Wastewater. Heat. Recovery.

revincus - wastewater heat recovery in residential and industrial buildings.

revincus

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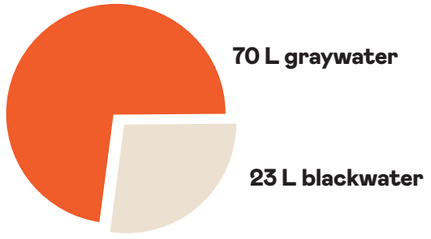
Wastewater - from waste to usable resource.

Wastewater p.p. daily



150 Mio. kWh
30 Mio. €
67 Mio. kg CO_2

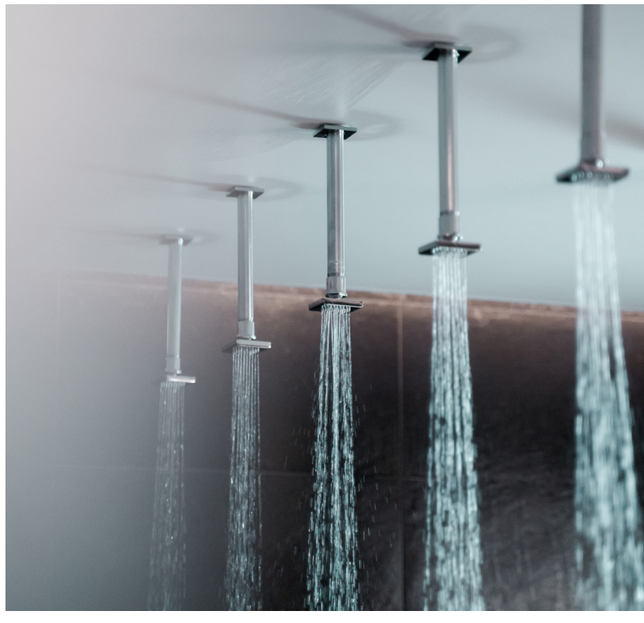
Energy demand, CO_2 emissions & costs for domestic hot water production in Germany daily.

The 21st century is characterized by the pressing goals of reducing energy consumption and CO2 emissions by increasing the use of renewable energy sources. The aim of CO_2 neutrality in building industry, especially in residential constructions, brings new challenges that need to be mastered through technological innovations. A main component is the use of existing energy potential to reduce energy consumption.

Heat recovery from wastewater offers a considerable potential. In Germany, around 150 million kWh of energy are required every day to heat drinking water, thus producing costs of 30 million euros and 67 thousand tons of CO_2.

In the field of decentralized wastewater heat recovery for residential buildings, innovation, alternative approaches and transformative ways of thinking are essential. Technical products of global relevance must be developed sustainably, integrated seamlessly into existing systems, and designed to make economic sense.

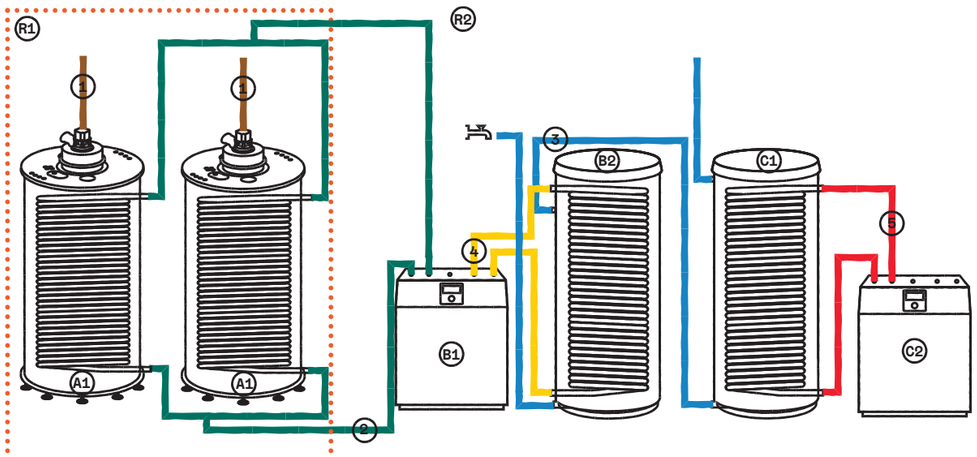
The revincus GmbH has met this challenge and is specialized in developing products for the economical and sustainable use of heat from wastewater.



Around 60% of Germans take a shower every day, using an average of 44 liters water.

ABW-PSW

Waste water puffer storage heat exchanger



A1 revincus-System
B1 Heat pump
B2 Drinking water storage tank
C1 Drinking water storage tank (heating system)
C2 Heating system

1 Graywater
2 Brine heat pump 10-35°C
3 Drinking water
4 Circulation heat pump 35-60 °C

5 Circulation line Heating system

R1 public basement
R2 technical room

The wastewater heat exchanger combined with a heat pump. The extracted heat from the wastewater is transferred to the house's drinking water supply via a drinking water pu erser storage tank.

The ABW-PSW wastewater heat exchanger has been specially developed for heat recovery from domestic graywater.

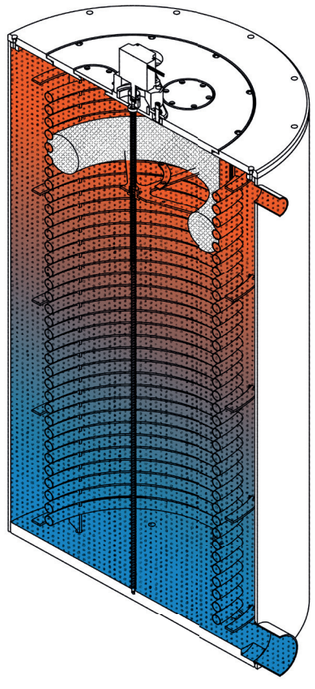
Graywater, which comes primarily from showers, washing machines, dishwashers and does not contain any fecal impurities, is fed into the tank via a connection point in the lid after upstream filtration.

The stored wastewater flows around a corrugated tube heat exchanger made of stainless steel. This helically designed heat exchanger extends over the entire height of the tank and carries the heat source brine of a heat pump.

The heat of the graywater is absorbed by the brine and transferred to the heat pump. The cooled graywater is then fed back into the sewer system.

A brush ring is responsible for cleaning the heat exchanger. By means of a threaded rod it moves vertically up and down to effectively clear the spiral of any debris.

The ABW-PSW enables the permanent heat utilization of the wastewater and, in combination with a heat pump, the integration into various applications, e.g. the provision of hot water.



Example calculation

Efficient recovery of heat from domestic wastewater

The figure below shows the payback period as a function of the number of residents and costs per kWh. A graywater volume of 53 liters with an average temperature of 25 °C per resident is assumed. After the heat exchange process, the graywater is discharged into the sewage system at 8 °C.

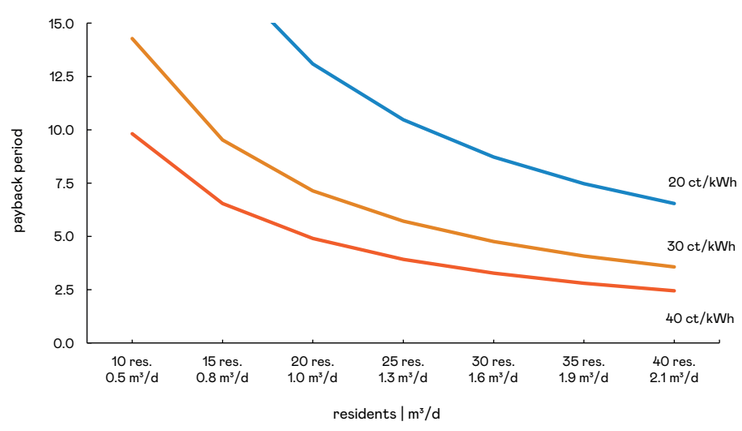
In the example calculation, an ABW-PSW with 700 liters storage volume and a heat pump with 6 kW heat output is used (€25,000 investment).

This system design is suitable for a maximum of 40 people and achieves the shortest payback period at the highest capacity utilization.

The heat pump achieves an average COP of 5, at a target temperature of 55 °C using wastewater heat. The electricity costs for operating the heat pump were calculated at 40 ct per kWh.

Wastewater heat is considered a renewable heat source. This was stipulated in Directive 2018/2001/EU. Systems for heat recovery from wastewater are therefore eligible and can be subsidized with grants of up to 40% of all costs. A non-repayable subsidy of 40% of the investment costs was included in the calculation. With 40 residents, the payback period ranges from 2.5 to 6.5 years.

Payback period depending on number of occupants and energy costs per kWh
25.000 € Invest heat exchanger + heat pump with COP 5, assuming temperature reduction to 8 °C



The main factors influencing wastewater heat recovery can be summarized as follows:

Utilization of the system

With increased demand for hot water, the amount of wastewater rises as well, which increases the efficiency of the system.

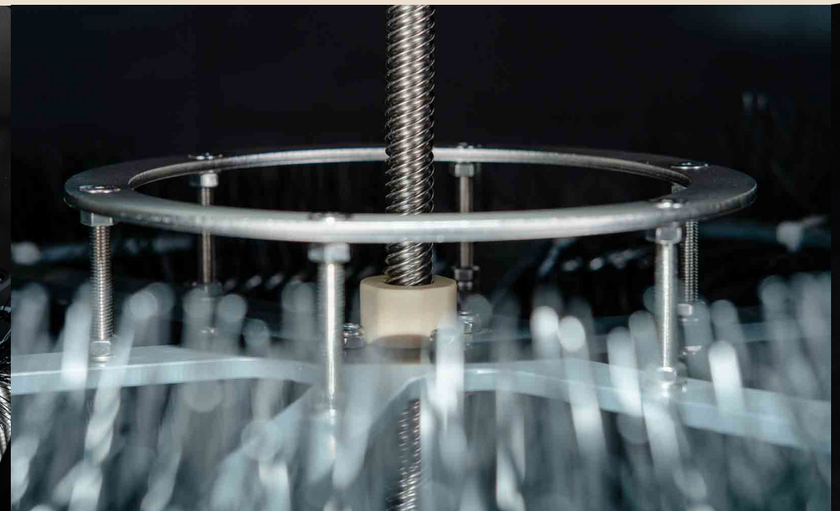
Temperature of the wastewater

The higher the average temperature, the greater the amount of energy that can be recovered. At the same time, electricity consumption is reduced by increasing the COP of the heat pump.

In addition to the integration of wastewater heat recovery in the residential market, there are other effective applications in industry. Here, wastewater is produced in larger quantities and at higher temperatures. This means that shorter amortization periods and highly efficient systems can be realized.

designation	application	output	heatexchanger surface	max. number of people	height	Ø	storage capacity
ABW-PSW 700	household greywater	5,5 kW[1]	6,6 m²	40	1400 mm	780 mm	700 l
connections	heatexchanger overflow greywater drain	DN 20 (1") DN 50 DN 75 DN 110					

[1] use case houshold greywater; drop from 25°C to 8°C in combination with a heat pump



revincus - your expert for waste-water heat recovery in residential and industrial buildings

Planning, design, production, realization, advice on conveyance possibilities and special production

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