BaseLink

State-of-the-art working environment for start-ups
and established companies in Allschwil

JANSEN

CO_2-free for the future

BaseLink, which opened in summer 2022, is a technology hub offering a state-of-the-art work environment for start-ups and established companies in Allschwil. As a visionary location, innovation is anchored at the core of the site covering 75,000 m². The broad energy concept also includes geothermal energy. In this concept, large heat pumps are fed with geothermal energy – the probe field also serves as a thermal reservoir. The complete probe field was designed to be diffusion-tight, with high-performance geothermal probes.

Basel is one of the world's leading locations in the pharmaceutical, biotech, life sciences and technology sectors. Nestling between Basel and Allschwil, on the border with France and Germany, BaseLink is a unique ecosystem for innovation. The new area is a home for world-leading companies, visionary startups, universities and foundations. The Swiss Tropical and Public Health Institute, the University of Basel and Basilea Pharmaceutica Ltd are just a few examples of the first organizations that have now moved their headquarters here. "A home for forward-thinking minds" is what BaseLink calls itself, showing that the site itself was conceived from the ground up with the future in mind and, more importantly, that this concept has been implemented.

Holistic energy concept

The technology hub comprises a total of 16 individual construction sites. Everything is connected by a user- and environmentally-friendly transport and energy concept: networked heating, cooling and power supply, photovoltaic systems, high performance fiber optic network and, last but not least, geo-thermal energy utilization. Example: The smallest areas within and between the campuses are used as diverse green spaces, which are not only part of the ecological energy concept, but specifically link the public space with the business ecosystem. And of course, the heating and cooling supply for the enormous area of 75'000 m² including all peak loads and backups is consistently provided by renewable energies, 100% CO_2-free. The investment for the energy provision was handled via a contracting procedure.

Drilling in Field D: In the background, the parking garages have been built on Field B, and the geothermal probes are already underneath. Primeo Energie, Münchenstein, is the contractor and owner of the energy system.

Thermal reservoir

A major challenge in a project of this size is to determine the energy requirements. At the time the concept was drawn up, and indeed well into the construction phase, it was not yet clear how many and what kind of energy consumers would ultimately settle on the site. This brought unanswered questions and risks. For which services and energies should the plant be available? How must the system be designed to be as efficient as possible? Where should the energy generators be placed? How large must the probe field be? When does the concept start to be profitable? “At some point, you have to take the first step,” says Martin Dietler, Head of the Market and Customers department at Primeo Energie. "The client stipulated that no fossil fuels should be used.” Given the size of the building, it was clear that only deep geothermal probes could cover the energy requirements for both heating and cooling. “Because of climate change, we need better cooling systems in buildings in the summer. In addition, more and more technology is being used in buildings. The combination of heat pumps and geothermal probes is therefore an obvious choice,” he notes.

Thus, two connected underground energy generators were planned. Each generator has several large heat pumps to generate heat and cold. The source for both energies are the geothermal probe fields. The underground area of the site functions as a huge thermal battery. The excess heat of the summer is stored in the earth to be used again for heating in the winter. And conversely, when heat is extracted for heating in winter, the subsoil is cooled so that the building can be cooled all the more efficiently in summer.

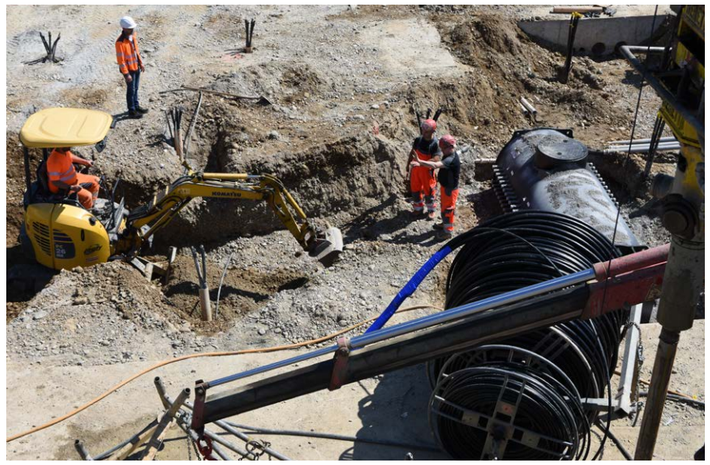
The large heat pumps from the Swiss manufacturer Walter Wettstein AG provide a total of around 5.5 MW of heating and cooling power. Each machine is six meters long and weighs 15 tons. They are operated with the natural refrigerant NH3 (ammonia). When designing the probe field, the energy requirement was estimated at about 5 to 6 GWh per year.

Decisive advantage: Quality and durability

In the planning stage, a market analysis was conducted of the available and suitable geothermal probe types. Conventional, as well as more pressure-resistant designs were considered. Both the cost-benefit ratio and the quality of the product were evaluated and compared. The owner of the geothermal system, respectively the contractor Primeo Energie, finally chose the JANSEN hipress geothermal probe.

Compared to standard geothermal probes, a JANSEN hipress is somewhat more expensive to purchase, but can offset the additional cost through efficiency gains over time. The low hydraulic resistance as well as the increased thermal conductivity beat any rival product, lowering operating costs and thereby increasing profitability.

The decisive advantage was the highest available pressure resistance of JANSEN hipress of PN35. This key figure indicates that the probe product supplied can withstand an internal pressure of 35 bar over at least 50 years of operation at an operating temperature of 20°C. Furthermore, the JANSEN hipress has an outer protective layer that is much thicker than specified by the standard and thus also offers greater safety during installation. These quality advantages maximize the reliability, so that all the probes in the huge field will continue to work in the worst-case scenario if, due to geologically difficult situations, the stabilizing function of the borehole backfill decreases over time. Although this is not normally expected, the increased pressure rating nevertheless improves longevity, so it can be expected that the borehole geothermal probes will continue to serve efficiently well beyond the planned 50-year minimum service life. Especially for a building complex of this type, this more than pays for itself.



Low hydraulic resistance as well as increased thermal conductivity are features of JANSEN hipress. The geothermal probes are used to store heat from the buildings in the ground in summer and to use it in winter.

Diffusion tightness added value

Diffusion (from Latin diffundere "to spread out") is the equalization of concentration differences in mixtures of substances due to the inherent motion of the particles, occurring without external influence. More specifically, it is a naturally occurring physical process in which gas molecules mix in between plastic molecules, allowing them to penetrate the geothermal probe pipes. Permeation then occurs, i.e. the gas molecules – if they are not stopped by a special layer – continue to migrate through the plastic and enter the circulating heat transfer medium on the inner side of the pipe wall.

A wide variety of gases, such as methane, carbon dioxide and air mixtures, can be present in the subsoil. All these gases diffuse more or less rapidly in plastic, depending on their concentration, the pressure and temperature conditions, and the wall thickness of a plastic pipe. Once inside the system, the gases rise and are further transported by the flow until they accumulate at higher points. There, they lead to system problems and can even cause malfunctions and the standstill of the heat pump. At any event, the gases lead to higher pumping resistance and thus reduce the efficiency of the overall system. In the worst case, however, the gases settle in the pipes inside the building, where – if vented – they escape into the basement or equipment room. Gases from the ground are potentially flammable or hazardous to health.

The full-surface metal intermediate layer of the JANSEN hipress probe pipes acts as a diffusion barrier to prevent the ingress of gases, thereby guaranteeing permanent hazard-free and smooth operation. This technically unique feature was also convincing at BaseLink. Although no powerful gas deposits were known on site in advance, it is nevertheless a significant advantage of the JANSEN hipress to be able to completely exclude this risk due to the large number of deep geothermal probes. As a result, Primeo Energie also decided to have the connecting lines from the probes to the distribution shafts made completely diffusion-tight. Jansen was able to provide a complete system for this purpose.

The drilling work followed a defined schedule. The individual construction sites, stages and trades had to be precisely coordinated.

The JANSEN hipress were to be sunk to approximately 280 to 300 meters. The geological strata sequence, which provided challenges on site, was decisive for the final installation depth. In the event that it was necessary to switch to a flush drill, Jansen had – as a precautionary measure and especially for this project – developed a flush drill bit adapted to the JANSEN hipress, which safely enables insertion by means of installation rods while minimizing the installation diameter of the probe.

Construction panel:

Landowner:
Bürgerspital Basel, Basel

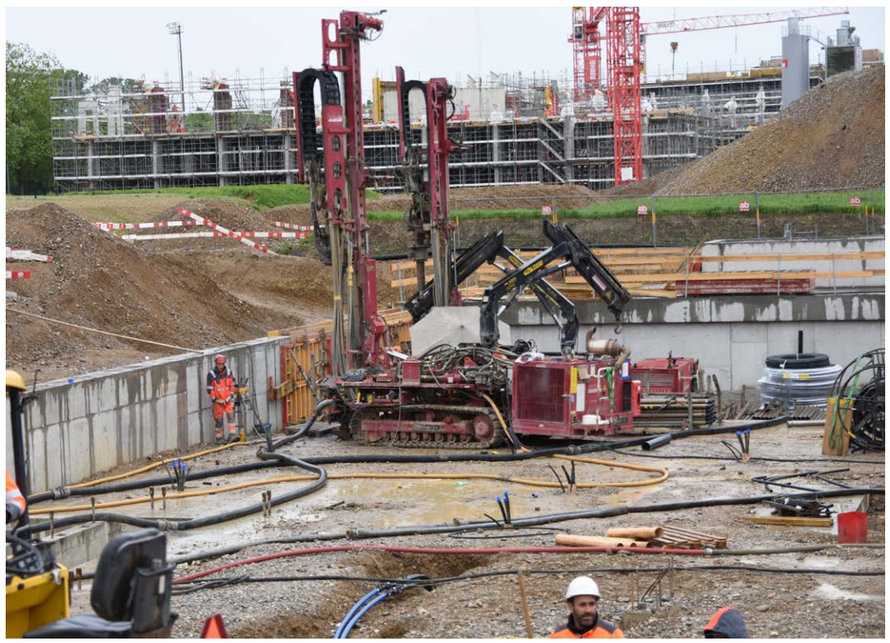
Owner of the energy system & contractor:
Primeo Energie, Münchenstein

Geothermal planning:
Schädle GmbH, Basel

Drilling company:
Hans Barmettler & Co. AG, Moosleerau

Heat pumps:
Walter Wettstein AG, Gümligen

Geothermal earth probes:
JANSEN hipress, Jansen AG, Oberriet

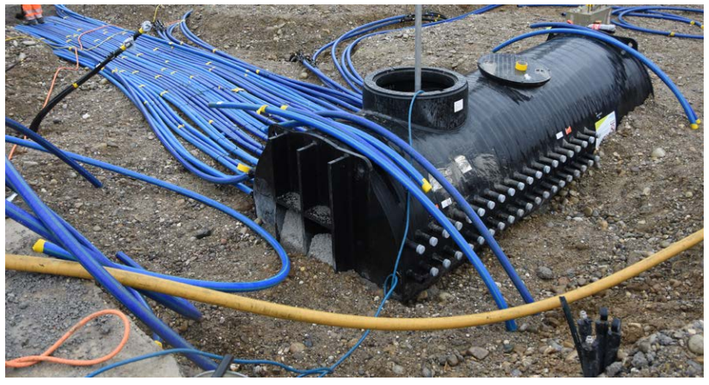


270 boreholes to a depth of 290 meters each were drilled by the professionals of Barmettler Erd-energie. Due to the rather soft geology, a very high drilling speed of about 40 meters per hour could be achieved.

Finally, low-terrace gravel with a thickness of 36 meters was encountered. This was followed by a relatively soft to medium-hard clayey marl. To achieve a good seal, the specialized company Barmettler Erdenergie drilled through the low-terrace gravel with a temporary steel casing, an additional four meters into the meletta layers. After the protective casing, drilling could be continued using a PDC bit (Polycrystalline-Diamond-Compact). Due to the rather soft geology, a very high drilling speed of about 40 meters per hour could be achieved, but without reaching the same installation depth for all geothermal probes.

In total, 270 probes, each measuring 290 meters, were installed between the third quarter of 2019 and the first quarter of 2022. Jansen delivered just over 6.5 km of diffusion-tight piping to the site to connect the borehole geothermal probes to nine large JANSEN “u-boot” distribution shafts. Extending the metal multilayer probe tubes requires the right electrofusion couplers, the necessary equipment and training, and a special welding process that was used for the first time at BaseLink. The professional team from Barmettler successfully implemented this under the guidance of Jansen.

This is one of the largest geothermal projects in Europe and the largest fully diffusion-tight geothermal probe field ever. The retrievable power of the energy supply, as well as the energy supplier itself, the probe field, are scalable to address demand factors that may still change as construction progresses.



Nine JANSEN u-boot underground distribution shafts were used. The cylindrical, horizontal submarine-shaped distribution shafts offer sufficient space for large distribution dimensions, special installations and up to 80 brine circuits.

Facts+Figures

Geothermal probes:
78 kilometers over three geothermal probe fields

Boreholes:
270 geothermal probe boreholes stretching 290 meters each

Distributors:
Nine large-scale distribution systems outdoors, two distribution systems indoors

Extensions:
9'900 m diffusion-tight barrier pipe lines

Statement

Statement Karl-Heinz Schädle, Owner & Managing Director, Schädle GmbH, Planning Geothermal probe field (thermal battery):

“I appreciate the cooperation with Jansen very much, because it is always fair and correct. Even in the case of difficulties – which are always present in a project like this – Jansen did not “disappear”, but actively contributed to solutions at all times.”

Statement by Martin Dietler, Head of Market & Customers, Primeo Energie, Contractor (planning, financing, construction and operation) and energy supplier (heat, cooling and electricity):

“I strongly believe that the concept of thermal batteries will become established in the future. The JANSEN hipress geothermal probes offer ideal technical properties for such projects such as BaseLink.”

Statement Bruno Barmettler, Division and Project Manager, Hans Barmettler & CO AG, drilling company:

“At the time of the early project phase, the JANSEN hipress, the globally strongest geothermal probe, was a new development and therefore we did not have much experience in dealing with diffusion-tight systems. We are proud to have successfully implemented this project together. The support, the quality of the products and the reliability of the Jansen team were a great help in this.”

Depending on the development of the neighborhood, more probe drilling or heat pumps may be required.

The approximately 78,000 meters of drilling demonstrate the high efficiency and absolute safety of the JANSEN hipress geothermal probe. It is predestined for very deep drilling, high thermal power requirements, difficult geologies and potential gas deposits in the subsoil. Having won two awards (German Innovation Award and European Geothermal Innovation Award), the geothermal probe can be used to meet the energy requirements of large construction projects efficiently, even where space is limited.

For around 78 kilometers, efficiency and absolute safety were of central importance. JANSEN hipress impresses with diffusion tightness – and is the strongest geothermal probe in the world.

GEOTHERMIE
SCHWEIZ SUISSE SVIZZERA

bwp Bundesverband Wärmepumpe e.V.

Erdwärme Gemeinschaft Bayern e.V.

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Reference report BaseLink, Allschwil | 09.2023