mobile: +91 9925190741

**Bureau of Energy Efficiency**
GEF-UNIDO-BEE PMU
Project Management Unit
4th Floor, Sewa Bhawan, Sector-1,
R. K. Puram , New Delhi 110066.
T: 011-26179699;
E-mail: gubpmu@beenet.in

**United Nations Industrial Development Organization**
Mr. Sanjaya Shrestha
Industrial Development Officer
UNIDO
E-mail: s.shrestha@unido.org