RABTHERM ENERGY SYSTEMS

Future-oriented further developments: Waste water heat utilization plants with a return on investment (ROI) of 2 - 6 years

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Sewage is dirty and stinks. Out of sniffing distance – out of mind. Up until the 1980s sewage was taboo and not given the attention it deserves.
One cold winter morning in 1988, 23 years ago, Urs Studer stopped beside a steaming manhole cover and wondered how such a source of heat could go untapped. Ever since he has been dedicating himself intensively to the recycling of sewage heat. At the time of the first oil crisis the heat loss as a result of discharged sewage amounted to approx. 12-15 %. In new buildings the loss of waste water heat already amounts, in accordance with the applicable energy regulations, to 45-50 % and this proportion will increase.
Today the heat contained in waste water fortunately no longer simply goes down the drain, or sewer, until it is utilized for the cultivation of bacteria in the sewage treatment plants.
Dirt became gold.

Insertion into existing sewer

Integral heat exchanger for new sewers

That is all very well – but is that all? Well, Urs Studer would not be Urs Studer if he was satisfied with this. The plants have to be economical. Let us again turn the clock back a few years and pose ourselves the following question:

What happens to the heat exchangers in the sewage on its way through the sewerage network? Organic substances are deposited on the moistened heat transfer exchangers. As a thin, viscous layer they help the microorganisms in the sewage to adhere to the heat exchanger surface. In this way an up to 5 mm thick biofilm gradually develops. This layer of what is called sewer slime has an

insulating effect on the heat exchangers.
Clearly it can be flushed away with high pressure. But what a recurrent effort.

Here again a stroll in the fresh air triggered another ingenious idea: This biofilm is missing on rooftops which are, for example, fitted with copper-edged chimneys; the roof tiles remain clean:

This gave rise, in 2004, to the development of the anti-fouling system, which prevents the heat extraction rate from dwindling by up to 50% as the thickness of the biofilm increases:
Every 3 meters thin copper strips are integrated into the heat exchanger chain:

Measurements carried out at sewage treatment plants of various sizes demonstrate that the anti-fouling system is absolutely harmless for the treatment plants. The results of the measurements can be requested at info@rabtherm.com.

So heat exchangers do not have to be slimey and insulating. They have to conduct heat well. With a lot of time and money a new ferritic steel was developed which makes it at least as suitable for withstanding corrosion and erosion as the previously used material. In addition, it was possible to increase the thermal conductivity by over 80%.

Sewage is also suitable for recooling cooling plants. Normally Waste water heat recovery plants are constructed bivalently to meet peak demands. Industrial plants whose production yields very warm cooling water can by the way be heated and cooled 100% with sewage energy, monovalently, thanks to our new, scientifically precise software. In such cases it is essential to employ the pressure pipe with a heat extraction **rate of 7 - 20 kW/m²** which is specially suitable for industrial operations:

Pressure pipe

Thanks to all these new developments it was possible to increase the heat extraction rate by up to 40%. That means, without the anti-fouling system and without the new ferritic steel, the heat exchanger chains would have to be 40% longer.

Together with a bivalent process control system, sewage heat recovery plants now score with a **ROI of 2 - 6 years**.

How come our system does not utilize the heat until the sewage reaches the public sewers rather than at the house itself, directly where it arises? Only the public network guarantees a steady, lasting discharge. Sewage heat recycling is possible upstream, in or downstream of the treatment plant. A power range of between 40 and 4000 kW is possible with a specific output of 3 - 9 kW/ m^2 .

How can such sewage heat recovery systems be implemented?

- Components / System
  The heat extraction (heat exchangers with intermediate medium pipes) is only one component in a sewage heat recovery system with in addition
  - connecting pipes and circulation pump
  - heat pump / cooling unit
  - peak boiler
  - infrastructure energy centre with piping, insulation, appliances, regulation
  - process control / I&C

- The owner (private, local authority, energy service provider) wants a turnkey facility with the manufacturer's guarantees regarding
  - power
  - temperature
  - utilizaton coefficient
  - timelines
  - costs

→ Rabtherm offers the following solutions:
  - as general contractor for the owner
  - as general for contractors

→ supplementary services
  - supervision with optimization
  - facility management

→ The owner does not want to be supplied with components. He wants a coordinated compound system with a comprehensive guarantee.

The Rabtherm Energy Systems team would be pleased to answer your questions at any time.

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