

CASE STUDY:

LACKEBY HEAT EXCHANGER AIR/WATER RYAVERKET WWTP, SWEDEN



Lackebys heat exchanger recovers 35% of the supplied electrical power to the blowers

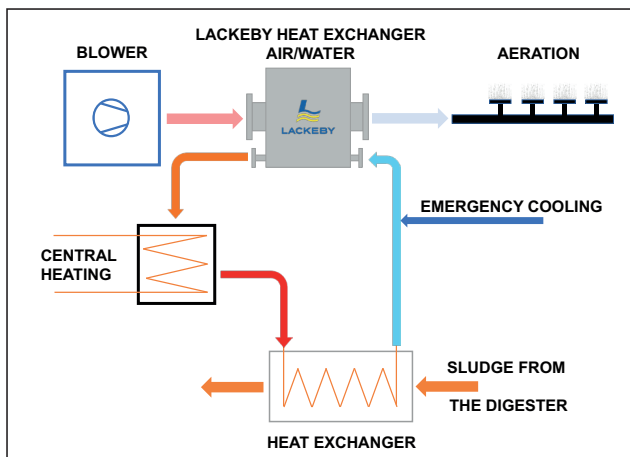
Already in 1995, during the refurbishment of Ryaverket WWTP, the plant had a big focus in energy management. They wanted to maximise any energy recovery as well as lowering the operational costs in terms of maintenance cost and manhour used for maintenance.

The blowers that distribute aeration into the biological tanks was generating a lot of heated air that was wasted when heating the wastewater. To recover this energy as well as lowering the lifetime of the EPDM membranes was a priority identified by Ryaverket WWTP.

Gryab AB

Gryab AB is a municipality owned company that is operating the water- and wastewater treatment plants in Ale, Gothenborg, Harryda, Kungälv, Lerum, Molndal and Partille. They have totally 760 000 persons plus industries connected.

Looking at the amount of the treated wastewater, Ryaverket WWTP is the biggest in the Nordic countries. And average day around 4 000 litres per second is treated.



Lackebys solution:

Lackeby Heat exchangers air/water is installed just after the blowers. The operation of the blowers is done by keeping a pre-set pressure in the aeration system.

The water side of the heat exchangers are connected to the return water from the sludge/water heat exchangers that is heating the sludge in the digesters. The heat exchangers are transferring the recovered heat from the blowers to the water before it goes back to the central heating system.

In order to avoid air temperatures above 70°C to enter the membranes, which is the breaking point for accelerated aging for EPDM rubber, there is a emergency cooling system installed. The systems way of working is that if the air going to the membranes exceeds 70°C the energy recovery is disconnected and only cooling water is going through the heat exchangers cooling the air additionally.

The cooling media is treated wastewater and has a much lower temperature than the return water from the sludge/water heat exchangers which increases the cooling capacity. The cooling media is directed back to the wastewater treatment process why no energy recovery takes place during the emergency cooling.

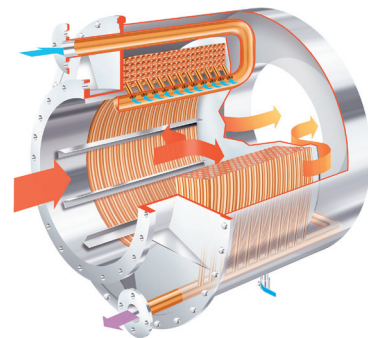
The result:

During 2009 Ryaverket WWTP was recovering 174kW from the heat exchangers. The energy cost 2009 was 42 Euro/MWh which gives a cost saving of 64 000 euro/year.

If the installation was to be done today the calculated pay-back time would be 1-2 years all depending on the amount of equipment that needs to be installed. In this calculation only the energy recovery is considered

Another important factor is the reduced aging effect on the rubber membranes. How big this cost saving is has not been calculated. Although it can be concluded that when changing membrans between years 2006 and 2009 the mebranes was not fully worn down but could have been used for additional years. Since the membranes was installed during 1995 and 1996 this indicates a lifetime of at least 15 years.

As comparison, other large WWTP with similar capacity and not using the air/water heat exchanger have been forced to exchange the membranes every fifth year which is both costly and time consuming.



Cross-section of Lackeby heat exchanger air / water.

"During the 15 years of operation we have only once been performing maintenance of the heat exchangers for air/water why the maintenance cost is neglectable".

Christer Hansson, Gryab AB.

Lackeby Products AB has more than 50 years of experience in designing and manufacturing high performance products for resource-efficient heat recovery and wastewater recycling. In our production facilities in Sweden we have made thousands of products for the toughest environments worldwide. We are well known for our ability to customize products to each customer's unique requirements.

All of our products are characterized by reliability, long life cycles and easy maintenance making Lackeby Products a trusted partner and supplier of products for plant upgrades or new plant constructions. We guarantee high quality, excellent performance and complete satisfaction.