UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

وزارة الصناعة والتجارة الخارجية

Solar Heating in Industrial Processes (SHIP) Project

The project "**Utilizing Solar Energy for Industrial Process Heat in Egyptian Industry**" is financed by the GEF and implemented by UNIDO in partnership with the Egypt National Cleaner Production Centre ENCPC. The objective of the project is to develop the market environment for the diffusion and local manufacturing of solar energy systems for industrial process heat. The project results will increase the knowledge and strengthen the awareness among the major stakeholders on the penetration potential of solar technologies in the food, chemical and textiles sectors in the region. The project focuses on improving the energy efficiency of the industrial process heating systems and the introduction of solar thermal technologies mainly in industrial companies that have low and medium temperature heat demand in three industrial sectors, namely the food, chemical and textiles sectors.

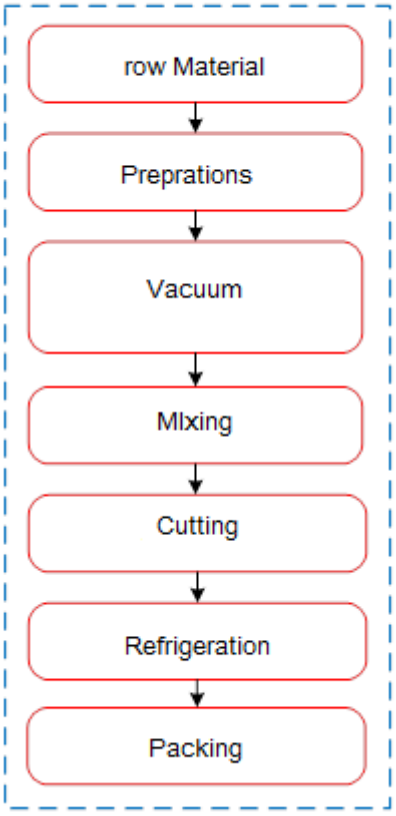
Horreia 2000 Co. Case Study

10th Of Ramadan Industrial zone

Food Sector **Candies**

8,500 Ton/year

2,385,865 kWh/year



Production Processes Flow Diagram

The Horreia 2000 food industries company is a stable company with a long history and good local and regional market share for over 40 years. Some production lines are old while several production lines have been renovated or added in the last 20 years. There exist several opportunities for energy saving in addition to the potential of integrating renewable energy to save fuel, electrical energy and reduce carbon emissions. The energy audit to the Horreia 2000 Food Industries Plants in the 10th of Ramadan industrial zone B2 was carried out with complete cooperation of the Plant management and technical staff. The audit included visual inspection, thermal measurements in utilities and production lines, discussions with plant manager and responsible engineers who availed most of the data needed for the energy balances. The plant in composed of 2 building locations across the street including Plant P1 and Plant P2.

The existing steam system in the factory is supplied through **Two steam boiler with capacity of 2 TPH at 6 bar & 5 TPH at 8 bar.**

- Optimization Opportunities -

Thermal Insulation

Boiler optimization

Waste Heat Utilization

Solar Water Heating

Thermal Insulation

Insulation of pipes, tanks, fittings, and machines is a general principle that should be applied in all steam consuming processes in the factories. Insulation needs to be fixed at multiple parts of the steam system. The collective saving from proper insulation is usually enormous. Insulating steam pipes will help **to reduce energy consumption**, **CO_2 emission**, and **operation costs**. **safety will be enhanced** after **reducing** surface Temperature.

Capex: 5,600 **USD**
Energy Savings: 481,000 **kWh/year**
Payback: 1.25 **years**
CO_2 Reduction: 64 **tCO_2/year**

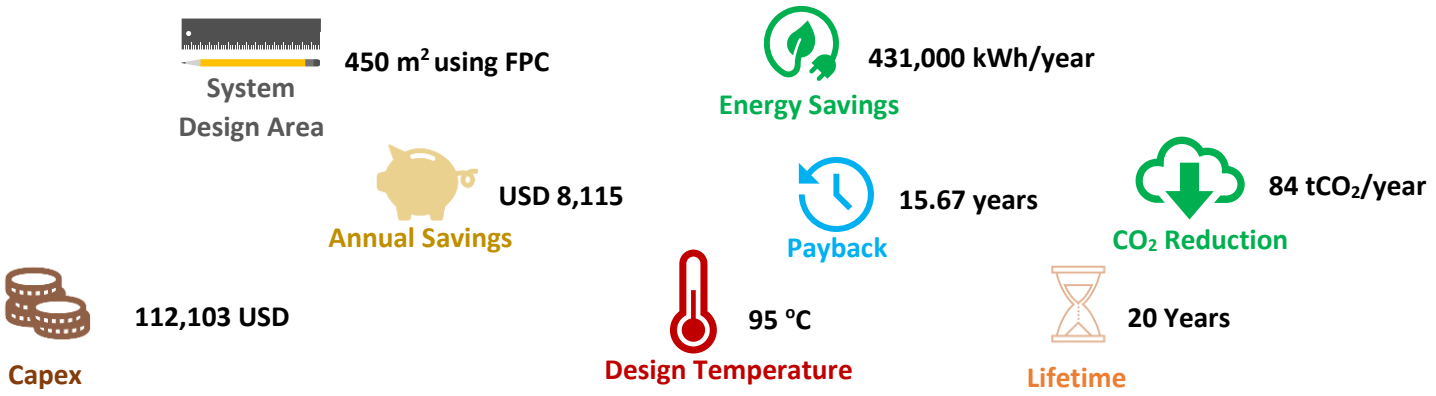
Recover Heat from Exhaust Gases

There is high potential to utilize the waste heat from chimney of the steam boiler. The temperature of the flue gases in the chimney is as high as 140 °C therefore heat can be recovered. The **proposed solution** will **Preheat the inlet feed water** for the steam boiler. Besides the savings showed below.

Capex: 28,571 **USD**
Energy Savings: 481,000 **kWh/year**
Payback: 4 **years**
CO_2 Reduction: 90 **tCO_2/year**

Integration of Solar Thermal Heating System

Solar heating technologies collect thermal energy from the sun and this heat can be used for heating purposes. Solar collectors are selected based on the range of the operating temperature range and the type of the industrial sector. Heat in the lower temperature range (<80 °C) can easily be provided with systems commercially available, such as flat plate collectors (FPC) and evacuated tube collectors (ETC). The **scenario envisioned** for the factory is to **preheat water** which will decrease the energy consumed by the boiler. The system will be **installed on the roof** occupying **450m²** of area. The system is designed to **heat to 95 °C**. The **system cost** is around **USD 122,103** and the **annual savings** will be **USD 8,115**. With lifetime of **20 years**, the **total savings is USD 162,300**. Other parameters are shown below.



Lessons Learnt

- **Thermal insulation is a quick win. It saves energy with very low upfront costs and have high impact a low payback**
- **Waste gas utilization is not a common measure, however highest energy saving can be achieved by this measure**
- **Solar thermal integration combines renewable energy resources utilization and energy savings measures**

The **total proposed solutions** summary:

- **Thermal Energy Savings:** up to 1,393,000 **kWh/year**.
- **Financial Savings:** 19,355 **USD/year,**
- **Capital Cost**: 146,724 **USD**,
- **CO_2 Emissions Reduction:** 238 **tCO_2eq/year**.

SCAN ME

SOLAR Heating for Industrial Process
Together Toward Efficient Production

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