

The Carbon Footprint





Confederation of Indian Industry

THERMAX COOLING & HEATING SOLUTIONS FOR DAIRIES



Amit Rana – Sales Manager
Thermax Ltd – Cooling Division
Date – 19.04.2018

PROFIT FROM HEAT

Our Vision

To be a globally respected high performance organization offering sustainable solutions in energy and environment.



Thermax



Thermax Group is a **USD 1 billion company**, providing a **range of engineering solutions** to the energy and environment sectors

Headquartered in Pune, India and operate globally through 19 International offices, 12 Sales & Service offices and **11 manufacturing facilities (7 in India, 4 Global)**

Presence spanning **75 countries** across Asia Pacific, Africa and the Middle East, CIS countries, Europe, USA and South America

Thermax group consists of **18 Subsidiaries and 2 joint ventures**



50 YEARS OF 'RELIABLE' GROWTH

PROFIT FROM HEAT

Utilities

POWER



HEATING



COOLING



WATER



CHEMICAL



Industry



Raw material



Finished products



WASTE WATER
TREATMENT



AIR POLLUTION
CONTROL



HAZARDOUS WASTE
TREATMENT

Waste Management

Reliable Support to Industrial Sectors



Oil & Gas



Steel



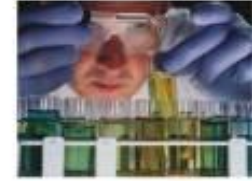
Automobile



Food



Cement



Chemicals



Refineries &
Petrochemical



Power
Generation



Textile



Hotels & Commercial
complexes



Pharma



Paper & Pulp

**WE ARE IN THE BUSINESS OF MAKING
YOUR BUSINESS ENERGY EFFICIENT,
SUSTAINABLE AND ECO-FRIENDLY**

PROFIT FROM HEAT

Global Customers

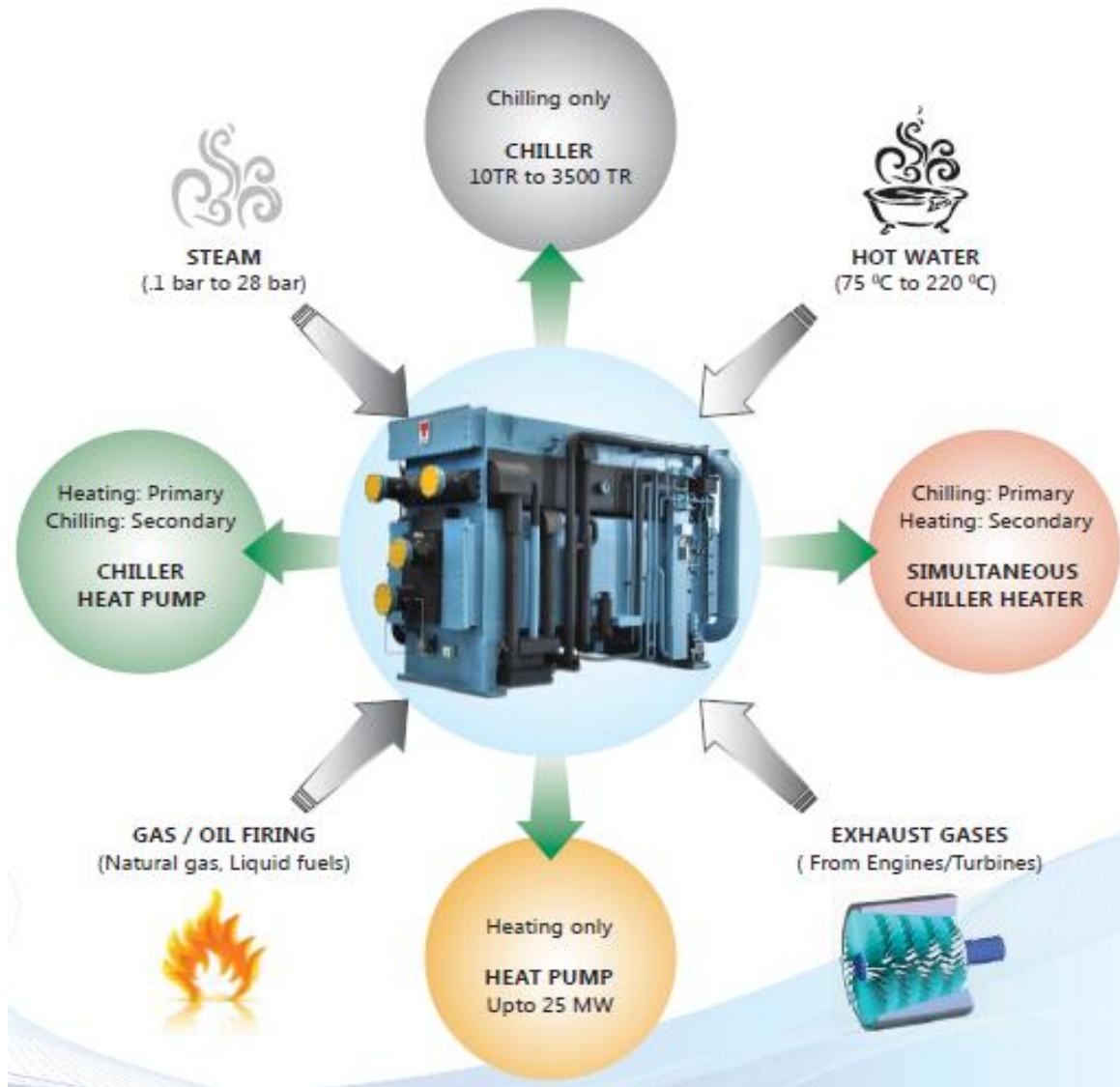


Serving global brands with quality products



PROFIT FROM HEAT

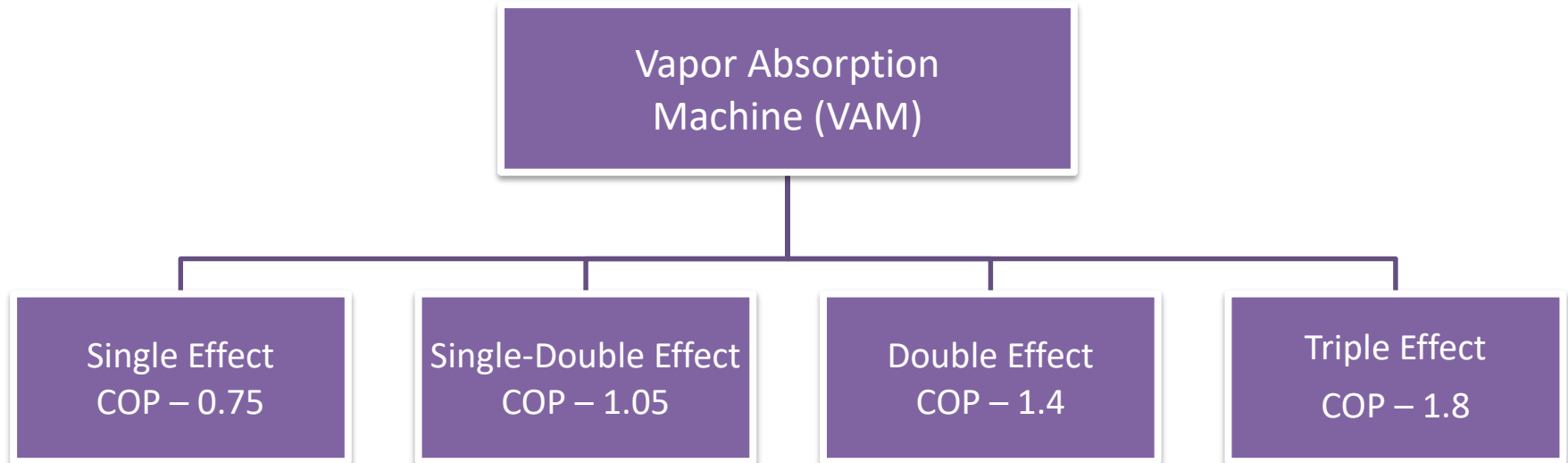
Multi Energy to Multi Utility



PROFIT FROM HEAT

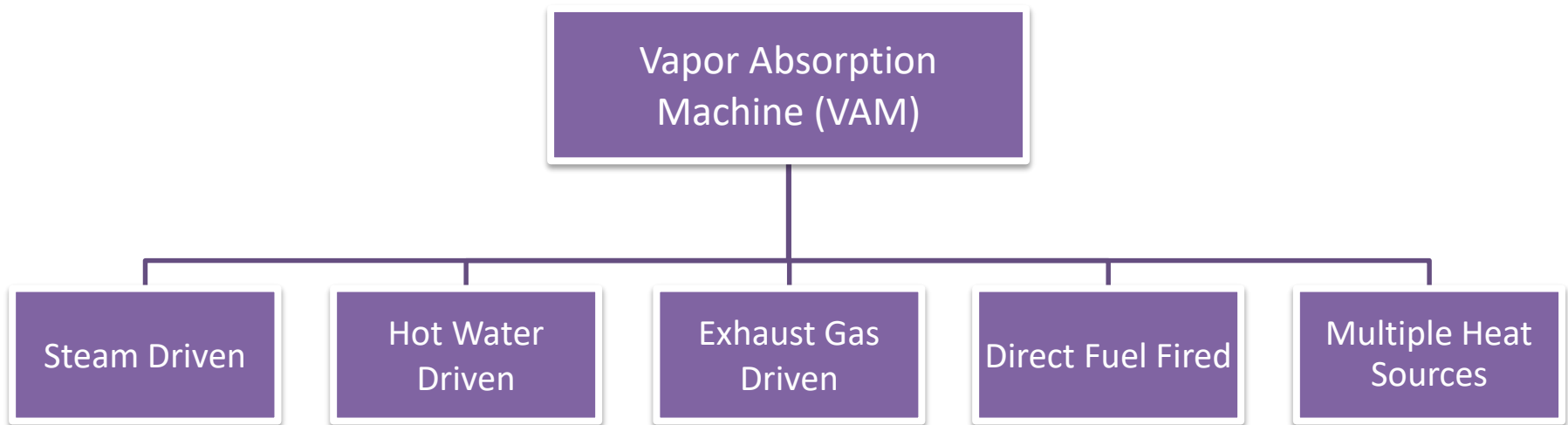
Types of Vapour Absorption Machine

Based on Effect (No of stages of regeneration)

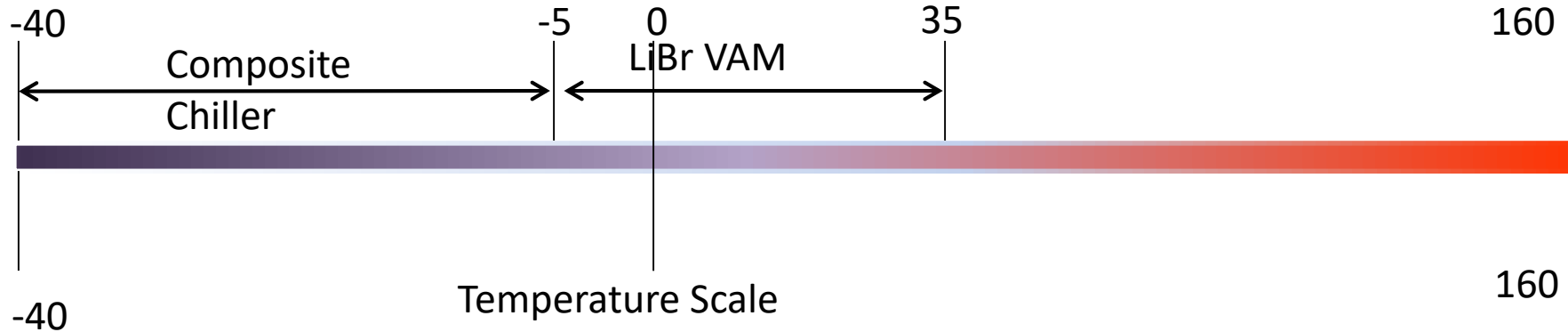


Types of Vapour Absorption Machine

Based on Driving Heat Source



Thermax Product Basket



❑ Cooling Solutions

❑ Single effect (COP: 0.7 – 0.75)

- ❑ Steam: 0 – 3.5 bar.g
- ❑ Hot water: 80 – 150 °C

❑ Double effect Chiller (COP: 1.38 – 1.43)

- ❑ Steam: 3.0 – 10 bar.g
- ❑ Hot water: 150 – 185 °C
- ❑ Exhaust gas: 270 – 600 °C
- ❑ Direct fired (Oil / Gas / LPG)

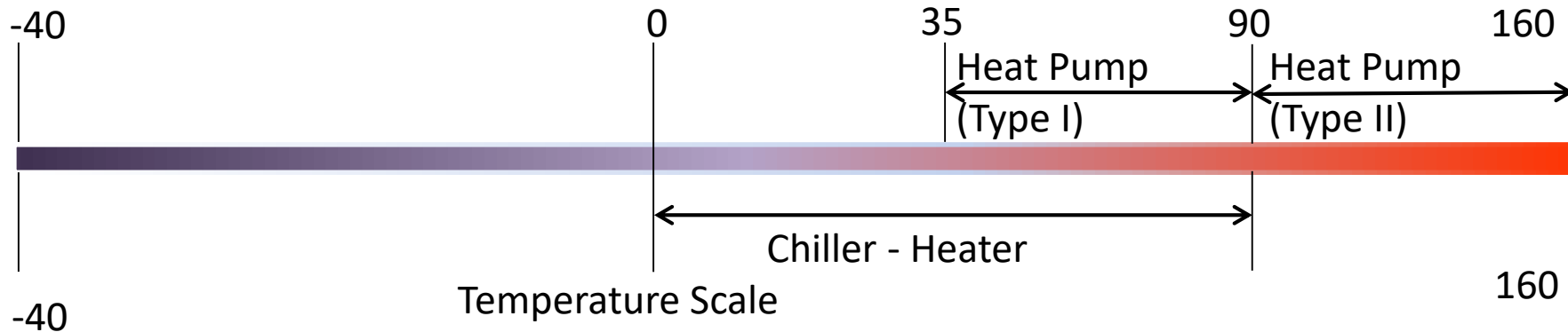
❑ Triple effect (COP: 1.75 – 1.9)

- ❑ Steam: 10 – 26 bar.g
- ❑ Hot water: 200 – 225 oC
- ❑ Exhaust gas: 400 – 600 oC

❑ Composite Chiller (25 – 250 TR)

- ❑ Steam: 0.5 – 10 bar.g
- ❑ Hot water: 90 – 185 oC
- ❑ Exhaust gas: 270 – 600 oC
- ❑ Direct fired (Oil / Gas / LPG)

Thermax Product Basket



❑ Heating Solutions

❑ Heat Pump Type I [200 kW – 40 MW]

- ❑ Steam: 1 – 10 bar.g
- ❑ Hot water: 130 – 185 °C
- ❑ Exhaust gas: 270 – 600 °C
- ❑ Direct fired (Oil/Gas/LPG)

❑ Heat Pump Type II

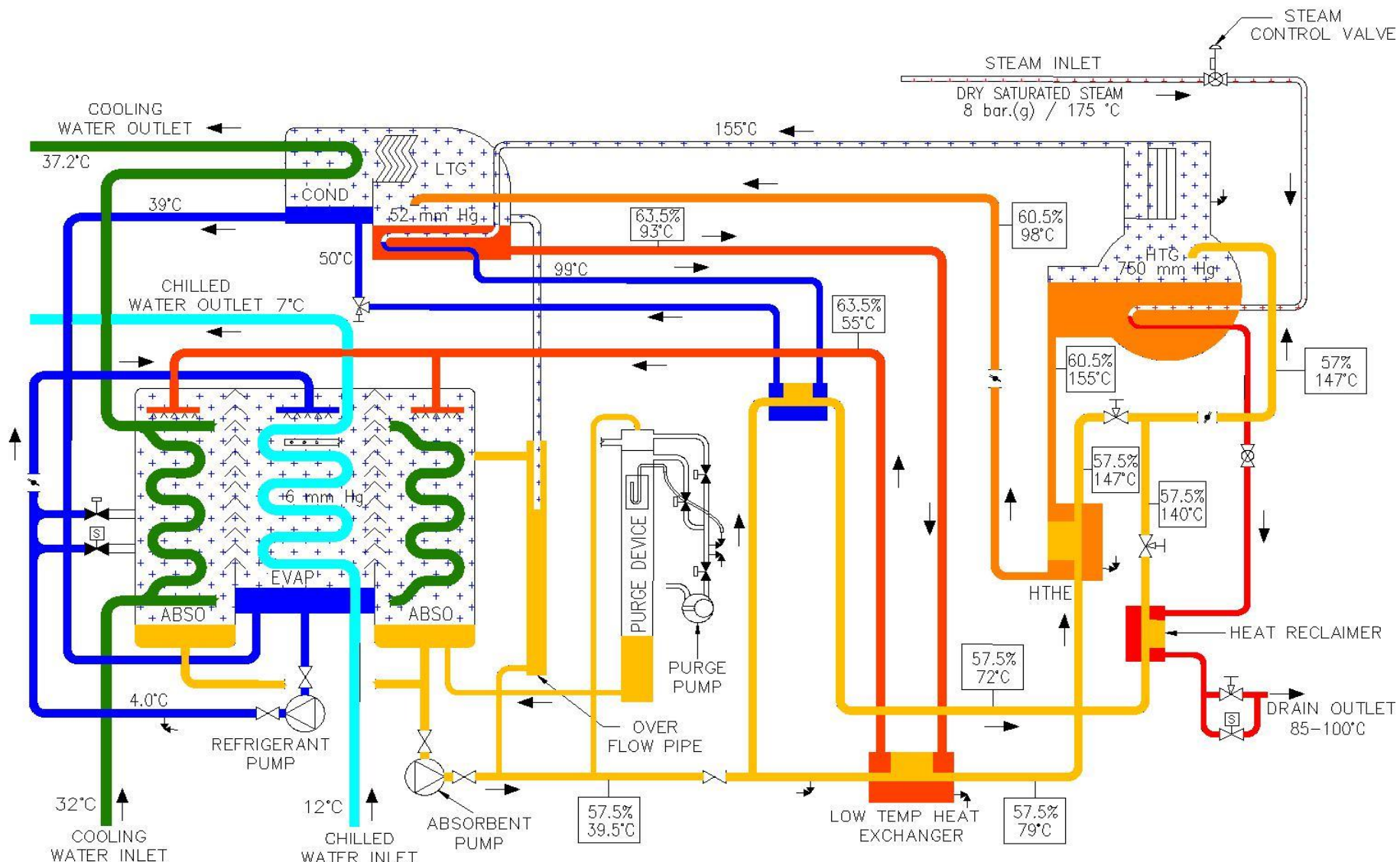
- ❑ Also known as heat transformer
- ❑ Can be used to generate steam or hot water at higher temperature from low temperature hot water

❑ Chiller-Heat Pump





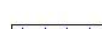


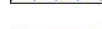

- ❑ Can simultaneously produce chilled water and hot water
- ❑ Does not require cooling water

❑ Chiller-Heater

- ❑ Can operate in Cooling only, Heating only or Simultaneous cooling and heating modes
- ❑ 40% savings on energy required for the heating part, in SIM mode
- ❑ Requires cooling water



* Values mentioned are for indicative purpose only

	CHILLED WATER		REFRIGERANT LIQUID		STRONG SOLUTION
	COOLING WATER		REFRIGERANT VAPOUR		INTERMEDIATE SOLUTION
	STEAM		STEAM CONDENSATE		DILUTE SOLUTION

Cooling & Heating Requirements in Dairy



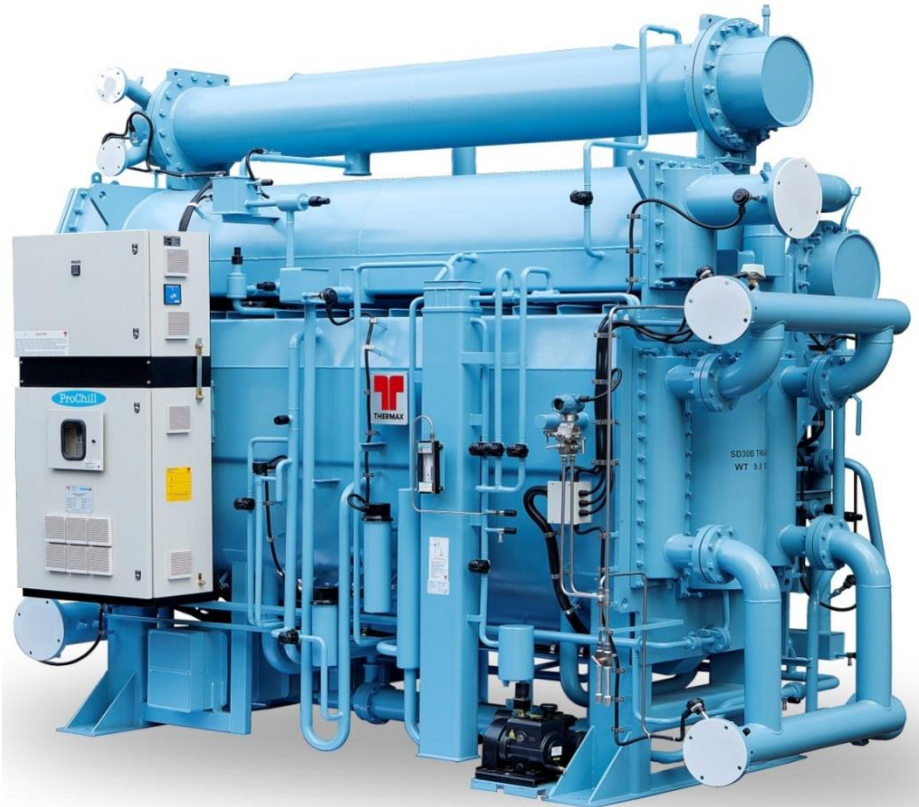
Bulk Milk Cooling

- Milk to be cooled to 4° C when received from collection center

Pasteurization

- 4° C Milk to be Heated to 75°C – 80°C
- Milk is then cooled to 2°C – 4°C

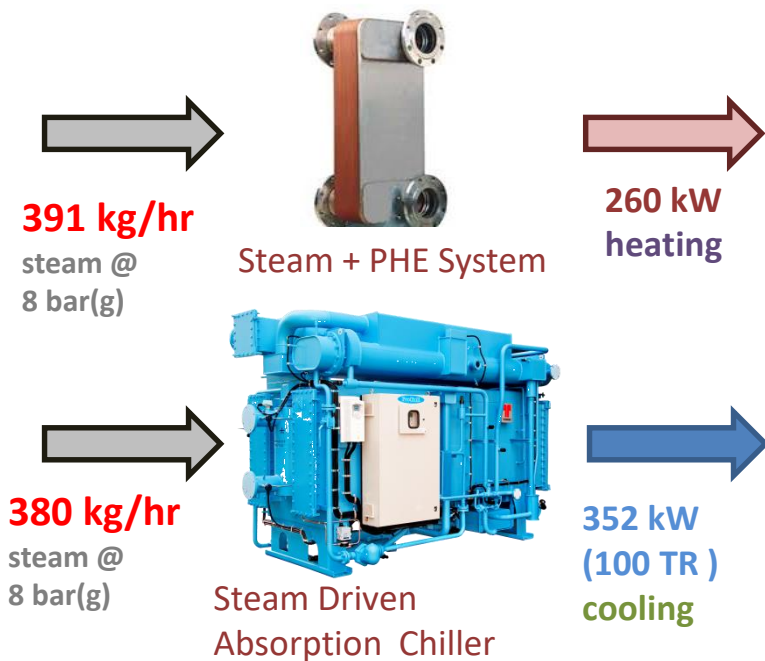
Simultaneous Chiller Heater



Conventional System

VS

Chiller Heater



Cooling and Heating



391 + 380 = 771 kg

600 kg



Reduces Cooling Tower Losses



Heat rejection in Cooling Tower
in steam fired chiller

Heat rejection in Cooling Tower
in steam fired chiller heater

253 kW
heat Input

399 kW
heat input

352 kW
Refrigeration

352 kW
Refrigeration

260 kW
heating
capacity

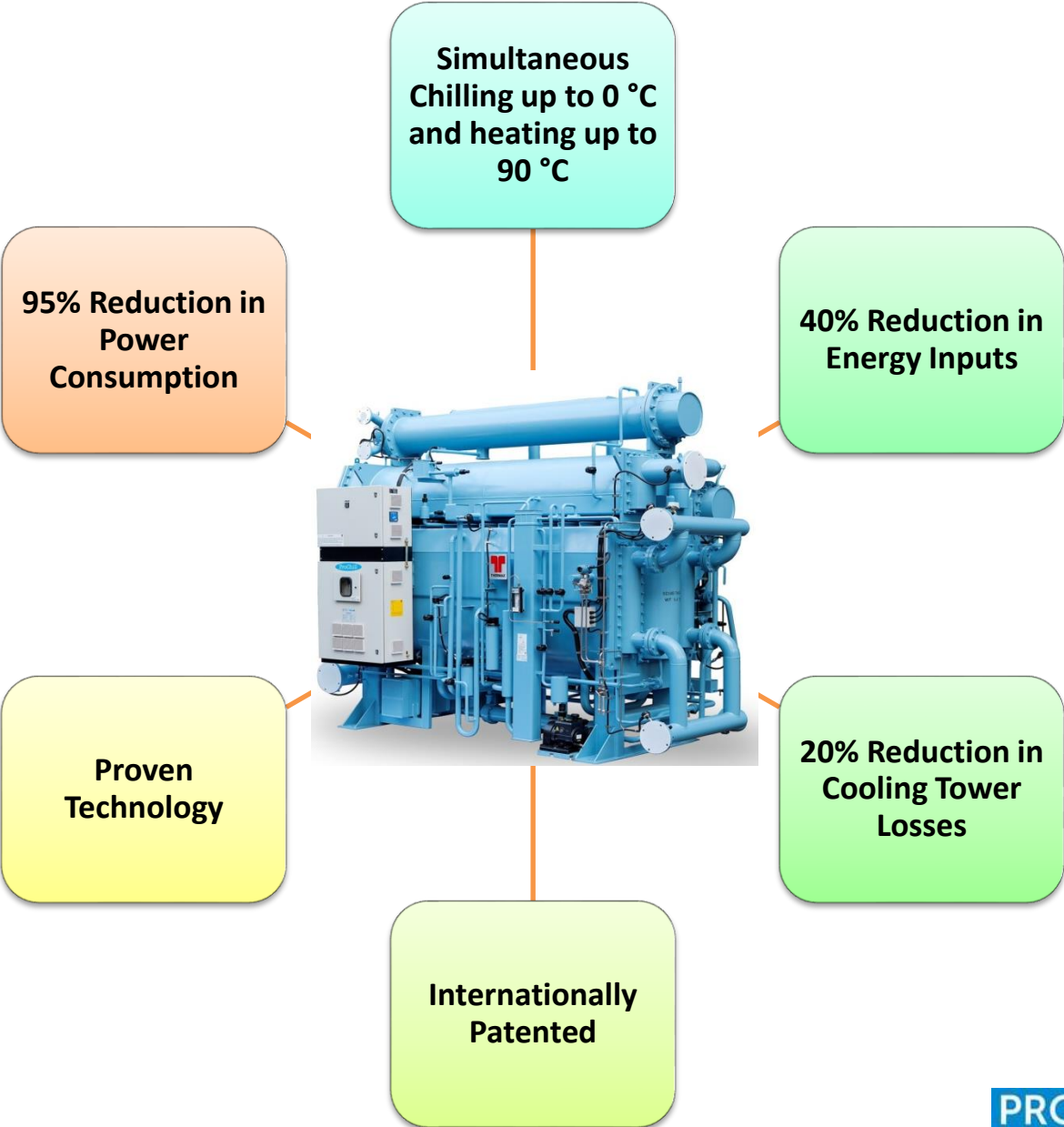
605 kW
cooling tower
heat rejection

491 kW
cooling tower
heat rejection

Heat rejection
reduced by
20% thus
reduction in
evaporative
losses

PROFIT FROM HEAT

Simultaneous Chiller – Heater Advantages



PROFIT FROM HEAT

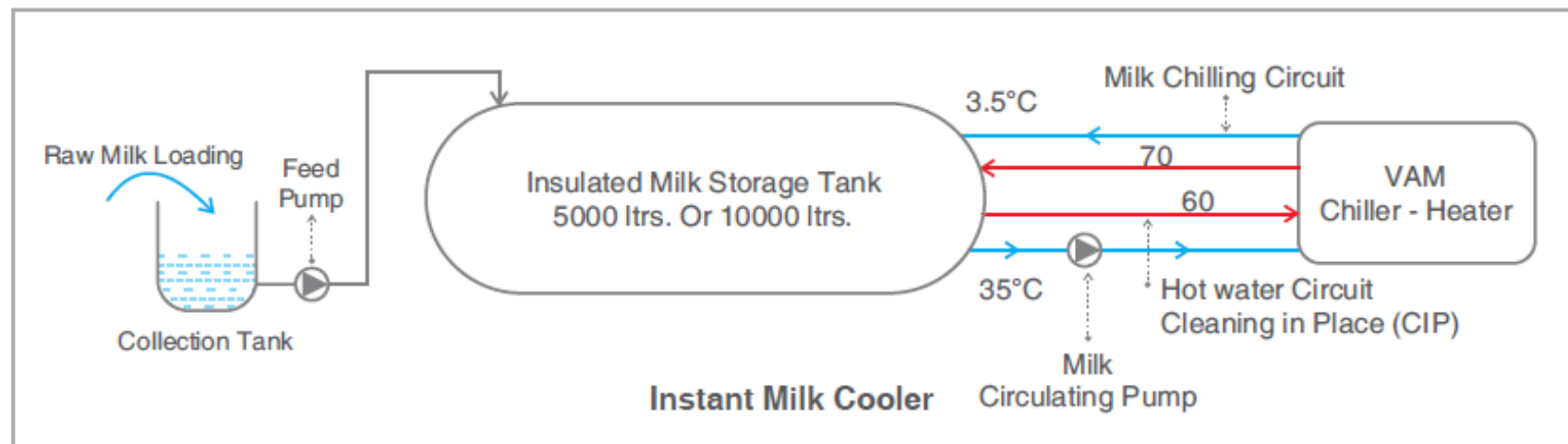
Replace Conventional Bulk Milk Cooler

Replace your conventional bulk milk cooler with Thermax's absorption chiller heater solution. It cools the milk instantly from 35°C to 3.5°C as against conventional bulk milk cooler which takes 4.5 hours for the same process. The instant milk cooling substantially improves quality of raw milk by minimizing bacterial growth.

The same solution (Absorption Chiller Heater) can be used to generate hot water for cleaning in place (CIP) hence

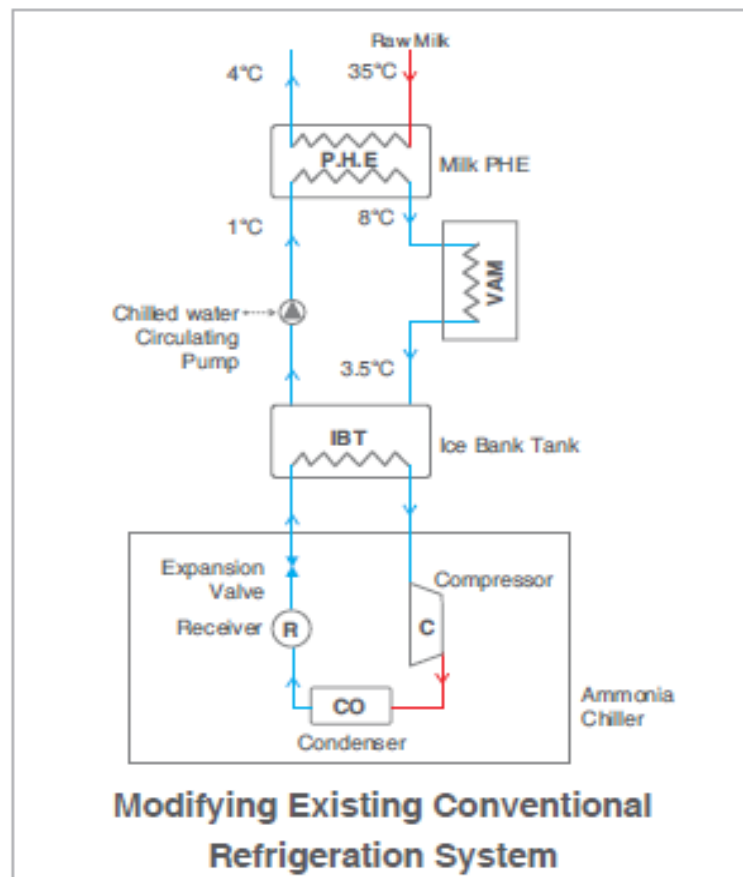
eliminates the need for separate hot water generating system.

The absorption chiller heater leads to higher overall system efficiency due to stepless operation and gives flexibility as the same set up can be used for 5KL and 10KL bulk milk cooling.



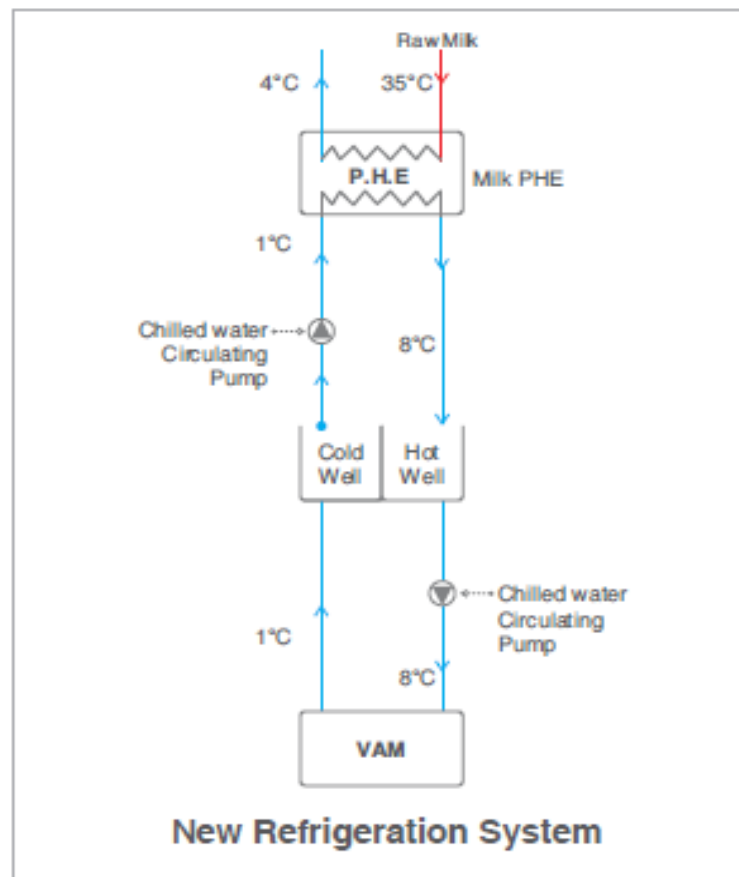
Modify Conventional Raw Milk Chilling Process in Milk Chilling Centres/Dairies

Thermax's Vapour absorption chiller help to reduce refrigeration load on Ammonia chiller by cooling water from 8°C to 3.5°C. This results in considerable savings in operational cost by reducing power consumption of ammonia chiller.



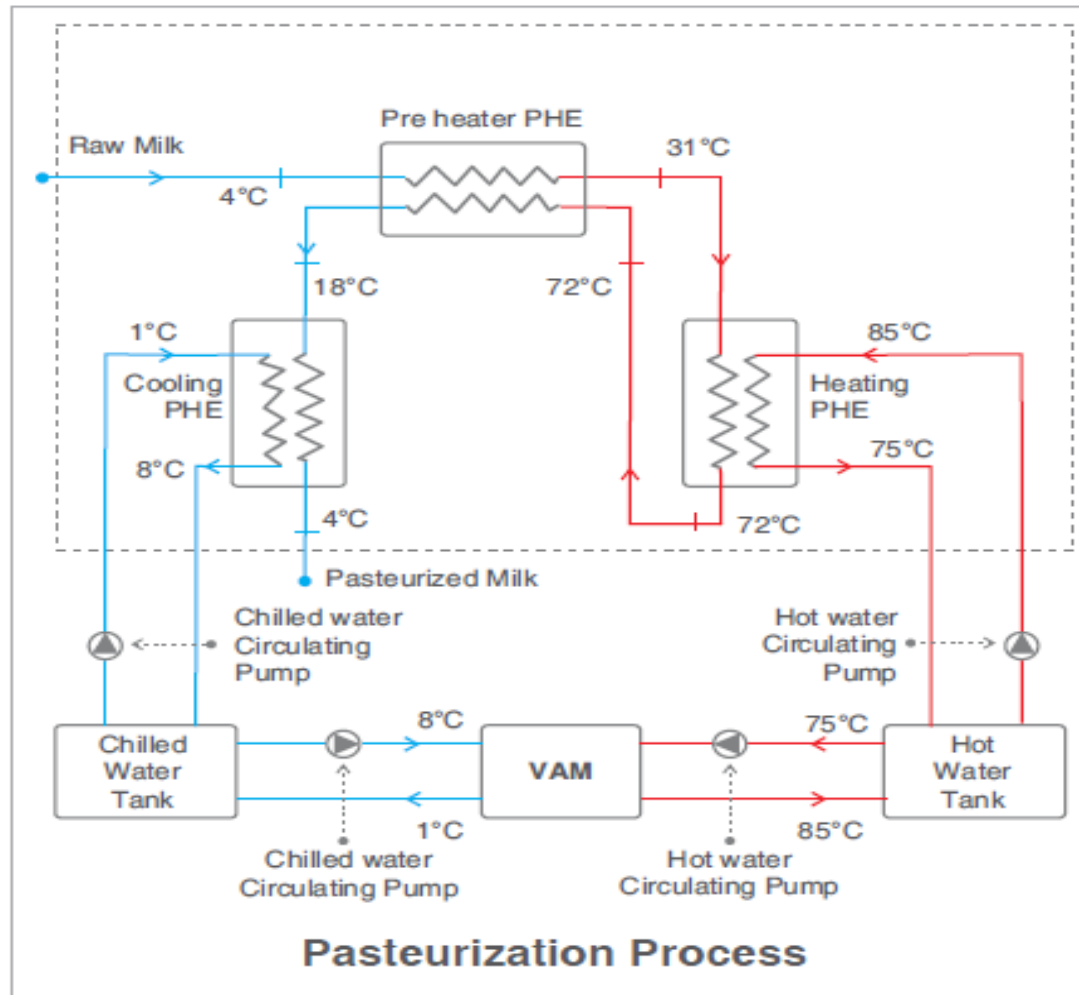
Replace Conventional Raw Milk Chilling Process in Milk Chilling Centres/Dairies

Replace conventional IBT (Ice Bank Tank) and Ammonia Chiller system with Thermax's 1°C chilled water vapour absorption chiller which gives substantial savings in operational cost. The initial cost also comes down as there is a remarkable reduction in the capacity of (standby) diesel generator.



Pasteurization

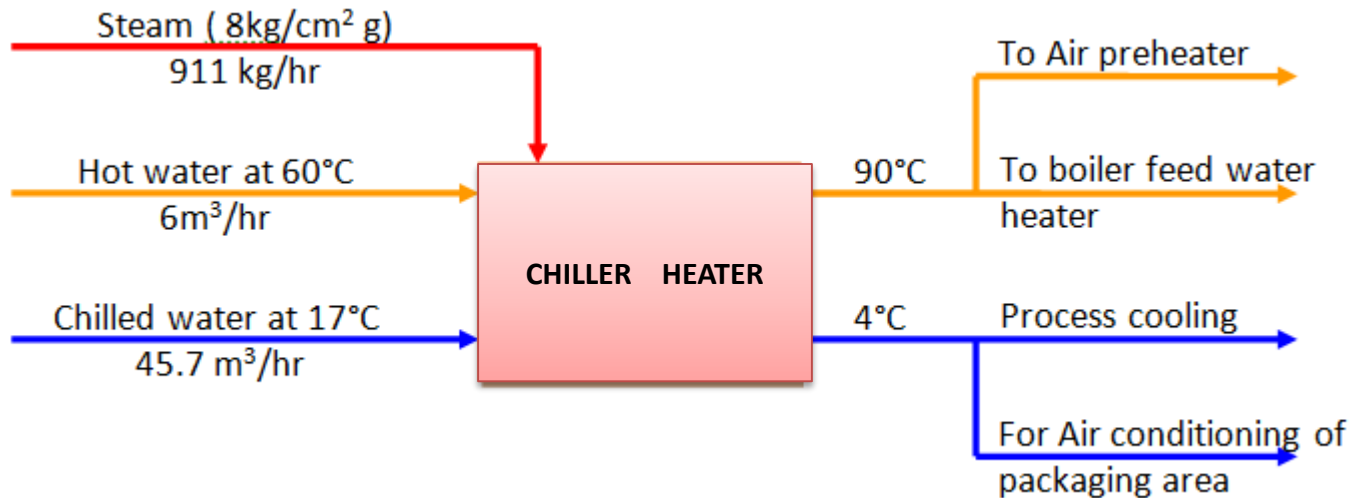
Replace conventional heat exchanger and Ice bank tank (IBT) system for pasteurization with Thermax's vapour absorption chiller heater. This solution generates chilled water at 1 °C & hot water at 85°C simultaneously, which leads to substantial savings in heat input and reduction in cooling tower capacity. The result is significant savings in operational cost.



Coffee Making Plant- Hosur

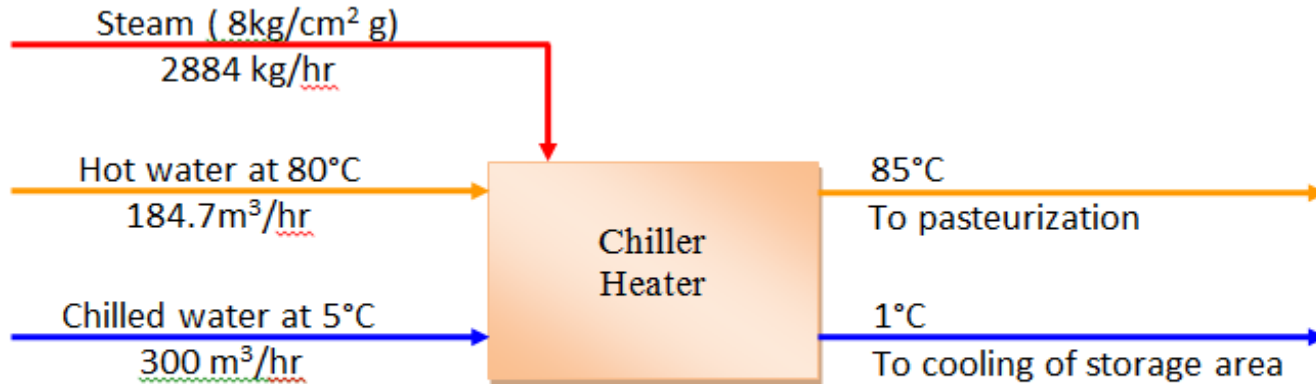


- A similar scheme has been provided to a Coffee making plant in Hosur.



Capacity	Chilled water		Cooling water		Heat source		Hot water	
	Temp profile	I/L Temp	Flow	8 kg steam	Flow	Temp profile	Flow	
TR	°C	°C	m³/hr		Kg/hr	°C	m³/hr	
197	17-4	29.4	220		911	60-90	6	

Case Study – One of the Installation in Dairy in Uttar Pradesh



Capacity	Chilled water		Cooling water		Heat source		Hot water	
	Temp profile	I/L Temp	Flow	8 kg steam	Flow	Temp profile	Flow	
TR	°C	°C	m ³ /hr		Kg/hr	°C	m ³ /hr	
400	5-1	32	400	2884	80 - 85	184.7		

Utility Requirements – Chilling Application



100TR NH₃ Electrical Chiller



- Evaporation Temp. -10°C
- Condensing Temp. 40°C
- Chilled Water Generated 1°C
- **120 kWh Electrical Consumption**

100TR Vapour Absorption Chiller



- Chilled Water Generated 1°C
- Steam Consumption @ 8bar(g) pressure 480 Kgs/hr
- **3.3 kWh Electrical Consumption**



in Energy conservation & Environment preservation



PROFIT FROM HEAT

Chiller – Heater Users

Unilever, India



- 330 TR cooling + 425 kW heating
- Heat Source : Steam

Fruit and Nutty, Nigeria



- 600 TR cooling + 1540 kW heating
- Heat Source : Multi-energy

Coca Cola, India



- 750 TR cooling + 625 kW heating
- Heat Source : Steam

Heritage Foods, India



- 133 TR cooling + 347 kW heating
- Heat Source : Steam

1°C Glycol Free Vapour Absorption Chillers



Need of Glycol Free Cooling in Dairies

- Toxic nature of Glycol
- Indirect Heat Exchangers

Process compatibility



- Glycol has Lower Heat transfer properties than water
- Requirement of Higher Heat Transfer Area

Heat Transfer



- Corrosive nature of Glycols
- Glycols degrade to acids
- Necessity to use Corrosion inhibitors & buffers

Corrosion

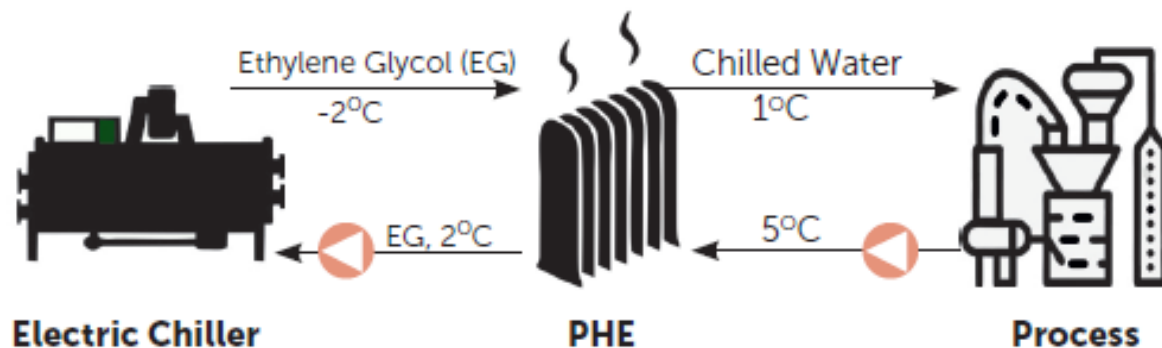


- High Pumping Cost
- All accessories according to Glycol
- Replacement of Glycol

Operation Cost

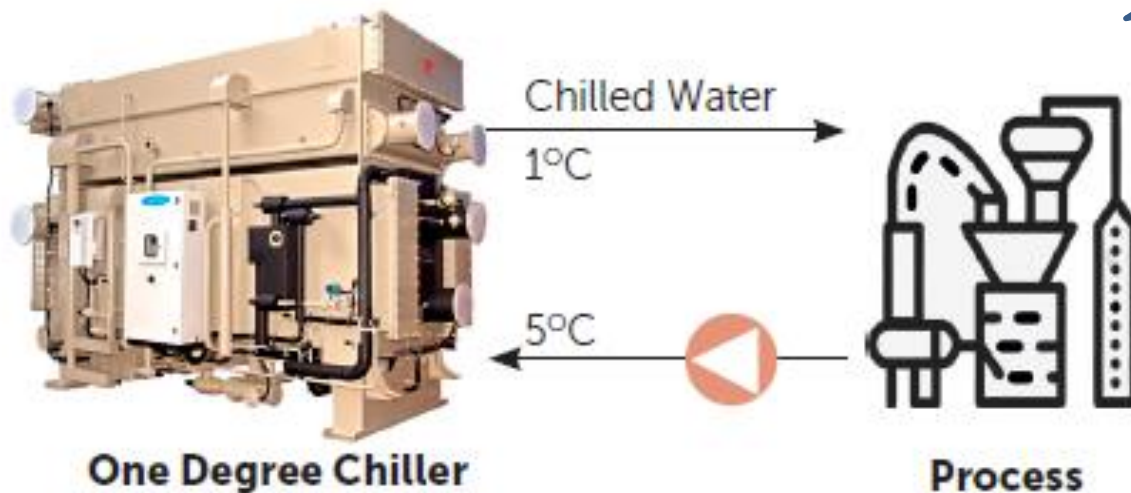


CONVENTIONAL SYSTEM



VS

THERMAX'S ENERGY EFFICIENT SOLUTION



1°C Glycol Free
Chiller -
BREAKTHROUGH
INNOVATION



PROFIT FROM HEAT

Advantages of Glycol Free 1°C Absorption Chillers



Zero-Glycol Chiller



Energy-efficient
Innovation



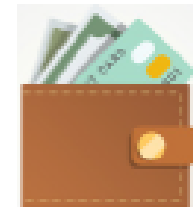
CFC Free
OZONE Friendly



Proven & Reliable Solution



Reduction in
Operational Cost



Faster Payback



Confederation of Indian Industry

**18th National Award for
Excellence in Energy Management 2017**

This is to certify that product

1 DEGREE VAPOUR ABSORPTION CHILLER

offered by

THERMAX LIMITED

Has been rated as "Innovative Energy Saving Product"

*This is based on the feedback of judges at the National Competition for
Excellence in Energy Management held on 30,31 August & 1 September 2017 at Hyderabad*

S RAGHUPATHY
Deputy Director General
Confederation of Indian Industry

MEHER PUDUMJEE
Chairperson - Energy Efficiency Council
CII - Godrej GBC

L.S.GANAPATI
Chairman
National Award for Excellence
In Energy Management 2017

Awarded by CII as Innovative Energy Saving Product

1 °C Water Chillers in action



- Customer: Mother Dairy, India
- Capacity: 600 TR (2106 kW)
- Heat Source: Steam, 8 bar g
- Application: Milk pasteurization



- Customer: Swaraj Dairy
- Capacity: 400TR
- Heat Source: Steam, 8 bar g
- Application: Milk Pasteurization

30+ Installations of 1°C Glycol Free Chillers Running in Industries

PROFIT FROM HEAT

THERMAX PROCESS COOLING SOLUTIONS



Thermax Evaporative Condenser

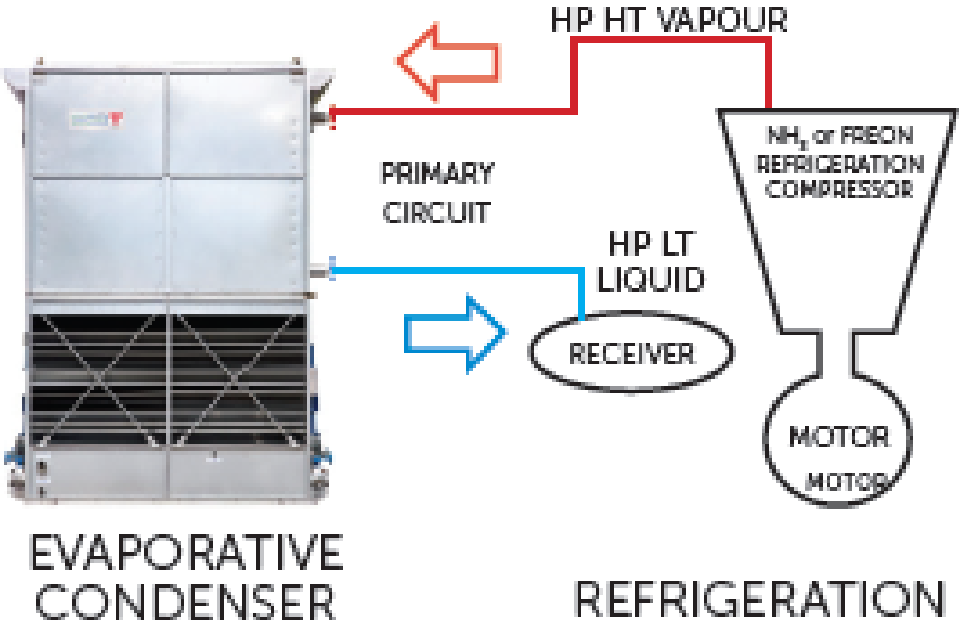
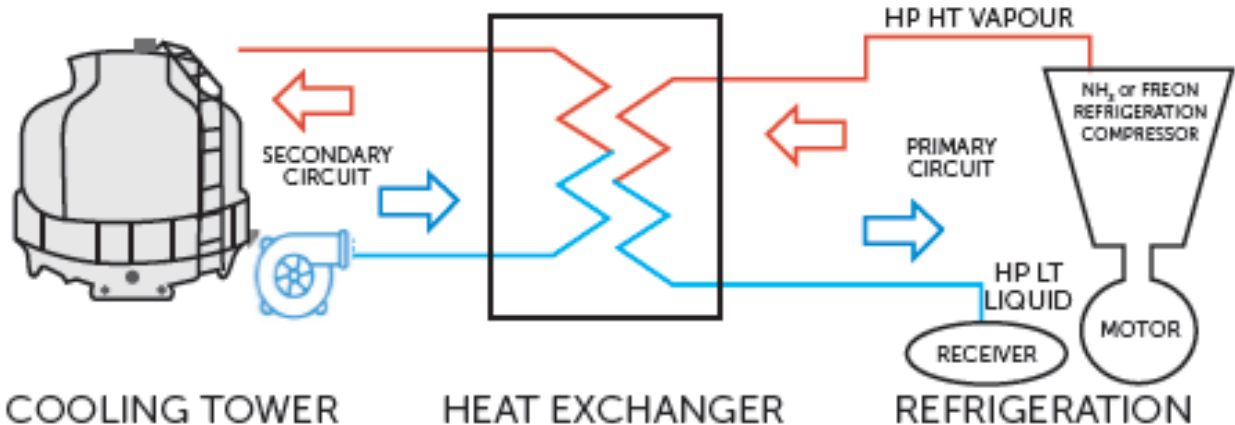


PROFIT FROM HEAT

Ammonia/ Freon Refrigeration

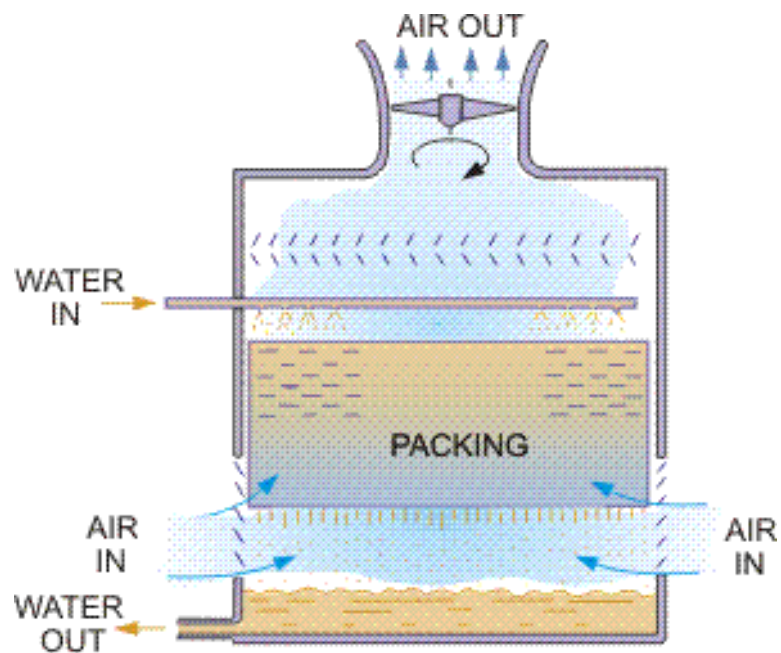


Conventional Way of Refrigerant Condensation

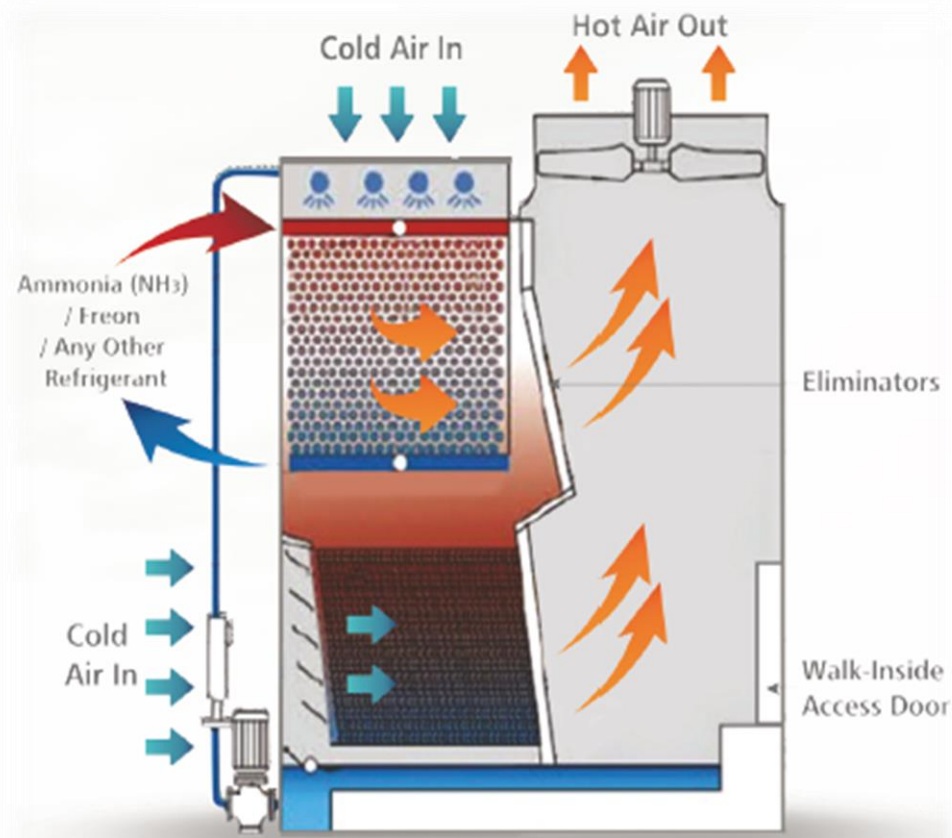


Thermax's Energy Efficient – Evaporative Condenser

Conventional Cooling Tower



Evaporative Condenser



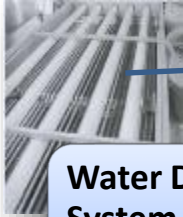
Thermax Evaporative Condenser



THERMAX



Axial Propeller Fan



Water Distribution System – Pipe and Nozzle



Side Air Inlet Screen and Air Deflector



Exclusive Fills



Circuit Pump and Descaling Cleaner

Maintenance Room

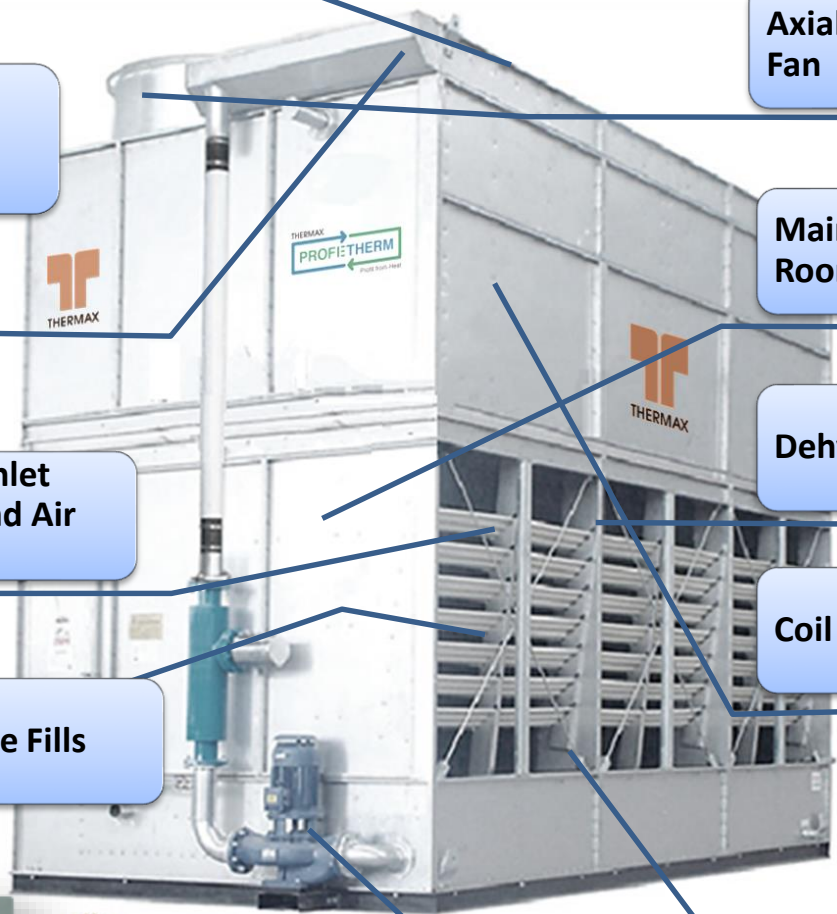


Dehydrator

Coil Set



Basin with Slope Bottom



PROFIT FROM HEAT

BENEFITS of Evaporative Condenser



- Closed circuit cooling towers completely isolate the process cooling fluid from the atmosphere.
- A closed loop system protects the quality of the process fluid, reduces system maintenance, and provides operational flexibility
- Secondary Circuit of the conventional system consist of
 - Open circuit, Wooden Cross flow cooling tower,
 - Secondary pumps,
 - Plate Heat Exchangers,
 - Piping and Valves
- This entire set is replaced with closed circuit cooling tower/fluid cooler.
 - Advanced Technology (Water Curing)
 - Environmentally Conscious Operation
 - Low Energy Consumption
 - Lower Annual Operating Costs
 - Reliable & Simple Operation and Maintenance
 - Completely isolate the process cooling fluid from the atmosphere. avoid contamination
- Occupy 30 % less space compare to conventional systems

BENEFITS of Evaporative Condenser



RELIABILITY



- Continuous coil without welded joints
- Robust corrosion resistant structural material for long life
- Large diameter laminar flow nozzles for clog free operation.

EFFICIENCY

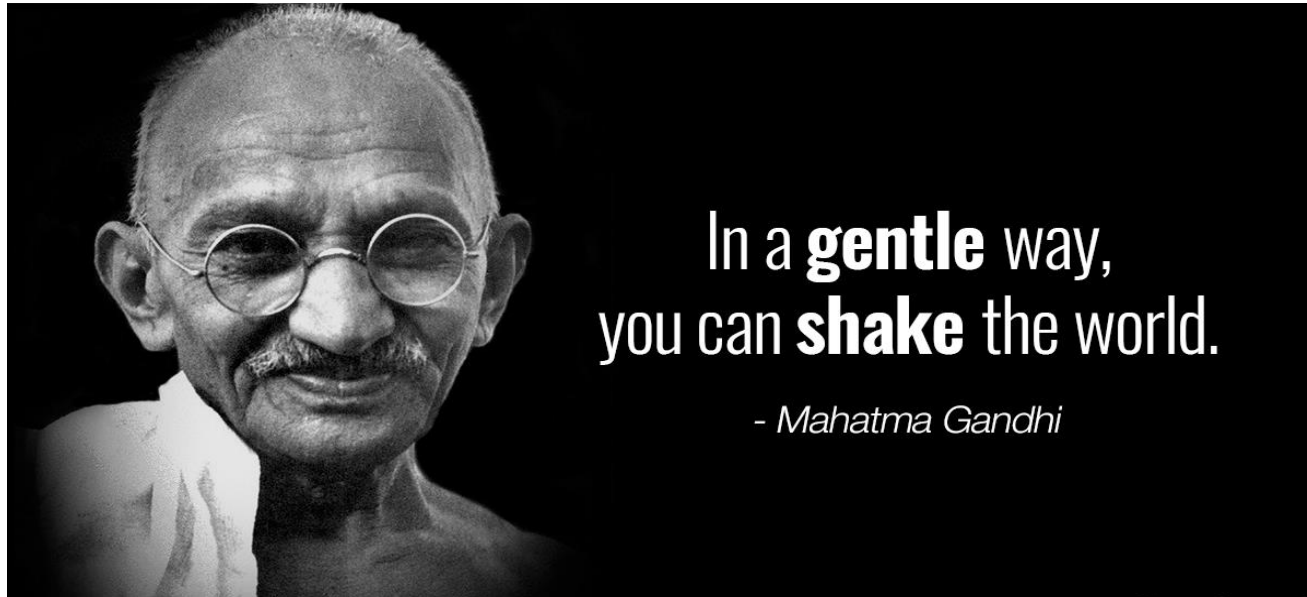


- Honeycomb PVC Wet deck design for most optimal air & Water usage
- Air Flow - Parallel at coil side & cross at fill side for efficient heat transfer
- Optimized spray water flow to coil for maximum heat transfer

MAINTENANCE

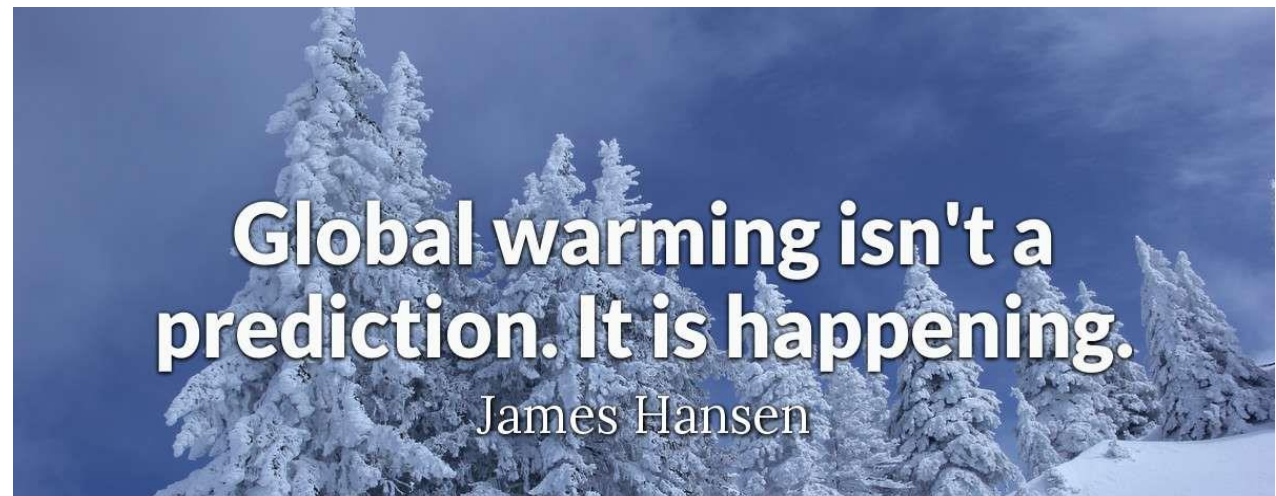


- Side access door for easy online maintenance
- Electronic De-scaling device for trouble free operation
- Direct Drive fan arrangement



In a **gentle** way,
you can **shake** the world.

- *Mahatma Gandhi*



**Global warming isn't a
prediction. It is happening.**

James Hansen



THANK YOU.....

Amit Rana – Sales Manager
Thermax Ltd – Cooling Division
[Email - amit.rana@thermaxglobal.com](mailto:amit.rana@thermaxglobal.com)
Mobile - 9725907509