SCREW, SCROLL & SEMI-HERMETIC

HEAT RECOVERY

INVERTER®

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1. PROFIT ON WASTE HEAT

Rising energy prices are major challenge for many industrial planst. The days of cheap energy era over, and energy efficiency is becoming a crucial success factor.

Great potential...

The good news is that most sites have a considerable unexploited potential for energy savings. A report from the International Energy Agency states the industrial planst throughout the world are using about 50% more energy than necessary. By switching to the most energy-efficient technology available, companies can makehuge savings and significantly reduce environmental impact.

...for higher profitability

Recovering wast heat using compact heat exchangers is straightforward and easy way to boost the energy efficiency of plant. The investments are often very profitable and payback periods often less than one year

Many process industries are already recovering heat, but use shell-and-tube technology. Switching to compact heat exchangers boosts the energy efficiency and is a very good investment in most cases.

<1 YEAR

Payback periods for waste heat recovery investments are often shorter than one year thanks to the high thermal efficiency of Alfa laval's compact heart exchangers.

BARCELO: PUERTO VALLARTA

AQUASNAP TM

AIR-COOLED SCROLL CHILLER

1.2 WASTE HEAT RECOVERY

An effective way to increase energy efficiency is to recover waste heat.
The process industry mainly consumes two types of energy:

- Fossil fuel to generate process heat

The energy and cost saving potential is closely linked to the “ow of heat in the plant in most cases. The basic idea behind waste heat recovery is to try to recover maximum amounts of heat in the plant and to reuse it as much as possible, instead of just releasing it into the air or a nearby river.

1.3 HEAT EXCHANGERS

A key component in waste heat recovery is the heat exchanger. The profitability of an investment in waste heat recovery depends heavily on the efficiency of heat exchangers and their associated life cycle costs (purchase, maintenance, etc).

Different designs

All these factors vary considerably between different heat exchanger techonologies. Although compact heat exchangers are very common in the process industry today, shell-and-tube heat exchangers are still dominating.

Compact heat exchangers have many benefits over shell-and-tubes:

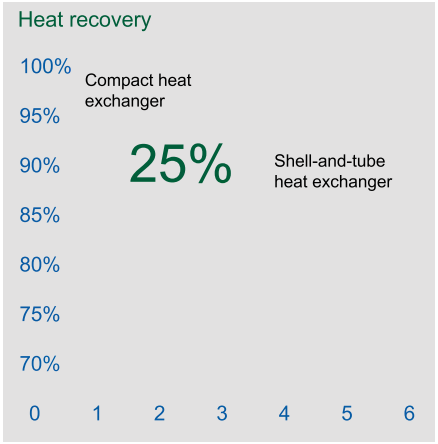
- **Up to five times higher heat transfer efficiency**
- **Lower costs for both initial investment and maintenance**
- **Much smaller in size**

These arguments are especially true for heat recovery services where the differences are maximal.

An important choice

The choice of heat exchanger is very important and has a direct impact on the bottom-line result. In fact, replacing old shell-and-tubes with new comtems is often a very good investment, thanks to the strong benefits.

The diagram shows the heat recovery level as a function of initial const. The yield from compact heat exchangers is up to 25% higher than for shell-and-tubes at a comparable cost. To reach the same levels of heat recovery, shell-and-tube solutions often became several times more expensive. The basis of compar-ison is a BEM shell-and-tube system with stainless stell tubes and fusion bonded AlfaNova compact heat exchangers. For more details, please visit www.alfalaval.com/waste-heat-recovery



x5

Compact heat exchangers are up to five times more efficient than shell-and-tubes, making heat recovery profitable even where the energy sources traditionally have been deemed worthless.

2. SEVEN WAYS TO PROFIT FROM WASTE HEAT

Before investing in waste heat recovery it is important to analyse all potential gains, and assess the profatibility of the investment.

There are eight ways to profit from waste heat:

- **Saving fuel to water Heating**
- **Using heat to generate Rooms, WC, Services Hot Water**
- **Increasing Water consumption in evaporative cooling tower**
- **Reducing capital investment costs in Heaters systems**
- **Reducing greenhouse gas emissions**
- **Reducing Cooling Towers Maintenance and Use**

Most plants have the opportunity to make use of recovered energy in several ways. The optimum mix depends on the specific characteristics of the plant, its location, and energy prices.

2.1 SAVING FUEL

Process heat is usually generated in steam boilers and/or infrared heaters/furnaces. In both cases, waste heat recovery can lead to substantial fuel savings.

Process heat from steam boilers

Recovering waste heat often reduces the need for steam in a plant. Consequently the boiler's fuel consumption is reduced, as are greenhouse gas emissions and the load on the cooling system.

Recovered heat can also be used for preheating the boiler feed, lowering fuel consumption.

Chillers Carrier Heat Recovery Chillers Systems Recover often 5 times Heat than Shell and Tube heat Exchangers

Process heat from fired heaters/furnaces

The fuel consumption of a infrared heater/furnace can be reduced by using waste heat from the Chiller for preheanting the heater feed. Again, this reduces fuel bills, cooling system load, and greenhouse gas emissions.

2.2 REDUCING COOLING NEEDS

Recovering heat often has positive effects on the cooling system. The more heat is recovered and reused, the less it needs to be cooled off after the process steps. This can be valuable in a number of cases.

Chillers Carrier Heat Recovery Chiller Systems
Reduce the Cooling Tower water consumption and Motor Fan Energy use.

2.3 REDUCING UTILITY INVESTMENTS

Considering heat recovery can lead to substantial savings in both new and existing Cooling plants when planning new utility investments. It can cut both future operating costs, utility systems and capital investment costs.

Recovering process heat reduces investment costs in systems for heat generation and cooling, as well as costs for space.

Boilers and burners

Recovering heat leads to a lower need for new heat, reducing the capacity of boilers, direct #red heaters and furnaces.

Water Tower Cooling

The first thing to consider when planning new cooling capacity is how to reduce the input of heat into the system. Recovering heat reduces the cooling need and cooling tower of less capacity will sur-

2.4 REDUCING GREENHOUSE GAS EMISSIONS

Since waste heat recovery often leads to significant fuel savings, co2 emissions are often reduced. The primary benefit of lower emissions is of course the positive effects on our environment, but they can have monetary value as well.

Many parts of the world have, or are about to introduce, emissions trading systems (cap and trade), the European Union emission Trading Scheme being the largest in use.

After implementing waste heat recovery systems, companies may find they have unused emission permits. These can then be sold if the company is operating under a cap and trade system.

Incountries without cap and trade systems there may still be possibilities to sell emission permits to other parts of the world through the UN's "exible mechanisms.

CO2 EMISSIONS