

# FLUE GAS CLEANING AND ENERGY RECOVERY AT UMEÅ, SWEDEN



## Dåvamyran Project

Umeå Energi AB has built a totally new heating and power plant to incinerate waste and bio-fuel, at Dåvamyran, approximately 15 km north-east of Umeå in northern Sweden.

The operation commenced in the spring of 2000.

The plant is designed to fulfil the future stringent EU environmental requirements and it is probably the most efficient plant in the world of its kind in regard to extensive energy recovery.

Götaverken Miljö AB supplied the flue gas cleaning plant plus gas condensation system, the heat pump facility and the turbine set.

## PLANT DESIGN DATA

Supplier: Consortium between  
Götaverken Miljö / Von Roll

Furnace type: Water-cooled grate type  
for waste and bio-fuel

Boiler output: 55 MW heat for district heating

### Flue gas cleaning:

Designed and supplied by: Götaverken Miljö AB

Process: Bag house filter, acid  
scrubber, SO<sub>2</sub>-scrubber and  
water treatment

### Energy recovery:

Designed and supplied by: Götaverken Miljö AB

Process: Flue gas condenser, heat  
pumps and back pressure  
steam turbine & condenser

Output, MW:

Flue gas condenser	11
Heat pumps	2 x 5.7
Turbine (electricity)	15
Turbine condenser	40



### Atmospheric emission limits (24-hour average)

Substance	Limit	Unit
Dust	5	mg/Nm <sup>3</sup>
HCl	5	-"
HF	1	-"
SO <sub>x</sub>	25	-"
NH <sub>3</sub>	5	-"
Cd + Tl	0.05	-"
Hg	0.03	-"
Dioxin	0.1	ng/Nm <sup>3</sup>

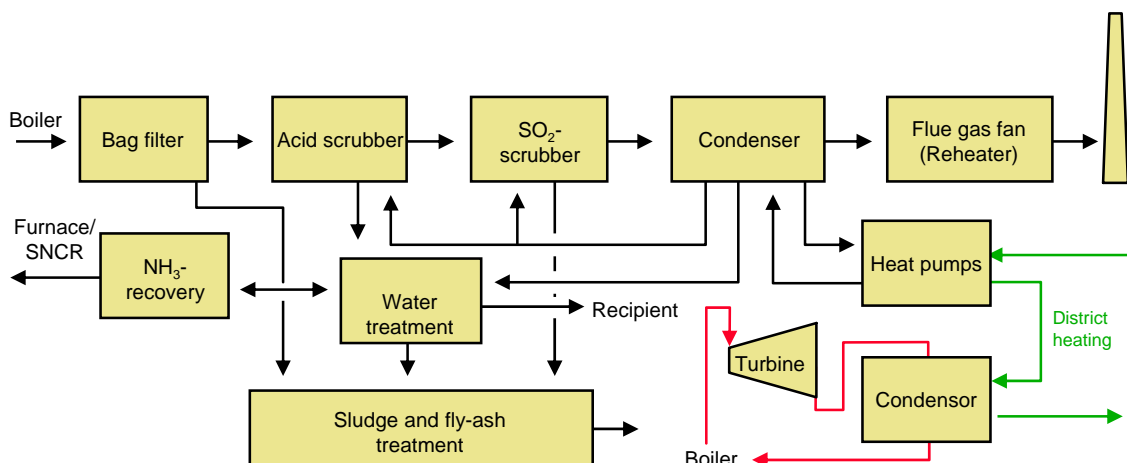
## Plant description

The plant incinerates 175,000 tons of municipal waste yearly (20 tons/hour). Simultaneous incineration of bio-fuel is also possible.

As a result of Götaverken Miljö's extensive energy recovery system, the thermal efficiency of the incineration plant is 100% or more! The technique is based on the fact that latent heat in flue gas, chiefly in water vapour, is recovered in a condenser connected to a heating pump system. This energy is then transferred into the district heating system of Umeå city. By definition, the energy in the water vapour is not included in calculating the efficient heating value of a fuel, and thus efficiency levels of over 100% can be obtained when recovering this energy!

The Umeå district heating system delivers approximately 750 GWh/year. Dåva heating and power plant has a total heat production of 350 GWh/year, of which 20% originates from the flue gas condenser. In addition, approximately 80 GWh/year of electricity is produced.

The flue gas cleaning takes place in a fabric filter followed by an acid scrubber, an SO<sub>2</sub>-scrubber, and a gas condenser. Water is also recovered from the gas. Thus, the cleaning process is self-sufficient in regard to water.



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