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Solutions

Climate-friendly energy network solutions for cities, towns and communities

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Christoph Deiss
Head of Energy Solutions, ewz
Member of the Executive Board

As one of Switzerland's largest providers of turnkey energy solutions, we have already established over 40 environmentally friendly heating and energy networks in cities, towns and communities.

In this magazine we showcase four innovative solutions from Zurich, Herrliberg and Illanz: each network uses locally available resources such as lake water, waste water, geothermal energy or wood.

Our experience shows that project development for the neighbourhoods of the future is particularly successful in close collaboration with all stakeholders.

Whatever project ideas and goals you have – benefit from our expertise. We take on the responsibility of planning and implementing the construction project, and of operating all energy systems safely and efficiently. Thanks to regional operation teams and remote monitoring of all systems, we can guarantee maximum security of supply and short response times.

We look forward to working together with you to pave the way for a sustainable energy future in your region, community, town or city.

'Our energy networks are climate-friendly and cost-effective. They use locally available resources.'

Altstetten and Höngg energy network

Regional value generation and climate action

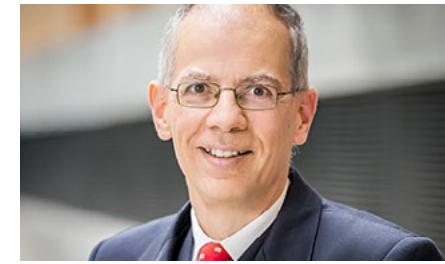
ewz.ch/en/altstetten

The Altstetten and Höngg energy network is a flagship project for the environmentally friendly energy supply of the future. With its thermal heating and cooling networks, it efficiently supplies entire neighbourhoods and districts with renewable and carbon-neutral energy sources.

When fully completed, it will supply approximately 30,000 households with sustainably generated heating and cooling – the largest network of its kind in Switzerland. We are using waste heat from the Werdhölzli municipal sewage treatment plant located nearby and the new Swiss Life Arena as energy sources.

Energy networks make a demonstrably valuable contribution to environmental conservation and climate action. At the same time, they contribute to the sustainable reduction of greenhouse gas emissions and thereby support Switzerland and the city of Zurich with their net-zero emissions target.

Daniel Büchel
Deputy Director and Head of the
Energy Efficiency and Renewable Energy
division of the Swiss Federal Office of Energy



'The Altstetten and Höngg energy network follows the principle of regional, environmentally friendly heating and cooling and is therefore a showcase project for implementing the Energy Strategy 2050.'



The concept in detail



Reto Burkhardt
Head of Sales and Realisation ewz

‘We’re proud of the combination of waste water and sewage sludge as a source of energy – it’s unique within Switzerland.’

What makes this energy network unique?

Previously unused waste heat will ultimately be supplying an entire urban district with energy. The network combines the use of waste heat from treated waste water with the waste heat from the sludge recycling facility of the Werdhölzli sewage treatment plant. In doing so, we use both the direct waste heat and the condensation heat from the exhaust gases. We are especially proud of this combination of environmentally friendly energy sources in one energy network, the only one of its kind within Switzerland. It is particularly suitable for large sewage treatment plants with a sludge recycling facility.

The energy from the treated waste water is transferred via heat exchangers to the energy network, which connects the various energy centres. There, heat pumps bring the temperatures up to the 70 to 80°C required for supplying heat to our customers.

As of summer 2022, the new Swiss Life Arena, which is also connected to the energy network, now provides air conditioning to the connected properties via the district cooling network.

What were the most significant challenges?

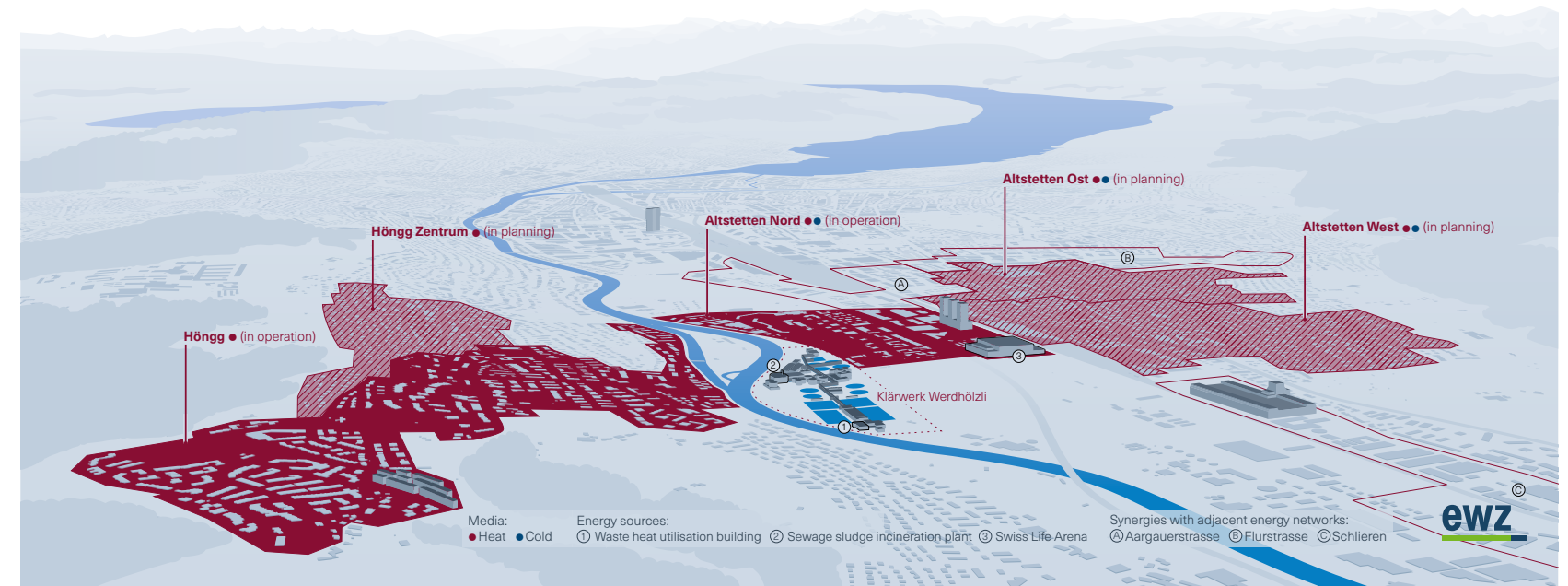
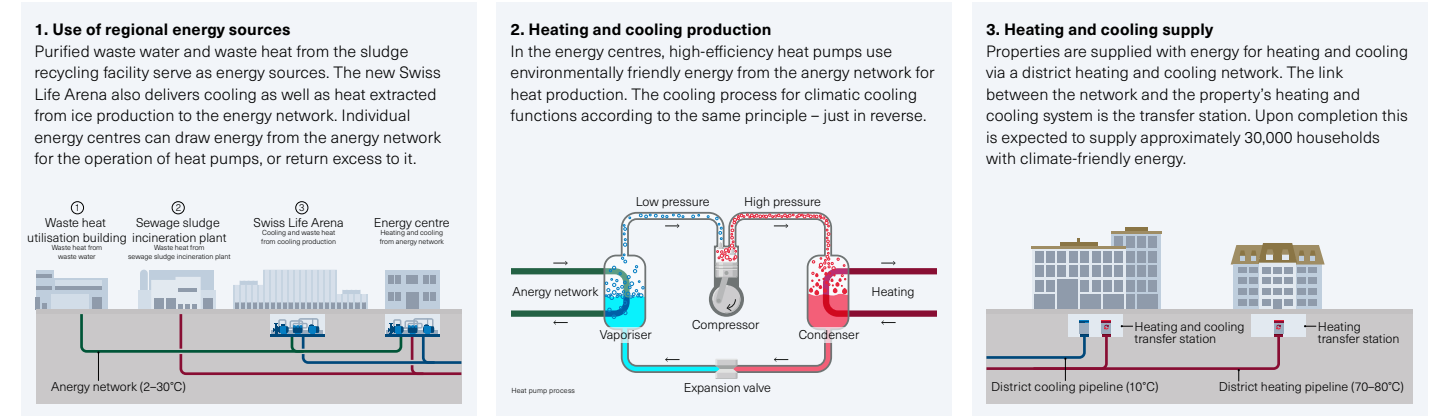
Definitely the complexity, along with the strategic and operational coordination with other municipal infrastructure partners: the civil engineering office, the waste disposal and recycling service, the traffic department, the parks department and others. On top of that, there was the fact that main construction work took place on a site with 24/7 operation. We had to ensure that the Werdhölzli sewage treatment plant was able to run without restrictions at all times.

Energy sources

Heat network for heating and hot water production from the following energy sources:

1. Treated waste water
2. Waste heat from the sludge recycling facility
3. Condensation heat from the exhaust gases of the sludge recycling facility
4. Waste heat from the Swiss Life Arena

Cooling network from the energy centre of the Swiss Life Arena for air conditioning, connected to the energy network.



Heat requirement
in final state
172,000 MWh/a

Cooling requirement
in final state
35,000 MWh/a

CO₂ emissions reduction
in final state
30,000 t/y

Energy production
85% CO₂-neutral



Lake heat networks in Zurich

Lake water as a climate-friendly energy source

www.ewz.ch/en/zuerichsee

Lake Zurich is a popular recreational area for the city and suburban population. At the same time, it also serves as a sustainable energy source. We provide properties around the Zurich lake basin with environmentally friendly heat and cooling using water from the lake.

We collect the lake water at a depth of 10 to 15 metres and transport it through pipes over several hundred metres to our various pumping stations and energy centres. There, heat exchangers extract a few degrees of its natural heat and transfer it to the district heating network. Heat pumps use this heat to bring the water in the buildings up to the required temperature so that it can be used for

heating and hot water supplies. In this way, the connected buildings benefit from sustainable heating in winter. In the summer, they obtain energy for their cooling systems either directly from the lake water or via cooling machines. At the end of the cycle, the lake water is returned to the lake in a chemically unchanged form around 150 metres from the shore.

Franz Bachmann
Project Manager
Building Technology
Swiss Life Asset Management AG



‘The lake heat network supplies our properties with environmentally friendly heating and cooling in a cost-effective way.’

Swiss Life has several properties around Lake Zurich. Four of these are connected to the Falkenstrasse lake heat network and seven to the Escherwiese network. How did this come about?

In the course of ongoing maintenance works and the resulting replacement investments for heating installations, we were constantly evaluating various alternative options, which is how we found out about ewz’s lake heat networks. Sustainability, preservation of the climate, economic aspects, reliability and round-the-clock service were particularly important to us.

The connection to the various lake heat networks meets our requirements perfectly: it provides us with a plentiful supply of carbon-free energy and uses Lake Zurich, which is right on our doorstep, as an environmentally friendly source of energy. In economic terms the system is comparable with market offers involving other technologies. It’s important to us that the system runs smoothly. Working together with ewz as contractor for our heating and cooling solutions gives us the assurance that the facilities are being professionally managed and efficiently operated around the clock. We’re happy to be connected to these innovative networks.

The concept in detail

Rainer Schellenberg
Head of Implementation
at ewz



What makes using Lake Zurich as a climate-friendly energy source so attractive?

On the one hand, the lake represents an enormous sustainable energy source that we can harness using technical means. On the other hand, there are many properties around the lake that require heating and cooling. That results in a high connection density, an unbeatable synergy effect between heating and cooling users and, consequently, maximum efficiency. An equally important factor is our customers' need for an environmentally friendly energy solution. The use of this renewable energy source enables us to make an important contribution to the city of Zurich's 2000-watt targets.



Why are lake heat networks sustainable?

The water balance of the lake remains unaffected. We return the same amount of water to the lake as we take from it, the only difference being that some of the heat has been extracted. We harness this thermal energy using efficient heat pumps (this is possible even in low winter water temperatures of around 5°C). In relation to the volume of the lake as a whole, the heat extraction is so minimal that it has no measurable effect.

The different heating and cooling needs of the buildings connected allow the pipeline grid of the lake heat networks to be used as an energy storage system both for heat dissipation and for heat extraction. These synergies result in efficient and cost-effective operation.

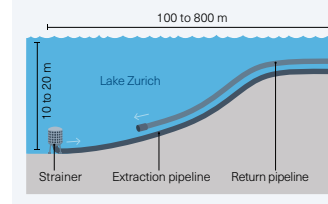
The energy is produced locally and consumed locally. This dispenses with the long transport routes associated with fossil fuels like oil and gas. Additionally, the electricity used to power the heat pumps is 100% carbon-free.

What projects have already been implemented on Lake Zurich, and what does the future hold?

Since 2003, we have put into operation the Escherwiese, Fraumünster, and Falkenstrasse networks around the Zurich lake basin. The Seefeld heat network is currently under development, and further major projects are being implemented with the CoolCity and Enge networks.

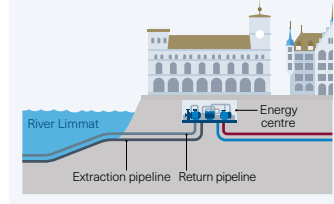
1. Lake water collection and return

This cyclical process sees lake water extracted using an extraction pipeline and strainers, and then returned to the lake after usage.



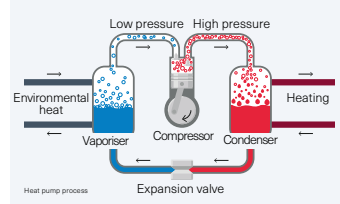
2. Transfer to energy centre

The lake water is transferred via lake water pipelines, sometimes several hundred metres long, to the relevant pump station and energy centre.



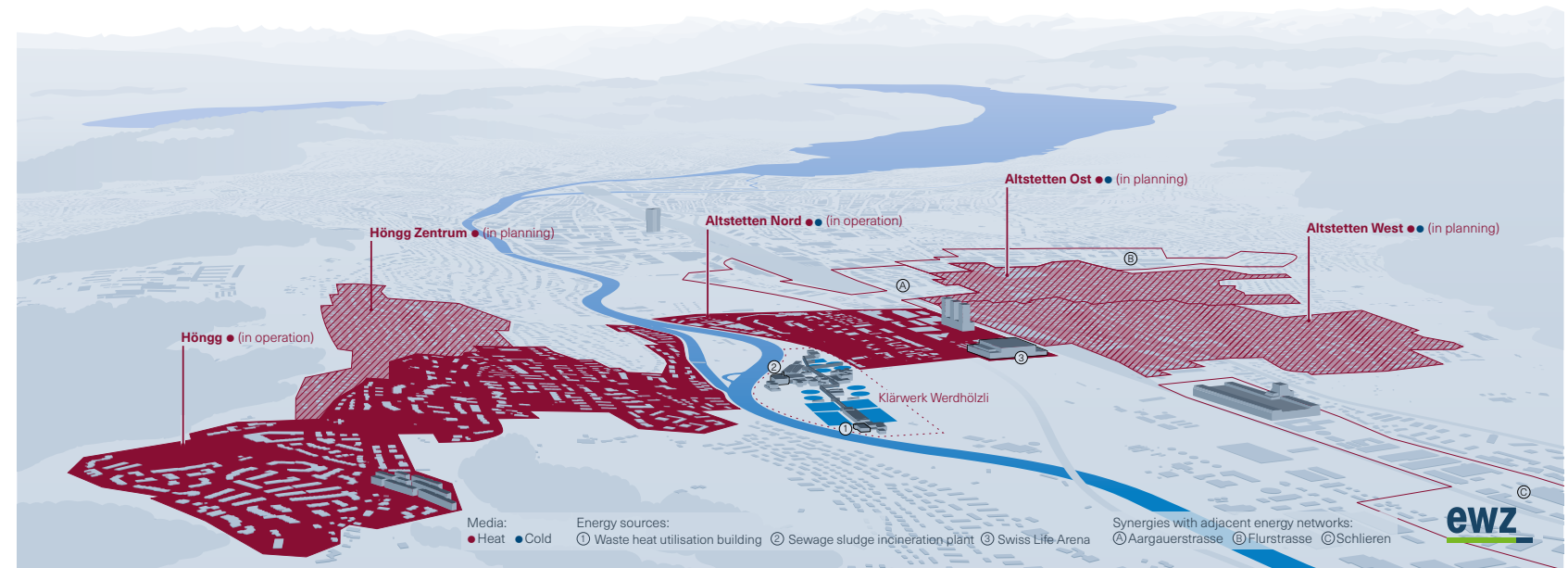
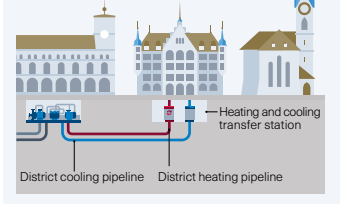
3. Heating and cooling production

Lake water serves as the energy source for high-efficiency heat pumps and cooling machines. Rather than extracting water from the lake, these plants only draw the energy they need for production of heating or cooling.



4. Heating and cooling supply

The heat produced is largely used for heating in winter. In summer the water is used efficiently for cooling, either directly or via cooling machines.



Heat requirements
in final state including CoolCity, Enge and Seefeld
164,900 MWh/a

Cooling requirements
in final state including CoolCity, Enge and Seefeld
38,700 MWh/a

Reduction in CO₂ emissions
in final state including CoolCity, Enge and Seefeld
32,400 t/y

Energy production in average
88% CO₂-free

Herrliberg heating network

Unique district heating concept

ewz.ch/en/herrliberg

Based on two environmentally friendly, carbon-neutral energy sources, regional value generation plays a central role in the Herrliberg heating network. An innovative use of exhaust gas completes the unique concept.

At the heart of the heating network are the two energy centres. They provide public and private properties with climate-friendly energy while conserving resources, as energy is generated from borehole heat exchangers and local wood from the Pfannenstiel region.

Designed with sustainability front and centre, our energy solution concept encompasses the planning, implementation, uninterrupted operation and professional maintenance of facilities by our experts. Thanks to this solution, both the municipality and its population benefit from a full-service heat supply based on economic efficiency and sustainability.

Perfect interaction: geothermal energy and local wood enable Herrliberg residents to cut down their carbon emissions.

Sustainability, economic efficiency and the involvement of regional energy sources were of key significance in the tender process. The municipality were therefore looking for a reliable partner with extensive experience in this field. Working together in close collaboration, we carefully analysed all needs. The energy solution concept developed by our experts using carbon-neutral energy sources easily met all requirements.

The customers in the properties connected to the network especially appreciate that their buildings are supplied with climate-friendly energy from local wood or geothermal heat. They also give a positive assessment of the energy costs, which are predictable in the long term.



The concept in detail



David Fülleemann
Project Manager ewz

What distinguishes the Herrliberg heating network?

There are two unique aspects: the combination of a low- and high-temperature network, and the innovative method of using waste heat in the high-temperature network. We extract heat from the exhaust gases from the wood stove via an exhaust gas condensation system. This results in a 25% increase in the heat yield of the wood chip heating. Without prior condensation, exhaust gases would reach the surrounding air at 160°C. Thanks to the condensation system, the temperature is lowered to around 15°C (conventional exhaust gas condensation systems can only lower exhaust temperatures to about 60°C). This has a very positive impact on the sustainability of the heat network: the municipality recovers 800 MWh of heat in this way.

What advantages are there from using wet wood?

Wet wood is very welcome, because wood chip that is delivered wet will be dried out during burning, thereby releasing a lot of steam. The heat gained through exhaust gas condensation can be used either for borehole heat exchanger regeneration or directly by customers via the anergy network. This concept is unique even beyond Switzerland.

The **anergy network** (cold district heating network) is supplied with heat from a borehole heat exchanger field. The heat exchangers serve as seasonal energy storage systems and draw their heat from the ground. The anergy network primarily supplies cold district heating (6°C to 25°C) to new buildings and properties with more modern designs. In the connected buildings, heat pumps are used to raise the temperature for space heating and hot water production.

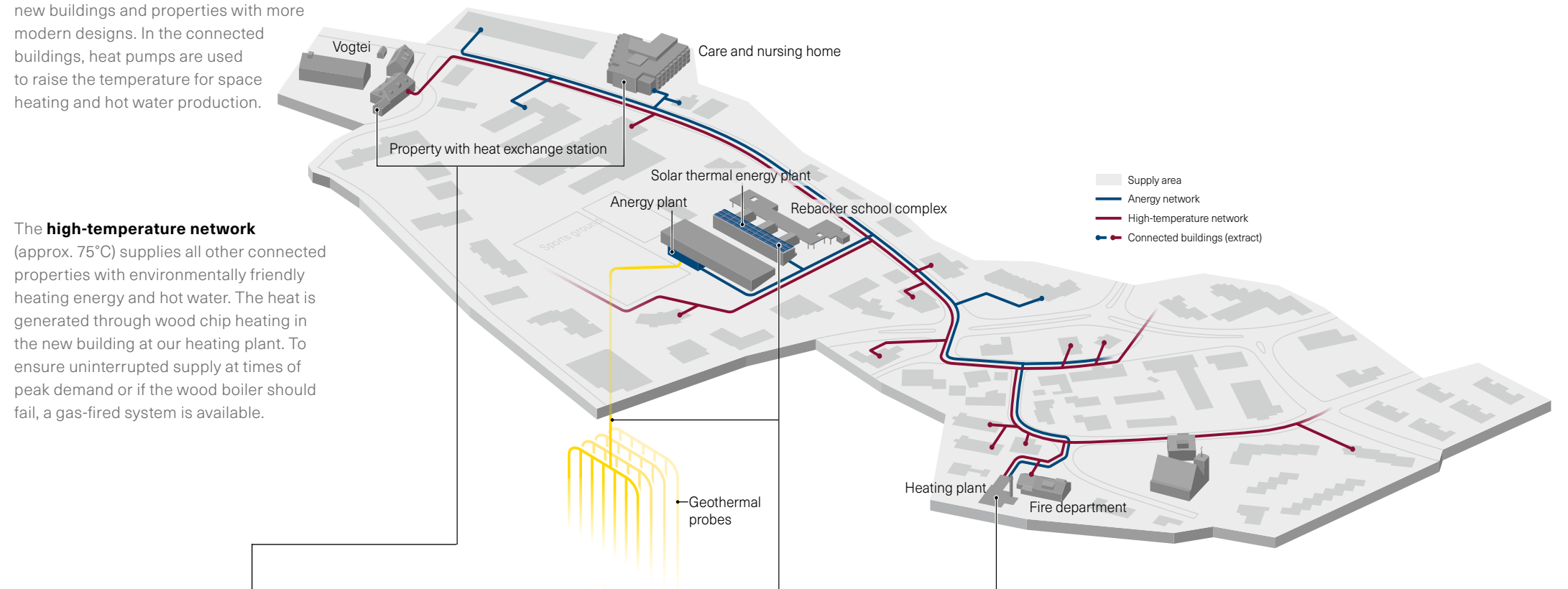
The **high-temperature network** (approx. 75°C) supplies all other connected properties with environmentally friendly heating energy and hot water. The heat is generated through wood chip heating in the new building at our heating plant. To ensure uninterrupted supply at times of peak demand or if the wood boiler should fail, a gas-fired system is available.

🌡️ Heating required
5,500 MWh/a

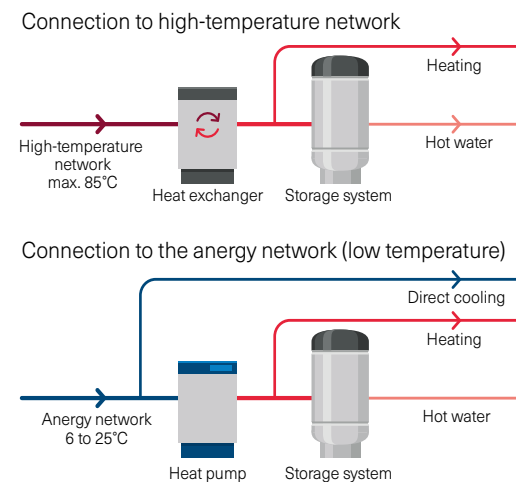
🌡️ Cooling required
300 MWh/a

↓ Reduction of carbon emissions
1,000 t/a

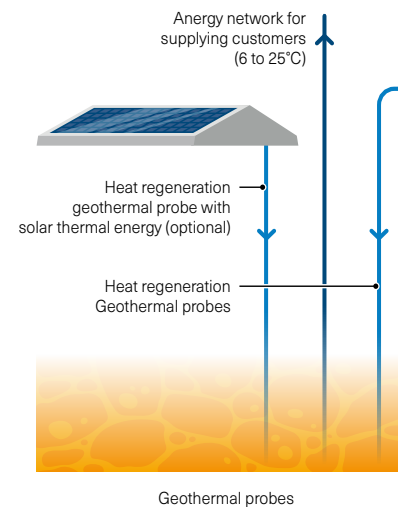
↓ Energy production
85% carbon-neutral



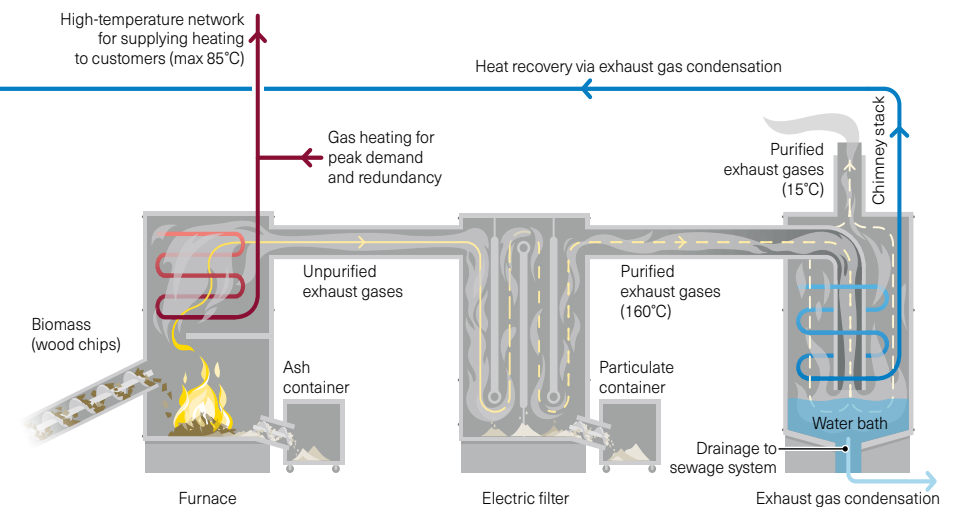
Two connection options (each to the buildings connected)



Heat source for anergy network



Heat production for high-temperature network



Climate-neutral: heating and electricity from Grisons wood

ewz.ch/en/ilanz

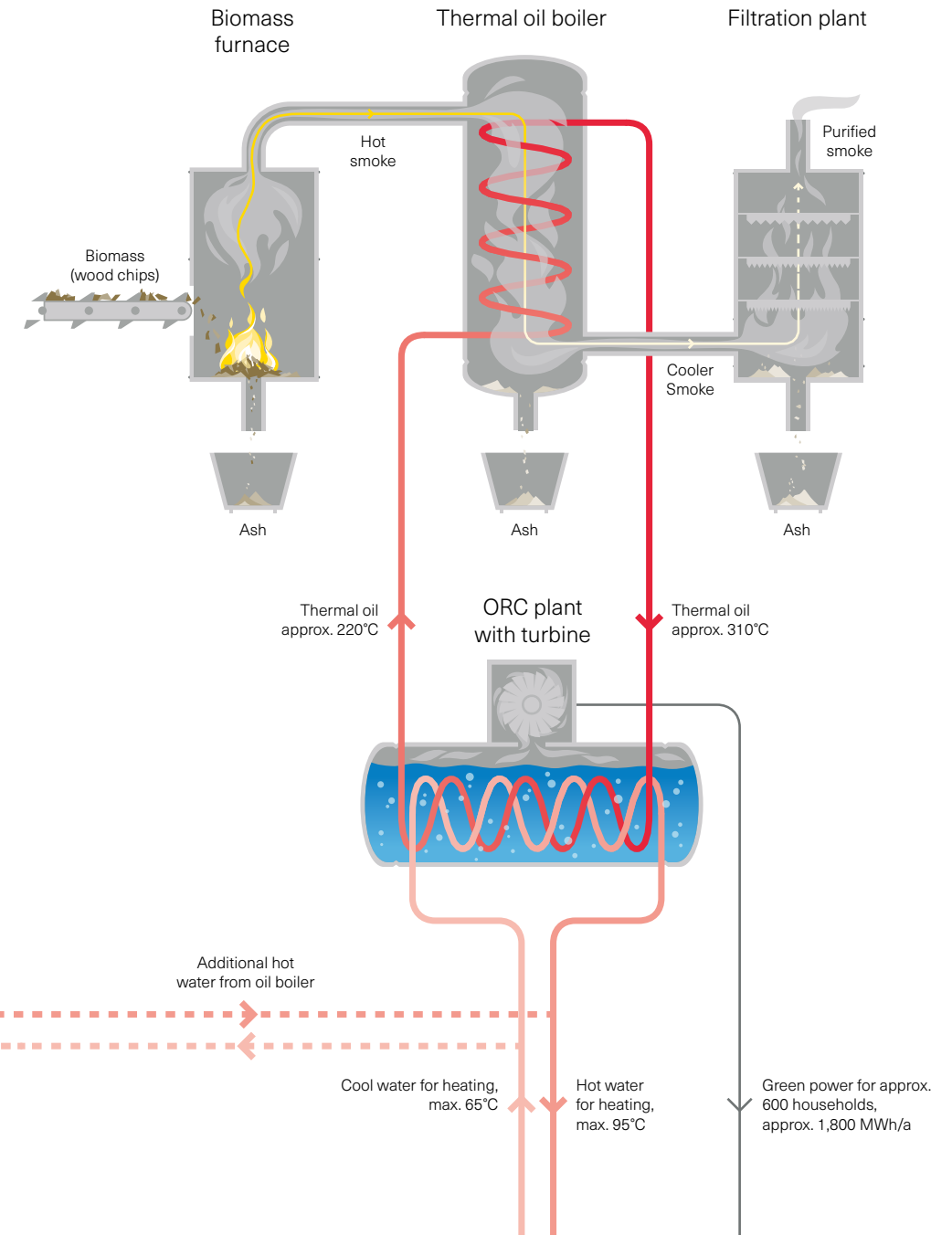
As an 'energy town', Ilanz has committed to a sustainable energy policy and the promotion of renewable energies. To supply the population with sustainable heating and electricity, the town has found a strong partner in ewz, bringing with it many years of experience in the field of climate-friendly heat and electricity supply. This includes our wood-fired combined heat and power (CHP) plant, which uses locally produced wood chip, delivered as a mixture of waste wood and forest timber.

Heating for over 80 properties

Our district heating network supplies over 80 local institutions and companies, such as Surselva regional hospital, the care and nursing home, the church hall, the town hall and the school, as well as private households. Around 1,800 MWh of green power is supplied annually, which equates to the demand of about 600 two-person households. Thanks to this sustainable and innovative concept, at least 80% of heating is produced in a carbon-neutral way and carbon emissions are reduced by about 1,600 tonnes per year.

Local heating and electricity production

The wood-fired combined heat and power (CHP) plant is equipped with an ORC module, which generates around 1,800 MWh of green power per year. The ORC is a thermodynamic, cyclical process, in which thermal energy is used to generate electricity. The thermal energy is produced through wood chip combustion. A thermal oil boiler releases thermal oil heated to over 300°C into the ORC module. There, the flowing medium is vaporised through thermal energy. The pressurised vapour is fed into the ORC module, where a turbine and generator are used to transform the thermal energy into electricity. Subsequently, the vapour is liquefied again in the condenser, and a pump drives the liquid flowing medium back into the vaporiser. In the ORC module, the district heating is also decoupled for heating. In this way the wood-fired combined heat and power (CHP) plant not only produces heating, but also electricity.

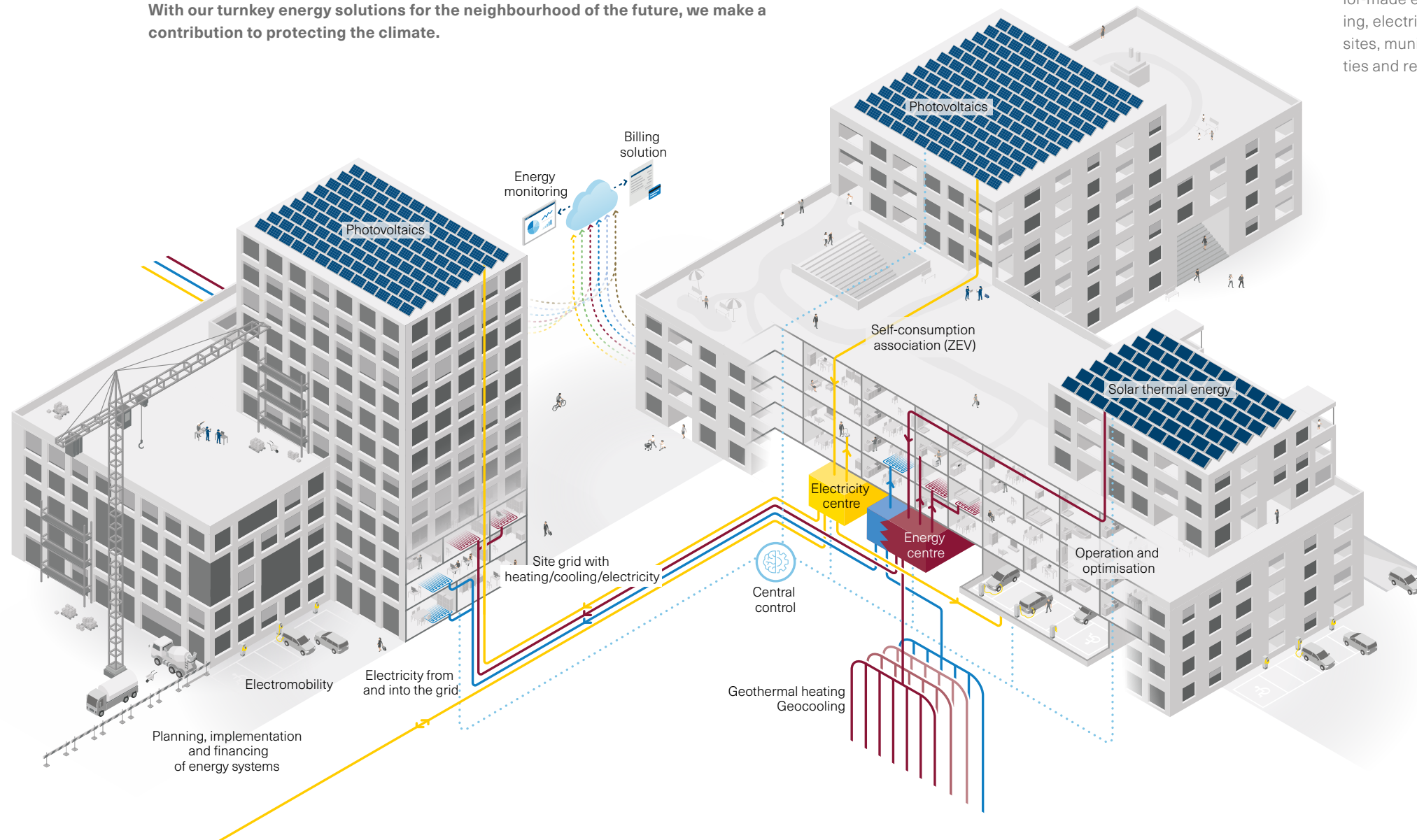


- 🌱 Heating required
7,000 MWh/a
- 🌱 Green power production (among others)
1,800 MWh/a
- ↓ Reduction of carbon emissions
1,600 t/a
- ↓ Energy production
80% carbon-neutral



What makes us special

Together with partners from business, politics and society, we play an active role in designing the future of energy, acting as an initiator, integrator and implementer. With our turnkey energy solutions for the neighbourhood of the future, we make a contribution to protecting the climate.



Working in partnership

As a strong partner and integrator, we support our customers across the entire life cycle of their properties and take responsibility for all energy-related matters in the background – from planning to implementation and efficient operation.

Holistic energy solutions

We work with our customers to develop tailor-made energy solutions for heating, cooling, electricity and mobility in complexes, sites, municipal buildings, special properties and renovation projects.

Forward-looking and cost-effective

We rely on local renewable energy sources as well as tried-and-tested and innovative technologies from leading manufacturers. Intelligent networking then enables us to achieve economic and environmental value added.

Reliable and rooted in the local region

We're a Swiss company with locations in Zurich, Grisons and Vaud. Thanks to our regional operating teams and 24/7 remote systems monitoring, we guarantee maximum security of supply and short response times.

Leading the Swiss market

With over 1,500 successfully completed projects and more than 40 energy networks throughout Switzerland, we can call on extensive in-depth expertise. You can also benefit from our strong network of proven experts.

Responsibility and quality

We demonstrate our commitment to our customers and to protecting the climate: we've been named the most sustainable Swiss energy service provider by the SFOE, and we've been awarded gold status by EcoVadis. Our subsidiary SunTechnics Fabrisolar has already won numerous European and Swiss solar prizes.

Benefit from our experience

Our experience pays dividends for you. We would be delighted to analyse your project plans and draw up cost-effective, environmentally optimised solution variants. We look forward to hearing from you.

We're never far away

06/2023 AD



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1. ewz highest-ranked
energy service provider
Swiss Federal Office of Energy benchmarking 2022



Ein Unternehmen
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