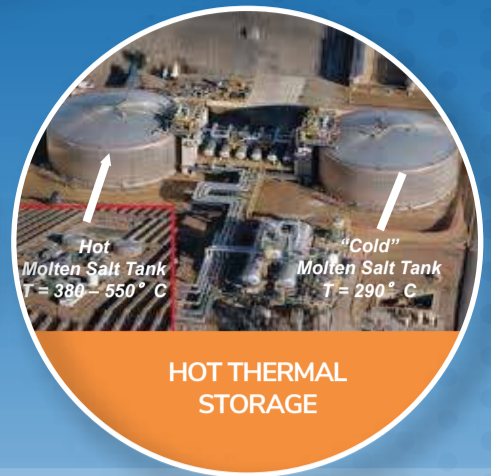
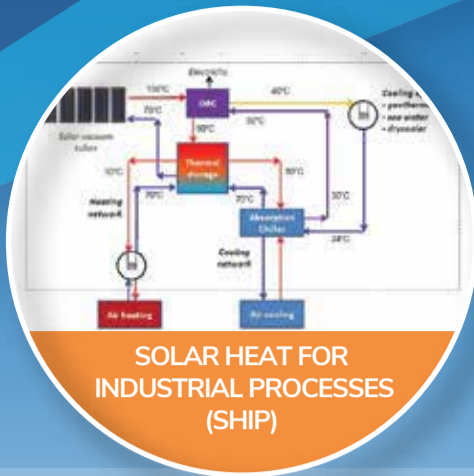
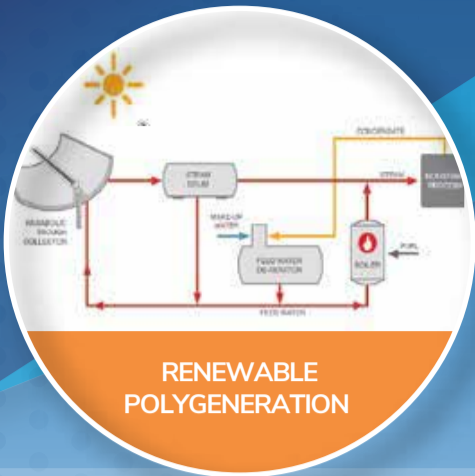


Technology Overview

SOLAR THERMAL APPLICATIONS

Solar thermal systems present a potential for energy and cost savings across several manufacturing and process industries in KSA.



A renewable polygeneration system is defined as any power system incorporating a heat engine with secondary energy streams, integrated with renewable power sources.

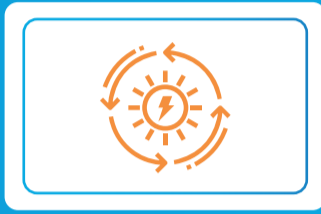
Solar Heat for Industrial Processes (SHIP) refers to use of solar energy to heat up a fluid, such as water, to produce hot water or steam, for use in industrial processes.

Hot thermal storage means storing heat at temperatures above 100°C. Because of the importance of process heat, there may be opportunities to deploy hot thermal storage to enable solar energy to supply all or most of a facility's process heat needs.

THE BENEFITS



- Reduce diesel and electricity consumption
- Reduce energy related OPEX
- Conserve Kingdom's fuel/ energy resources



Hot Thermal Storage: Ensure continuous and reliable supply of solar energy



Hot Thermal Storage: Improving utilization of solar energy and payback period of SHIP Projects

WHAT IS DRIVING ADOPTION?



Rising Energy and Electricity Costs



Innovative Business Models offered by technology providers
Government subsidies and incentives



Growing demand for Industrial Heat



Emission reduction and sustainability

PATENT AND INNOVATION TRENDS – KEY AREAS OF RESEARCH



Heat exchanger systems



Solar heat collectors



Solar hybrid systems in buildings



Enabling technologies such as sensible heat storage

PROMINENT COUNTRIES/ TECHNOLOGY PROVIDERS



KEY APPLICATION AREAS



Process Industries



Manufacturing Entities



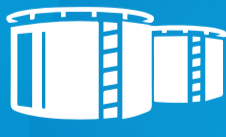
Large commercial establishments: Simultaneous need for electricity, heating and cooling

OPPORTUNITIES FOR KSA LOCALIZATION

Manufacturing of the following technology components:



Heat Exchangers



Storage Tanks



Piping, valves and flanges



Pumps and Pumping Systems

CHALLENGES TO SCALING IN KSA

1

Subsidised energy and electricity prices negatively impact financial viability

2

Limited end user awareness about technology and benefits

3

High capital investment and longer payback periods

4

Lack of policy initiatives for mandatory renewable energy inclusion

5

Absence of financial incentives and mechanisms to support technology installation