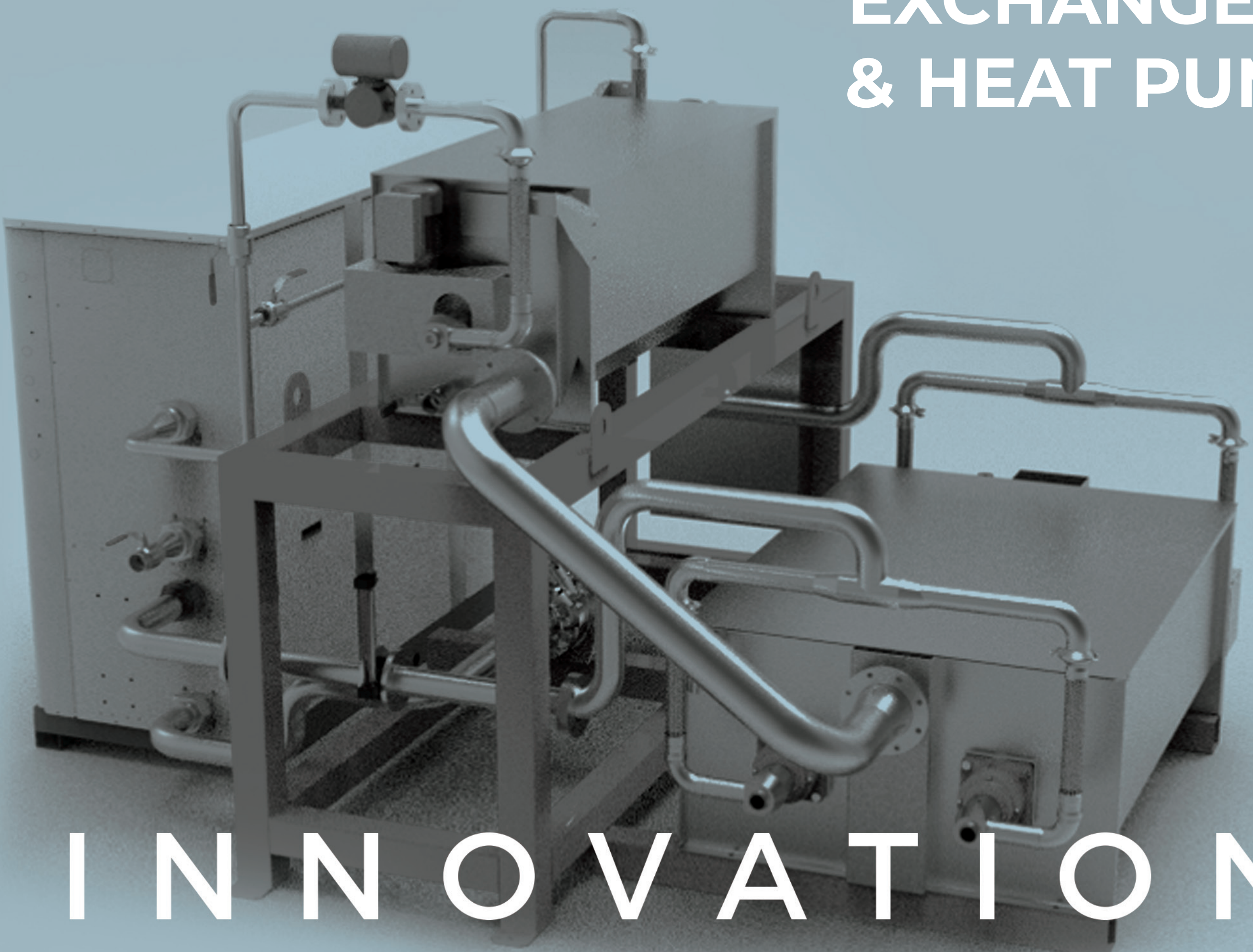
RHEX HEAT EXCHANGERS & HEAT PUMP



INNOVATION

HEAT RECOVERY AND UPGRADE TECHNOLOGY

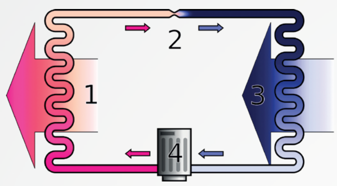
HEAT **EXCHANGERS**

Heat exchangers have a limit: as they can only recover up to whichever temperature the warmer fluid is. Furthermore, in many industrial applications the **temperature** of the discharged effluents is **lower** than the actual request of the process. This can depend on a variety of reasons such as cooling during the process, mixed drains with other processes, etc.

HEAT **PUMPS**

Shifting from a purely 'passive recovery' system such as a heat exchanger, to an integration with an active system such as a heat pump, can finally solve this limitation. Most **heat pumps** today work on a **vapor-compression cycle** (fig. 1), whose benefit is a **real increase** in the **temperature** given to the heat sink if compared to the source. In an industrial application, the source (on the evaporator side) is the effluent, while the sink (condenser side) is the fresh water to be fed to the system.

Fig. 1



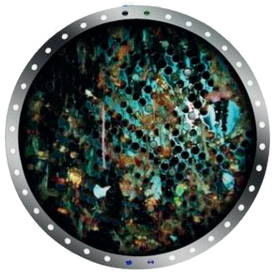
1. CONDENSER
2. EXPANSION VALVE
3. EVAPORATOR
4. COMPRESSOR

The fluid cycle as it enters the compressor as a low pressure low temperature vapor, through the condenser and the expansion valve (where it drops drastically in temperature), and through the evaporator where it gathers heat from the source and vaporizes completely. The cycle then starts over when the fluid passes through the compressor once again.

THE **ISSUE**

Heat pumps however, suffer from the same issue as traditional heat exchangers: the **inability** to effectively **work with dirty or troublesome fluids** due the fouling* that normally occurs on the surfaces of the exchanging areas.

*Fouling is the accumulation of unwanted material within a processing unit or on the on solid surfaces of the unit to the detriment of function.



Example *of fouling in traditional heat exchangers (shell & tube).*

POZZI **SOLUTION**

Instead of feeding the dirty effluents directly to the evaporator side, a closed circuit can be implemented in the system thus allowing the RHeX to act as a direct **intermediary** in between the **dirty source** and the **evaporator side.**

BENEFITS

1. The heat exchanger is passively recovering energy at a high efficiency at virtually zero consumption

2. The heat pump can be smaller (less powerful) and reach the desired temperature

3. Clean water is pre-heated (or pre-cooled, depending on the application), raising global efficiency

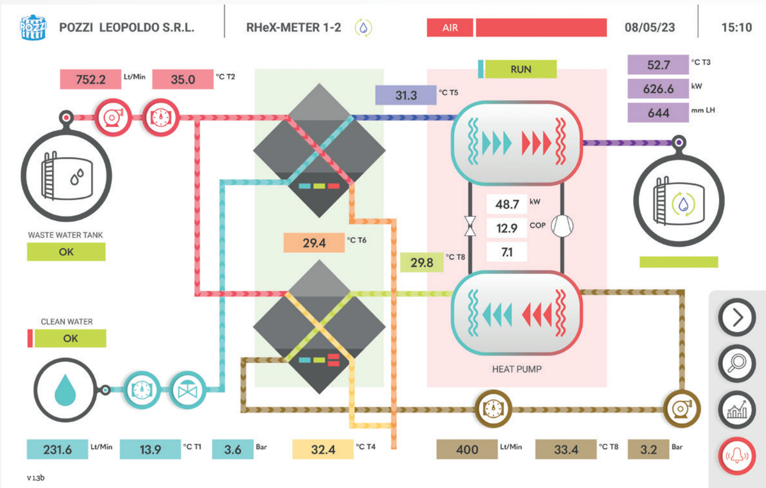
4. Lower difference between input/output temperature on the condenser side, raising efficiency and lowering consumption

5. The heat pump is more efficient, thus granting a higher COP (Coefficient Of Performance)

CASE STUDY

HEAT RECOVERY AND UPGRADE SYSTEM

installed by POZZI in ITALY



In this plant, the global COP (Coefficient Of Performance) of the entire system is on average 12.9, meaning that each kW of electricity entering the system generates 12.9 kW in useful thermal energy.

THE **ENVIRONMENTAL IMPACT**

Electricity generates ZERO[1] carbon emission.

[1] *Granted that not all countries generate electrical energy solely from clean sources, this is not a reality today. However the potential is there, and if we start implementing technologies such as these in our factories, whenever this potential will be achieved, our factories will too be able to work with green energy.*