

Ecochillers

Ultra Series

Waste heat recovery Chillers
– Optimizing your energy system



Volcanoes are extraordinary sources of energy. For example, the Laki eruption of 1783 in southern Iceland produced 15 km³ of lava. The heat released from the lava measured 80 exajoules; enough energy to keep all the world's industries running for six months ...

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1. Profit on waste heat

Rising energy prices are a major challenge for many industrial plants. The days of cheap energy are 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 plants throughout the world are using about 50% more energy than necessary. By switching to the most energy-efficient technology available, companies can make huge savings and significantly reduce environmental impact.

... for higher profitability

Recovering waste heat using compact heat exchangers is a straightforward and easy way to boost the energy efficiency of a 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 heat exchangers.

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 flow 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 technologies. 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:

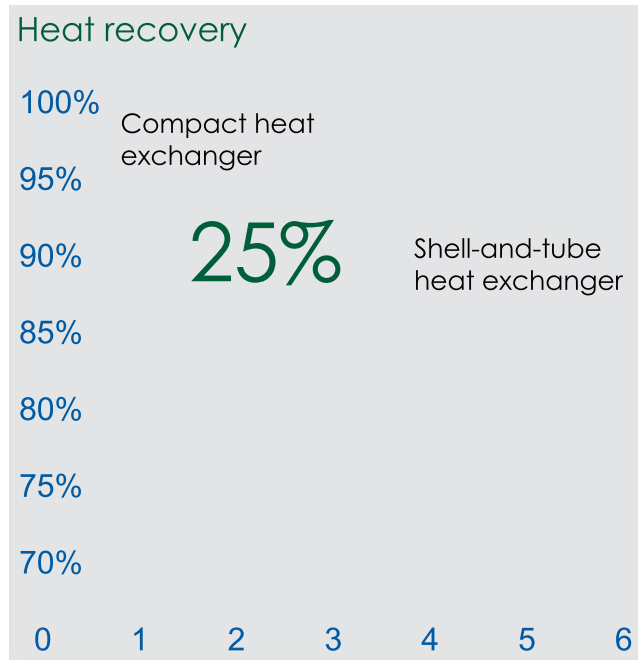
- Up to five times higher heat transfer efficiency
- Lower costs for both initial investment and maintenance
- Much smaller in size

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 compact heat exchangers in existing heat recovery systems is often a very good investment, thanks to the strong benefits.

The diagram shows the heat recovery level as a function of initial cost. 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 become several times more expensive. The basis of comparison is a BEM shell-and-tube system with stainless steel tubes and fusion bonded AlfaNova compact heat exchangers. For more details, please visit www.alfalaval.com/waste-heat-recover



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.

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2. Seven ways to profit from waste heat

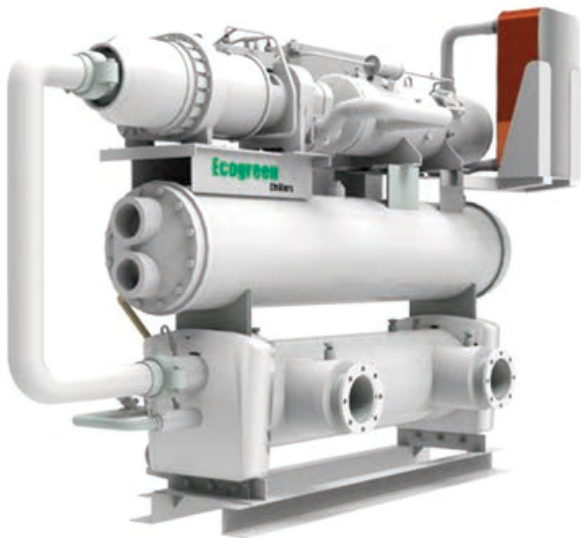
Before investing in waste heat recovery it is important to analyse all potential gains, and assess the profitability of the investment.

There are eight ways to profit from waste heat:

- Saving fuel to Water Heating
- Using heat to generate Rooms, WC, Services Hot Water
- Increasing Efficiency in Cooling systems
- Reducing 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.

Ecogreen 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 an infrared heater/furnace can be reduced by using waste heat from the Chiller for preheating the heater feed. Again, this reduces fuel bills, cooling system load, and greenhouse gas emissions.

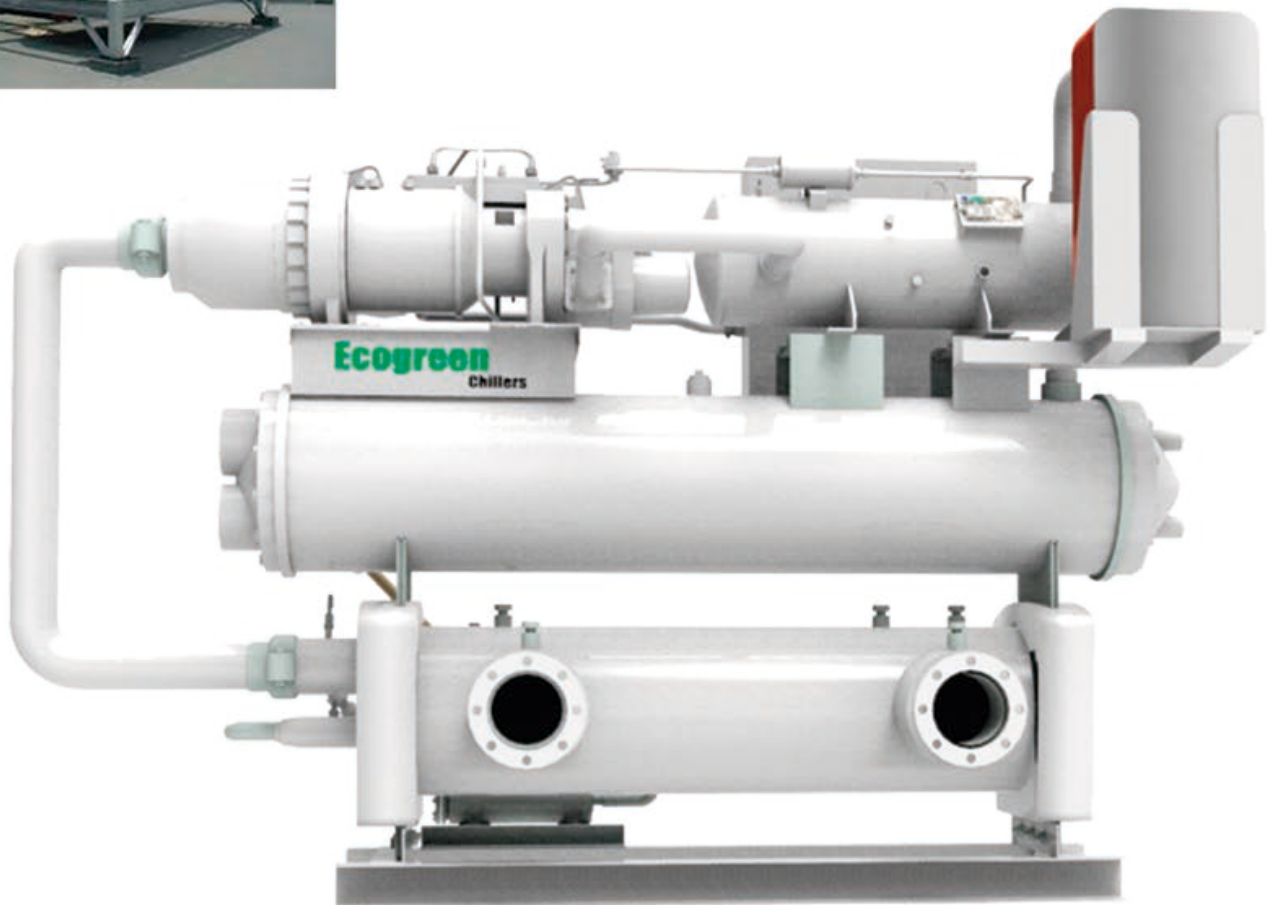


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2.2 Reducing cooling needs



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.



Ecogreen Heat Recovery Chiller Systems
Reduce the Cooling Tower Water consumption and Motor Fan Energy use.

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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 need 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 a cooling tower of less capacity will surface.



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.

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

CO₂ emissions