



Energy Efficiency with Alfa Laval



Uday Mahajani

A Global Company

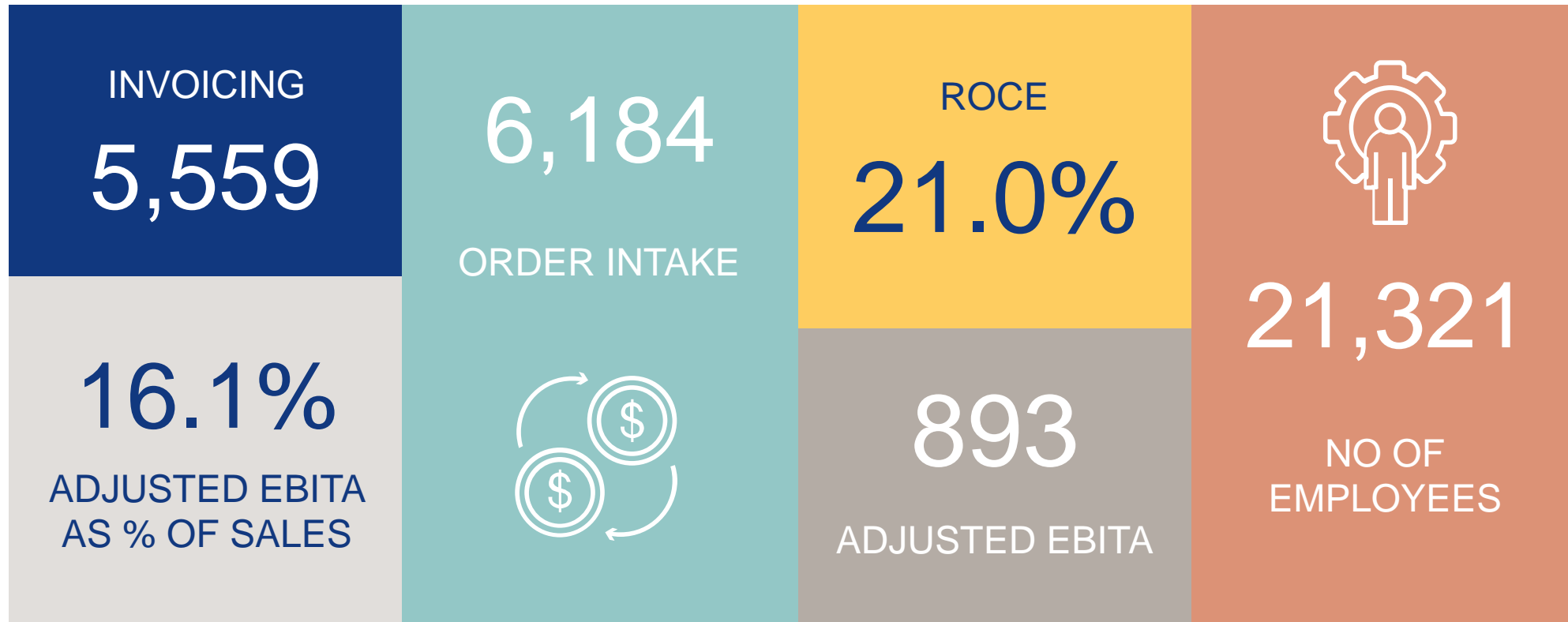
- Alfa Laval



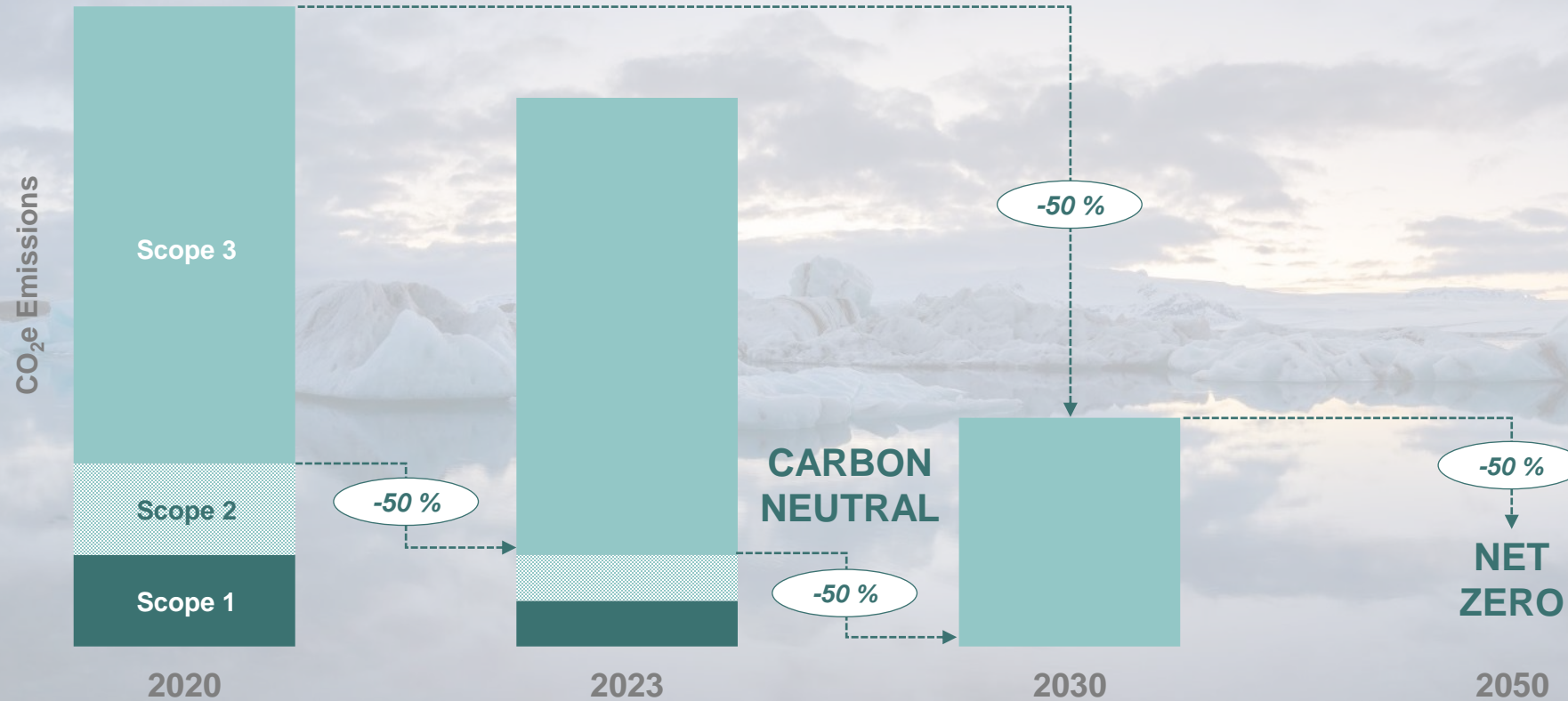
* Plus a number of minor production and assembling units

Key Figures 2023

- MEUR (1 EUR = 11.440267 SEK)



Our Climate Targets - The GHG Protocol have defined three scopes of emissions



Chemical Industry

– Energy Intensive Sector



- The International Energy Agency (IEA) notes that direct CO₂ emissions from primary chemical production remained relatively constant at around 935 Mt in 2022, with a stable CO₂ intensity over recent years at around 1.3t CO₂ per tonne of primary chemicals.
- The chemical sector is the largest industrial energy consumer but only the third largest industry subsector in terms of direct CO₂ emissions, partly because around half of the sector's energy input is consumed as feedstock.
- In the Net Zero Emissions by 2050 Scenario, CO₂ emissions are expected to decouple from production, aiming for an 18% CO₂ emission reduction by 2030 despite an increase in production.
- The Manufacturing Energy Consumption Survey indicates that the chemical industries account for about 29% of the total energy consumed in the manufacturing sector.

Energy Efficiency

The First Fuel



7 AFFORDABLE AND CLEAN ENERGY

13 CLIMATE ACTION

Energy efficiency definition by Alfa Laval



Technology selection

Implementation of the most innovative and efficient technology, in existing and new processes.



Process optimization

Ensuring process operations run as efficiently as possible long-term, through service and process optimization.



Heat reuse

Add technologies to existing process that capture excess heat and reuse for other purposes – as two-thirds of world's total primary energy is wasted.

5 - Immediate actions for greener tomorrow



1

Keep it clean

Maintain and service heat exchangers to ensure optimal performance – as up to 2.5% of world's emissions comes from fouling.

2

Strength in insights

Audit and connect to see how much energy is possible to save – give customers the insights to take the right decisions.

3

Reuse heat

Up to 50% of industrial energy is waste heat – find opportunities to reuse such as reintegrate in process, freshwater generation, district heating etc.

4

Make it last

Redesign and upgrade to ensure optimized for operating conditions during the entire lifetime.

5

Next generation performance

Select the right innovative and efficient plate HEX technology. Plate heat exchangers are up to 50% more efficient.

Accelerating decarbonization through energy efficiency

– Alfa Laval



- Energy efficiency is our ‘first fuel’ for decarbonization but does not get the attention it deserves.
- The technologies don’t just exist, they are available, affordable, and ready to use. We just need to make it happen.
- Alfa Laval is taking an active part in the solution, but we need many more to join on our quest for a more energy efficient tomorrow.

Join us and be part of the solution!

www.alfalaval.com/energyefficiencymovement



Sustainable Heat Transfer – Energy Efficiency

– Lightweight, greater thermal efficiency



- Superior thermal performance and maximum reliability.
- Longest service life – even under conditions with extremely high design pressures.

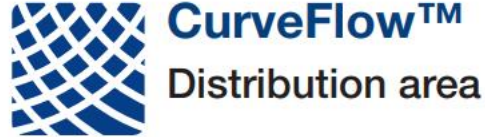
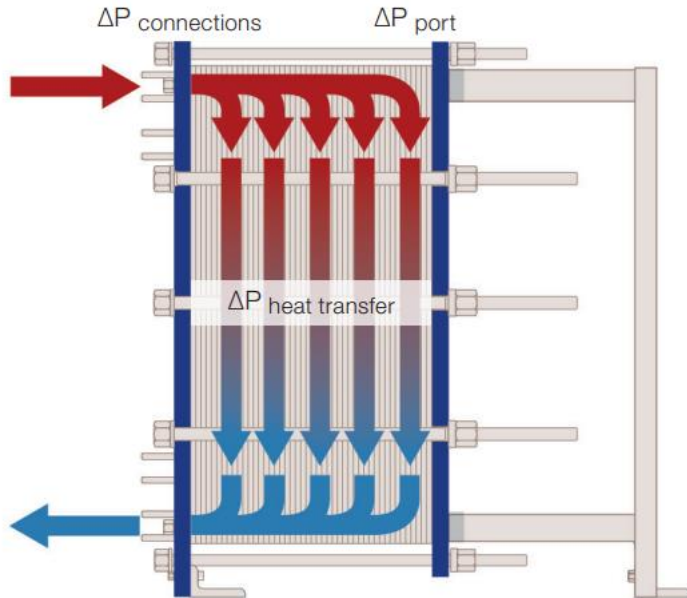


Key features – Heat transfer



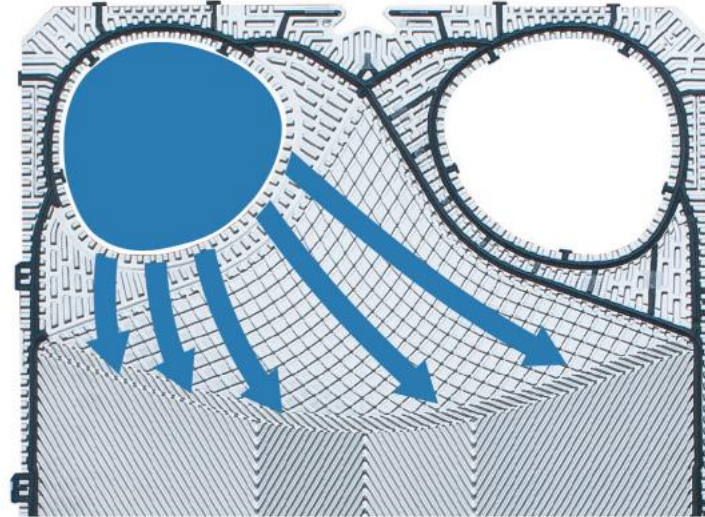
Enhances media flow and thermal efficiency.

- ✓ Avoids shortcuts in plate pack.
- ✓ Pressure drop better utilized for heat transfer.



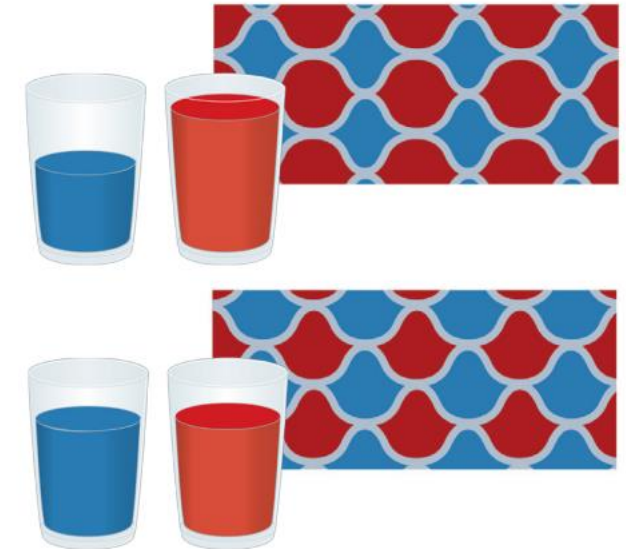
Improves media flow and minimizes the risk of fouling.

- ✓ Fully utilizes available surface area.
- ✓ Provides perfect distribution inside channel, unit stays clean longer.



Improves thermal efficiency and optimizes pressure drop utilization.

- ✓ Perfect for applications with unequal flows.
- ✓ Both channels stay clean longer.

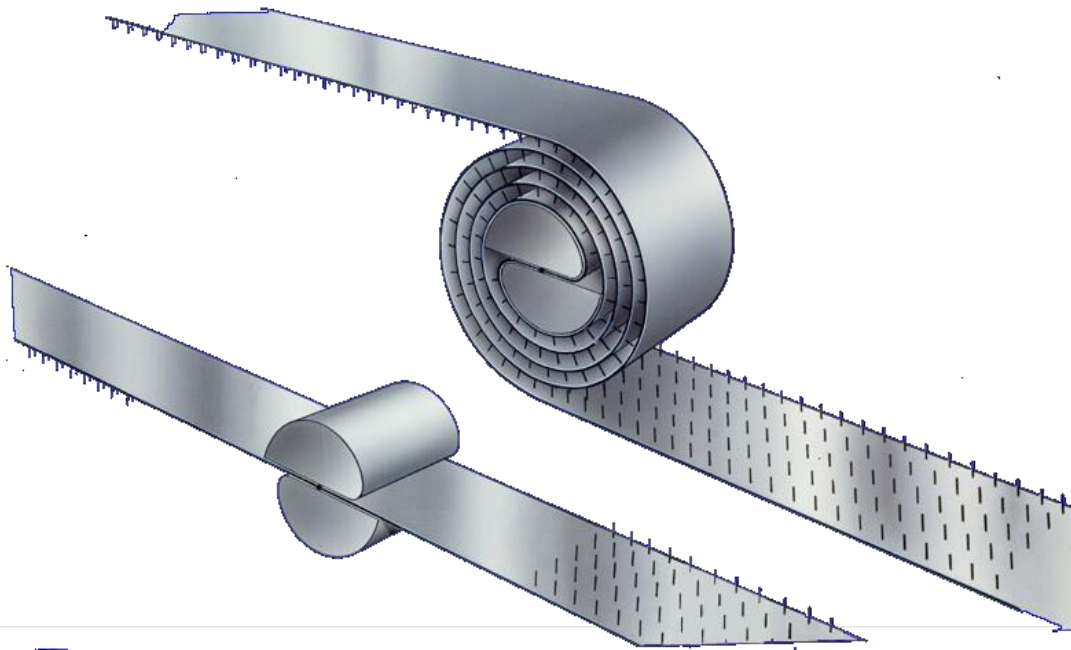


Spiral Heat Exchanger

– Construction



- SHE, is composed of two strips of sheets, wrapped around each other to create a pair of concentric spiral channels of rectangular cross-section. The channels are frequently alternately welded on opposite ends to form a hot channel and a cold channel, each accessible from its respective head.



Spiral Heat Exchanger

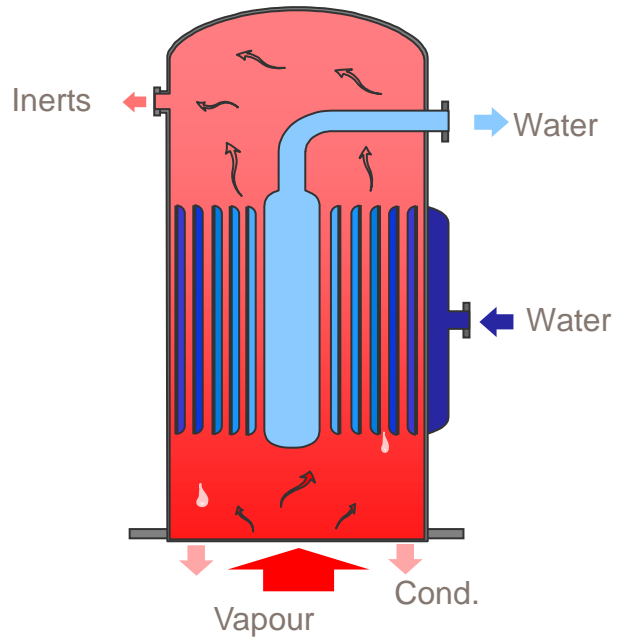


SHE DUTIES

- Spiral – Type 2 – Reflux and Vaporizer

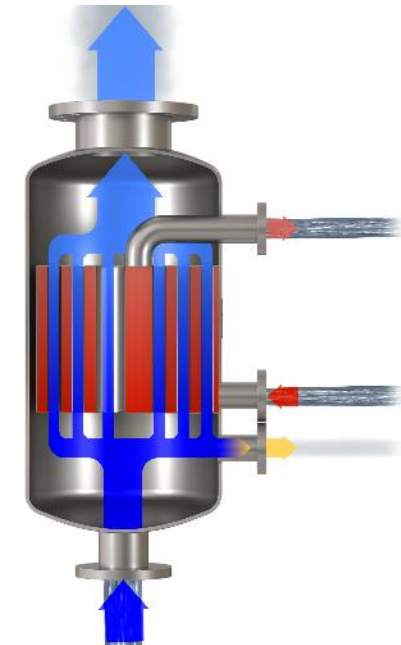


Type 2R Overhead simple reflux



© Alfa Laval

Type 2V Reboiler or vaporizer



Compabloc

- Liquid-Liquid duty



Decanter Centrifuges - Circularity

– Product Recovery



- Valuable products are normally lost in waste streams from industrial processes and are costly to treat or dispose
- Many waste products can be effectively recovered.
- Variety of general or industry specific solutions that help recover products of value that can either reuse or sell
- Variety of solutions for on-site water and waste treatment plus **recovery** of water, heat and even products from your process.



Zero Liquid Discharge - reducing the environmental impact

- Robust Compact Solutions



AL ZLD systems combine plate evaporator and decanter centrifuge technology

- Low investment, installation and operational costs
- Special heat exchanger plate design minimizes fouling and scaling
- High efficiency reduces heat transfer area required
- Can operate cost effectively at vacuum thereby reducing scaling risks
- Cost-effective maintenance – 100% cleanable and inspectable heat transfer surfaces

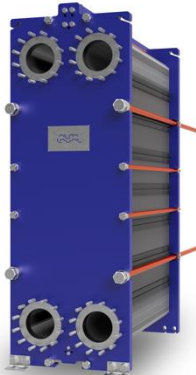


Optimizing plant uptime and maintenance

– Petrochemical company, Saudi Arabia



Condition-based cleaning services increased uptime for a Saudi Arabian petrochemical company by 85%. Alfa Laval service, including condition audits, cleaning, & reconditioning, which were secured by a performance agreement, helped the customer eliminate unplanned production.



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12 RESPONSIBLE CONSUMPTION AND PRODUCTION

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2,191,500 kWh
Energy savings



28,850 tonnes
Emission savings



54,787,500 m³
Water savings

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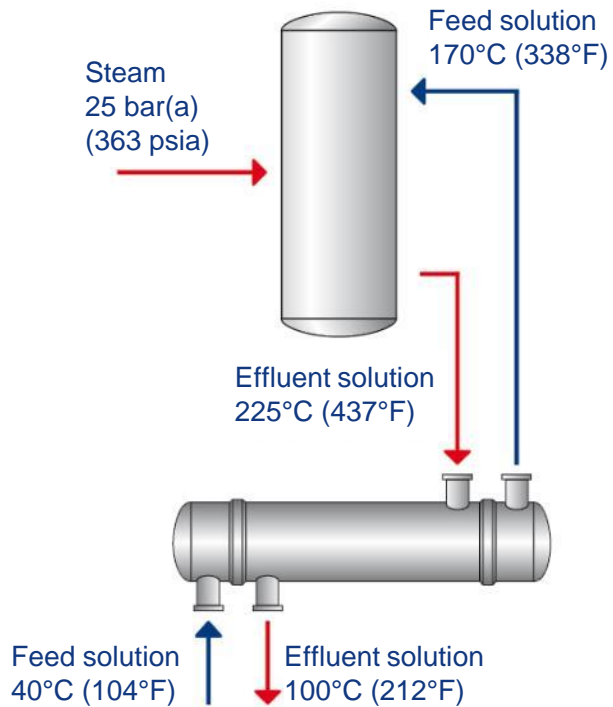
Energy efficiency – Heat recovery example

– Feed/Effluent heat exchanger – condensate stripper

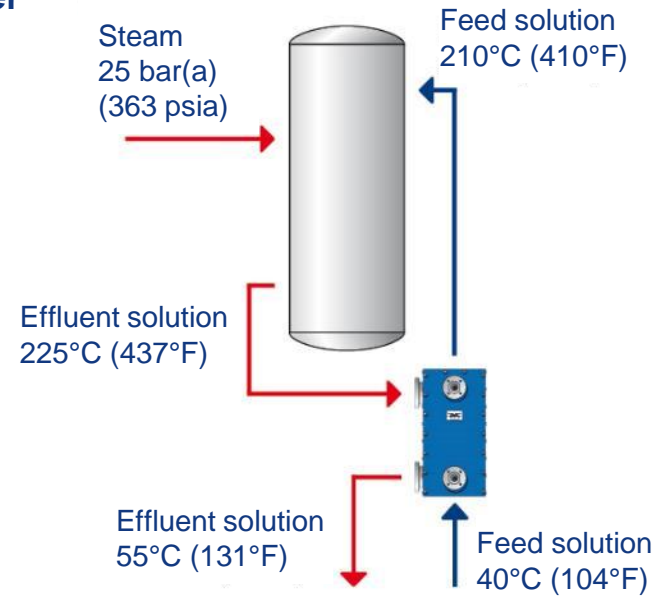


Increasing the level of preheating in interchanges reduces heat consumption

Before



After



3.8 MW (13 MMBtu/h) recovered

1 M€ savings per year



32,500 MWh
Annual Energy savings



141,300 m³/year
Water savings



6,400 Tonnes CO₂
Annual emission savings



Increased production

Agrochemicals

– Production set up

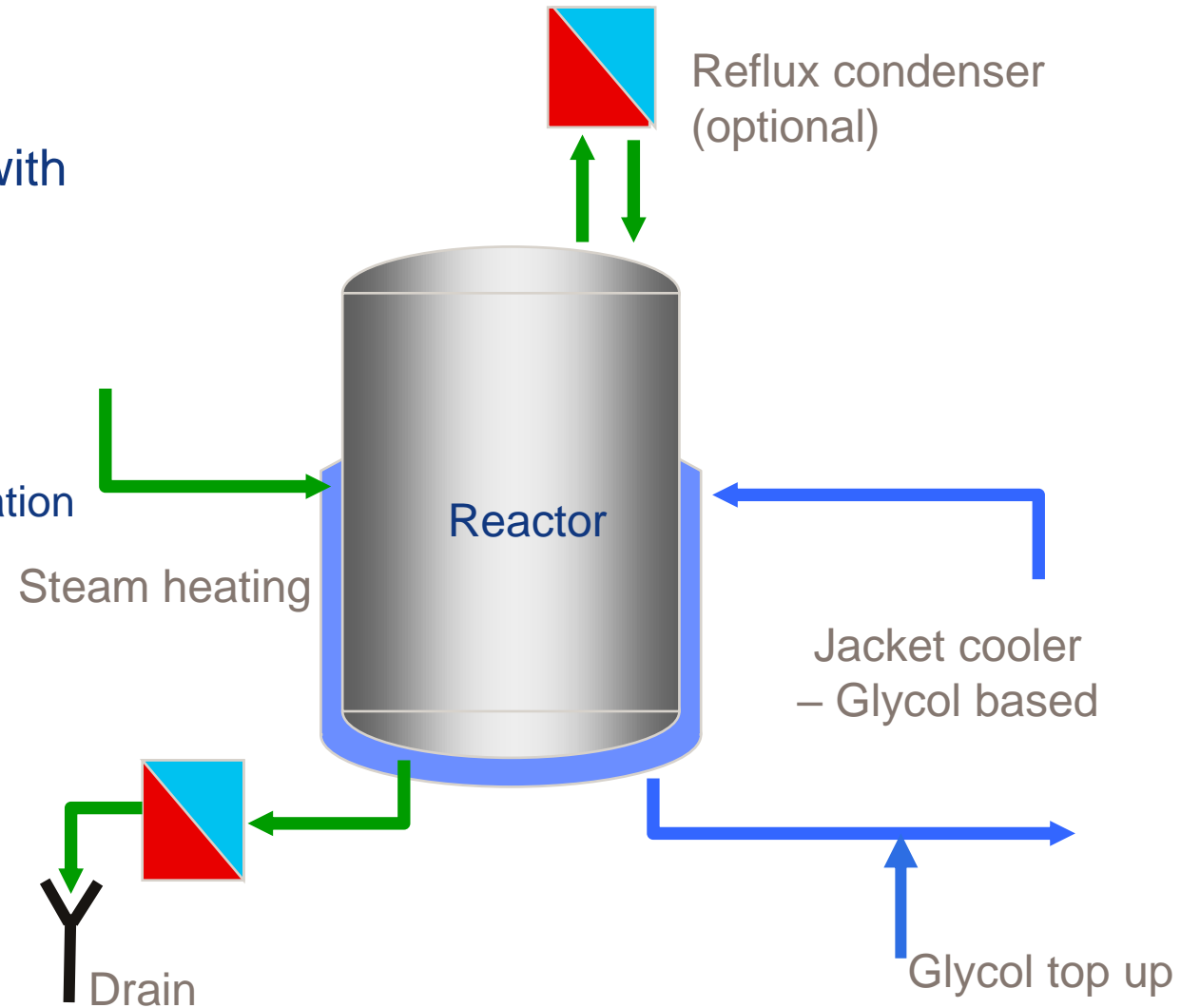


- Production of Agrochemical is traditionally made:
 - In batches
 - Small quantities
- Product Specification are:
 - Very precise
 - Lot of varieties
- That what drives the production to be made in close individual reactor



Traditional set up

- Using S&T for controlling the reactor comes with few drawback
 - Heavy thermal inertia
 - Poor thermal efficiency
 - Thermally no flexible
 - Dedication to a specific process in a reactor installation
 - Difficult or even impossible to clean
 - Extremely sensitive to corrosion

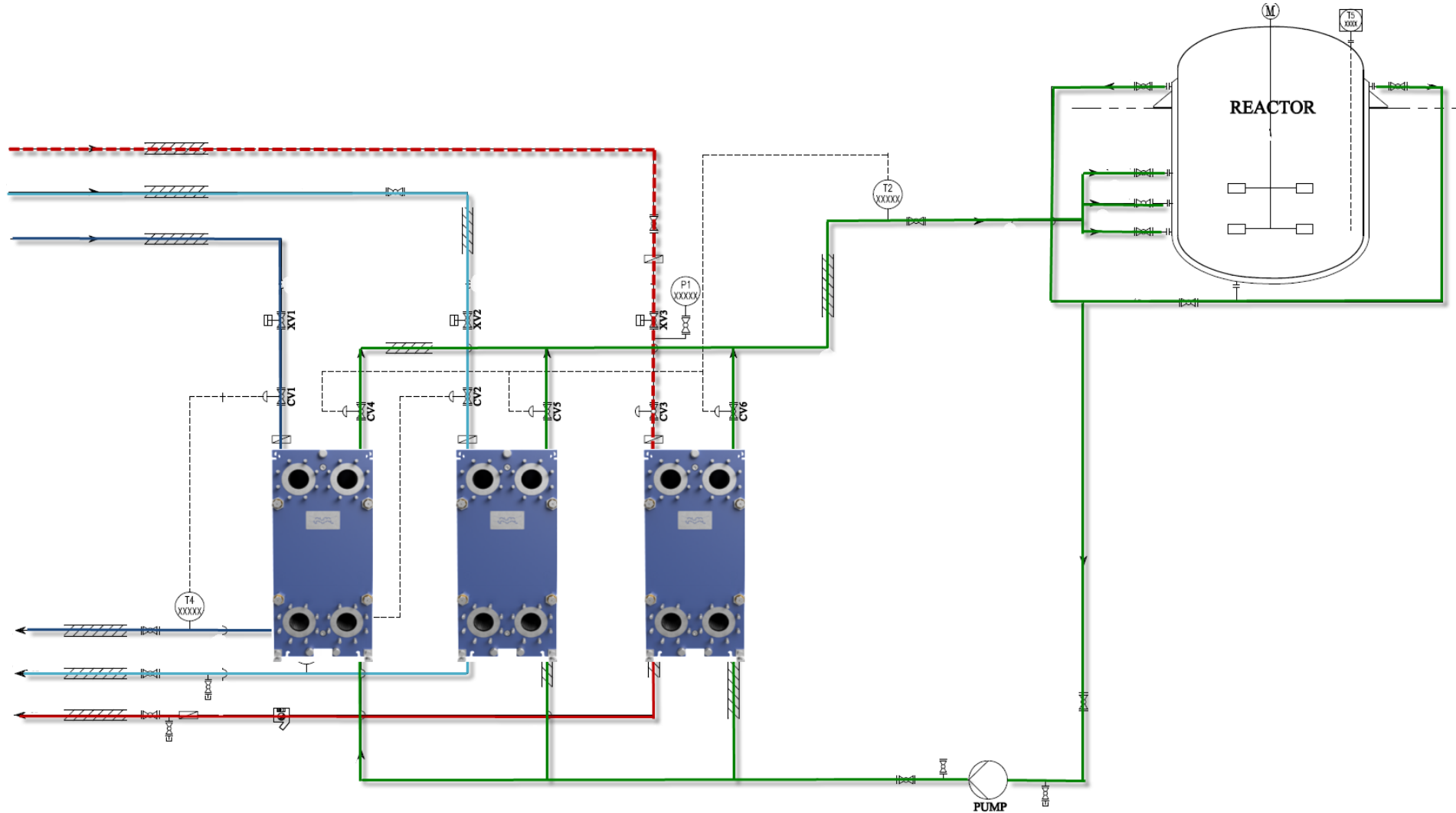


New layout with GPHE

- Not a revolution, but a update with what is best on the market today



Steam
CWS
Glycol



Indirect heating and cooling in the chemical industry

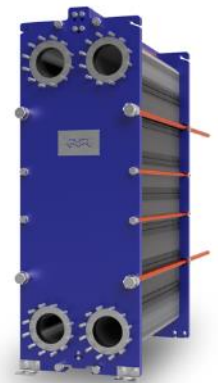
– Deccan Fine Chemicals. Andhra Pradesh, India



“Providing a product that is tailor made to fit a customer’s specifications is what we are best at, so working with a company that can do the same for us is paramount. With Alfa Laval, we didn’t have to pick between performance, cost, or energy efficiency because they found a solution that is made for our operation.”

Mr. KVLP Raju
Director-Technical at Deccan Fine Chemicals-Tuni

With Alfa Laval T series plate heat exchangers in their reactors, Deccan Fine Chemicals could optimize the temperature of all their batch processes without having to worry about costly shutdowns or maintenance from fouling.



Emission savings



Cost savings



Water savings

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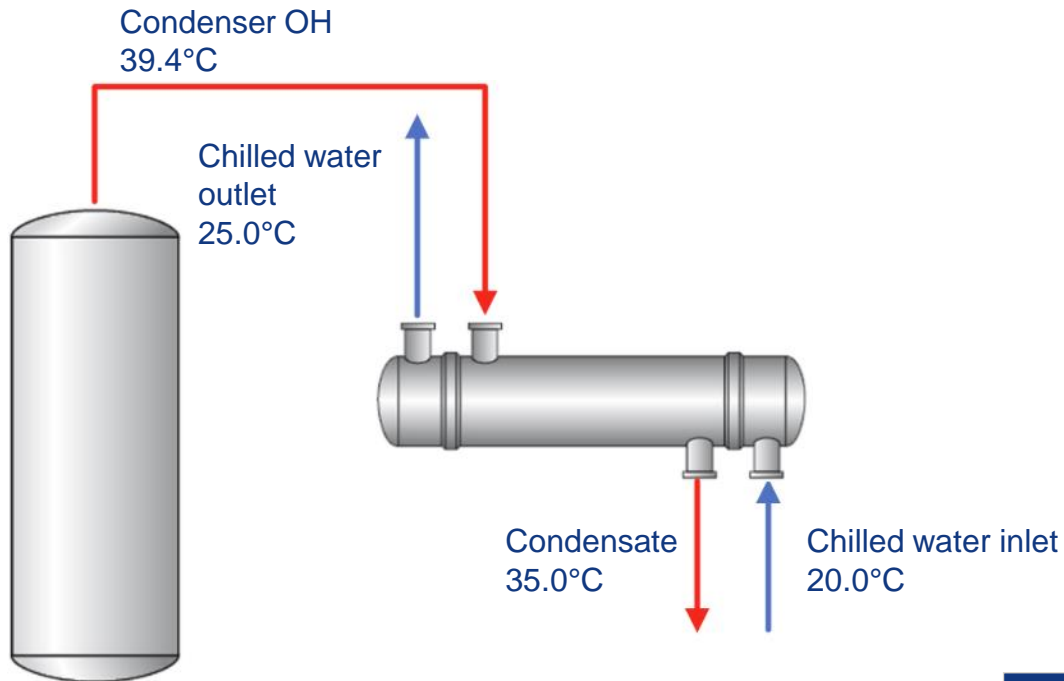
Energy Hunting – Heat recovery example

– Methylene dichloride condenser



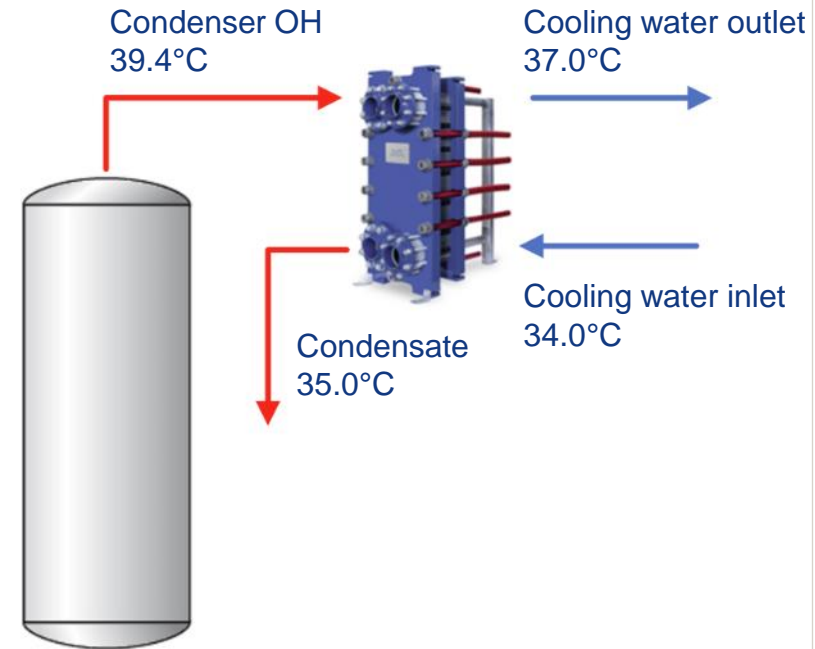
Removing need of chilled water by tighter temperature approach

Before



180 kW Duty
228 MWh saving

After



Less than one year payback!



228 MWh
Annual Electricity savings



118,000 m³/year
Chilled water savings



161 Tonnes CO₂
Annual emission savings



1.6 M INR
Annual OPEX savings

Cutting energy emissions and cost

– Balaji Amines, BAL, Tamalwadi, Maharashtra, India



Thanks to the efficient Alfa Laval compact heat exchangers, amine producer BAL have been able to reduce production cost while maintaining their world-class technology.

The first installation of eight Compablocs alone gave savings of around USD 700,000 per year in reduced energy cost. Today, BAL has more than 60 Compablocs, spiral, semi-welded and gasketed heat exchangers from Alfa Laval in its plants.



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40% reduction
Steam consumption



Emission savings



Reduced OPEX



Cleaning in hours
Increase uptime

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Energy Hunting in Equipment – How we can help?

– HVAC & Utilities



Chiller turn off during winter Free Cooling

Heat recovery from waste water

Heat recovery from flash steam

Chiller condenser protection

Heat recovery from Air Compressors

Technology transformation from S&T

Chiller pre-condenser desuperheating

Heat recovery from Cooling Tower return

Cooling tower interchanger



Why Heat recovery & Benefits of Desuperheater

Energy Hunting with Alfa Laval , Case study, Installation, ROI & Payback

- Utilizes Heat energy available in Refrigeration Cycle which otherwise goes to waste.
- Hot Water can be generated from this available heat energy from 30 deg C to approx. 60 to 75 deg C



- Boiler fuel savings
- Indirect benefit reduction of condensing load & Electrical power in cooling tower
- Less scale formation on condenser surface
- Simple and Operator friendly operations.

Hot water generated thus can be used for

- Boiler Feed Water
- Hot Water for CIP
- Hot water for washing.

**100KW SWPHE
Desuperheater**



**Energy saved
354,000 kWh per year**



**Cost savings
3MINR annually**



**290,000 kg/year
Emission savings**

Contact for More Information

– Alfa Laval



Uday Mahajani

Lead - PRODUCT & APPLICATION SUPPORT

[Email Id: uday.mahajani@alfalaval.com](mailto:uday.mahajani@alfalaval.com)

Mobile No: 9822412599



Energy Efficiency *The First Fuel*