

polytechnik

Transforming Biomass
Since 1965



Converting biomass
residues into
clean energy and
renewable carbon.

Our vision

“We want to make a significant contribution to a secure future for succeeding generations. To achieve this, we are developing innovative biomass technologies that will enable the defossilisation of the global economy.”

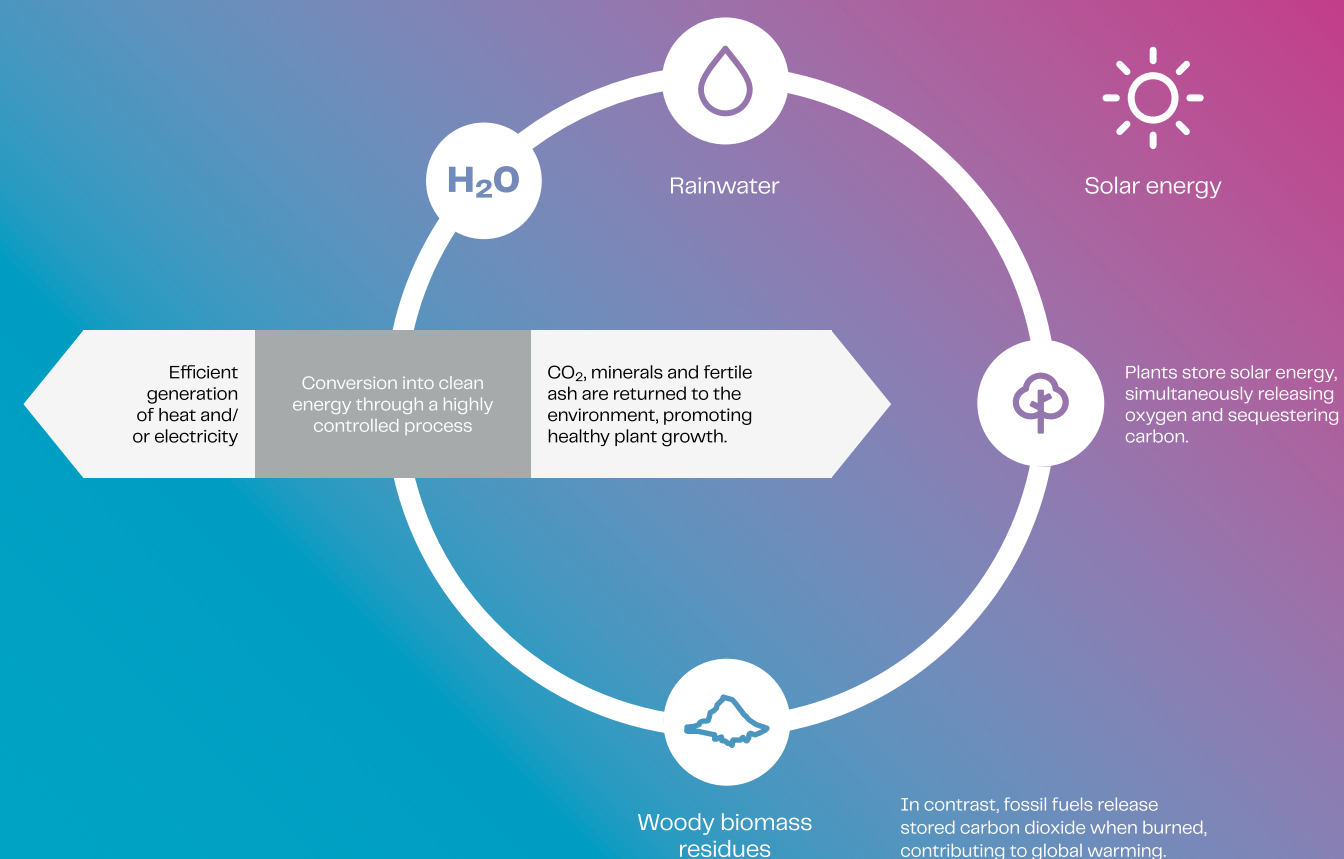
For over 55 years, we have been planning, designing, manufacturing, installing and commissioning biomass cogeneration plants worldwide.

The Polytechnik Group, based in Weissenbach, Austria, leverages expertise gained from over 3,000 successfully implemented systems. Established in 1965 as a small two-person venture, the company has become a global leader in technologies for biomass combustion, biomass gasification, carbonisation and torrefaction.

Approximately 240 experienced and customer-focused employees serve our clients worldwide. Polytechnik, which boasts an export rate of 95%, operates globally with branches in over ten countries and a network of meticulously chosen partners.

Transforming biomass residues to benefit future generations. Since 1965.

Since 2010, Polytechnik has invested in the research and development of innovative carbonisation technologies alongside our work in biomass combustion and new gasification methods. The primary aim of our recent research efforts is to create solutions that replace fossil carbon with CO₂-neutral, high-quality biochar produced from various sustainable biomasses.



Transforming biomass residues into high-value products. Since 1965.

A major advantage of our technologies is their capacity to efficiently use both high and low-quality fuels and residues. This allows our customers to lower their energy expenses and enhance the value of their residues. Using lower-quality fuels does not compromise reliability or result in higher emissions.

Reliability is as essential to us as it is to you. Our reputation is founded on our consistently reliable systems that have low service and maintenance costs. The combination of cheap and available fuel, outstanding reliability and low service and maintenance costs makes our plants the most cost-effective throughout their life cycle. Our industry-leading energy plants provide unparalleled customer service, offering secure online access to plant data –

fuel, load, oxygen, temperature, combustion and other control systems – anytime, anywhere. These systems continuously monitor, analyse and optimise all relevant parameters to operate at peak efficiency with the lowest possible emissions.

Flexibler Einsatz von Biomasse-Rohstoffen



Wood pellets



Wood briquettes



Wood peelings



Sawdust



Wood chips



Wood shavings



Shredded wood



Screen overflow



Forest residues



Bark



Bamboo



Waste wood



Agricultural residues



Miscanthus



Nutshells



Coconut fibre

Our technologies

As one of the world's leading providers of sustainable and climate-neutral technologies, we integrate sustainability with industry. We specialise in generating heat and power from biomass and offer innovative solutions for biomass gasification, carbonisation and torrefaction.

polycombustion

Leading grate technology for maximum flexibility when utilising a broad spectrum of biomass for energy production.

Output range

1 MW – 30 MW thermal
200 kW – 20MW electric



polygasification

Highly efficient conversion of biogenic residues into syngas for the material and energy utilisation of stored solar energy.

ReGaWatt

990 kW – 20,000 kW thermal
250 kW – 5,000 kW electric

PolyHeld

400 kW bis zu 3 MW thermal

polycarbonisation

Pioneering process for converting biogenic residues into a variety of valuable materials for energy and material utilisation as well as CO₂ sequestration.

Carbonisation

3,000 – 9,000 t/a

Torrefaction

bis zu 60,000 t/a

We provide innovative solutions tailored to our customers' needs. From initial concept to turnkey systems, we are a one-stop source of state-of-the-art technology designed for maximum efficiency and cost-effectiveness.

- Customised plant design
- Combustion tests and CFD simulations
- Process engineering, design and planning
- Detailed 3D planning of the entire system
- Production in our Polytechnik factories and with trusted and long-standing partners
- Worldwide logistics
- Plant installation
- Piping and electrical installations and system insulation
- Plant testing and commissioning
- Operator training and system handover
- Plant service and optimisation
- Fully automatic control and regulation, programmable logic controller (PLC)
- Process and system visualisation

polycombustion

Polytechnik offers highly efficient moving grate combustion systems for the optimal combustion of a wide range of biomass types with minimal emissions, based on decades of expertise. Our product portfolio ranges in output from 1 MW to individual boiler outputs of 30 MW thermal.

Combustion

Our fully automated fuel control system ensures optimal biomass distribution in the combustion system. The system is segmented into several process and system technology areas, where the fuel is pre-dried for degassing before combustion. Specialised air and flue gas fans adapted for each zone ensure precise temperature control and efficient mixing of pyrolysis and combustion gases with oxygen, leading to complete burnout, minimal emissions and maximum efficiency.

Combustion systems

- Air and water-cooled flat and step grates
- Underfeed stoker and grate combinations



Technical systems

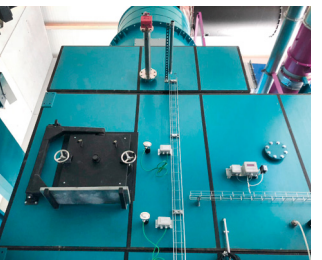
Warm and hot water

Polytechnik's systems for generating warm and hot water serve various applications, ranging from industrial uses like drying kilns in the timber industry to local and district heating for municipalities and cities. Our warm water systems provide water temperatures ranging from 90°C to 110°C, and our hot water systems range from 110°C to 200°C.



Hot air and hot gas systems

These systems use the flue gases from biomass combustion to generate hot air or hot gas. This can be achieved either directly by mixing flue gas in mixing chambers (hot gas) or indirectly through mixing chambers and heat exchangers (hot air). Hot gas systems can achieve temperatures between 950°C and approx. 130°C, and hot air systems temperatures between approx. 350°C and 130°C.



Superheated steam

Superheated steam is saturated steam that has been heated beyond its saturation temperature in the superheater using flue gas. Depending on the type of input material used, our biomass power plants can achieve superheated steam temperatures of up to 475°C. This superheated steam is typically directed to a steam turbine, where it is used to generate electricity.



Process steam

Our process steam systems ensure a reliable and efficient supply of steam to steam-processing industries ranging from veneer, food and brewing to dairy, cosmetics, aviation and paper production. Our product line-up includes everything from low-pressure steam boilers with 1 bar to steam boilers with 35 bar.



Thermal oil

Our thermal oil plants use mineral or synthetic oils as energy sources – depending on the requirements and operating temperature of our customers' processes. Polytechnik thermal oil plants are used in combined heat and power plants and various industrial sectors that utilise thermal oil as an energy source for heating, drying and other technological processes (e.g. veneer presses).



Combined heat and power generation

Combined heat and power (CHP) plants are a cost-effective and efficient method for generating heat and electricity from biogenic residues. The combined heat and power generation can be achieved using either a steam turbine or an organic Rankine cycle (ORC) turbine.



Trigeneration

Trigeneration allows for the simultaneous production of electricity, heat and cooling. It builds upon the concept of combined heat and power generation and, in biomass power plants, typically involves using some of the heat from the condenser downstream of the turbine to run an adsorption chiller for cooling.



polygasification

PolyHeld is the combustion technology of the future. Extreme air staging enables low-emission and efficient combustion of different fuels.

- Fuel flexibility: residues from the wood and forestry industry and most woody fuels (with a water content of up to M45)
- Efficiency: >92% (+5% compared to conventional firing systems)
- NO_x: -25% compared to conventional firing systems
- Dust: <20mg/Nm³; 11% O₂ (without additional exhaust gas cleaning)
- Output range: 25-100%
- Low maintenance costs

The PolyHeld system is an exceptionally efficient solution for heat supply in the low output range of 400 kW to 3 MW. By combining a counterflow gasifier with targeted staged combustion, we attain efficiencies exceeding 92%. Its unique design eliminates the need for additional flue gas cleaning, resulting in substantial operational cost savings. The PolyHeld also features an outstanding partial load capacity of up to 25%. The PolyHeld system is especially effective for generating warm water, hot water and steam, as well as for heating thermal oils.



ReGaWatt The counterflow gas generator developed by ReGaWatt is the core component of the Kombi Power System, capable of delivering thermal outputs ranging from 990 kW to 20,000 kW. Additionally, it can generate electrical outputs between 250 kW and 5,000 kW through a combined heat and power unit.

This robust and durable gasification technology offers numerous advantages:

- Wide range of fuels: biogenic residues such as waste wood, wood screenings, bark
- Capable of operating at part load (up to 20%) and quickly adjustable in a matter of minutes
- No pre-drying necessary (w30 - w55)
- Complete burnout, resulting in clean ash

The Kombi Power System's modular design allows it to be customised to meet customer needs, facilitating the flexible generation of electricity, heat, cooling, steam and synthesis gas for direct gas use. Additionally, the system produces bio-oil with a calorific value comparable to heating oil, which can be used for heat generation or temporarily stored to balance peak loads (storable for up to six months).

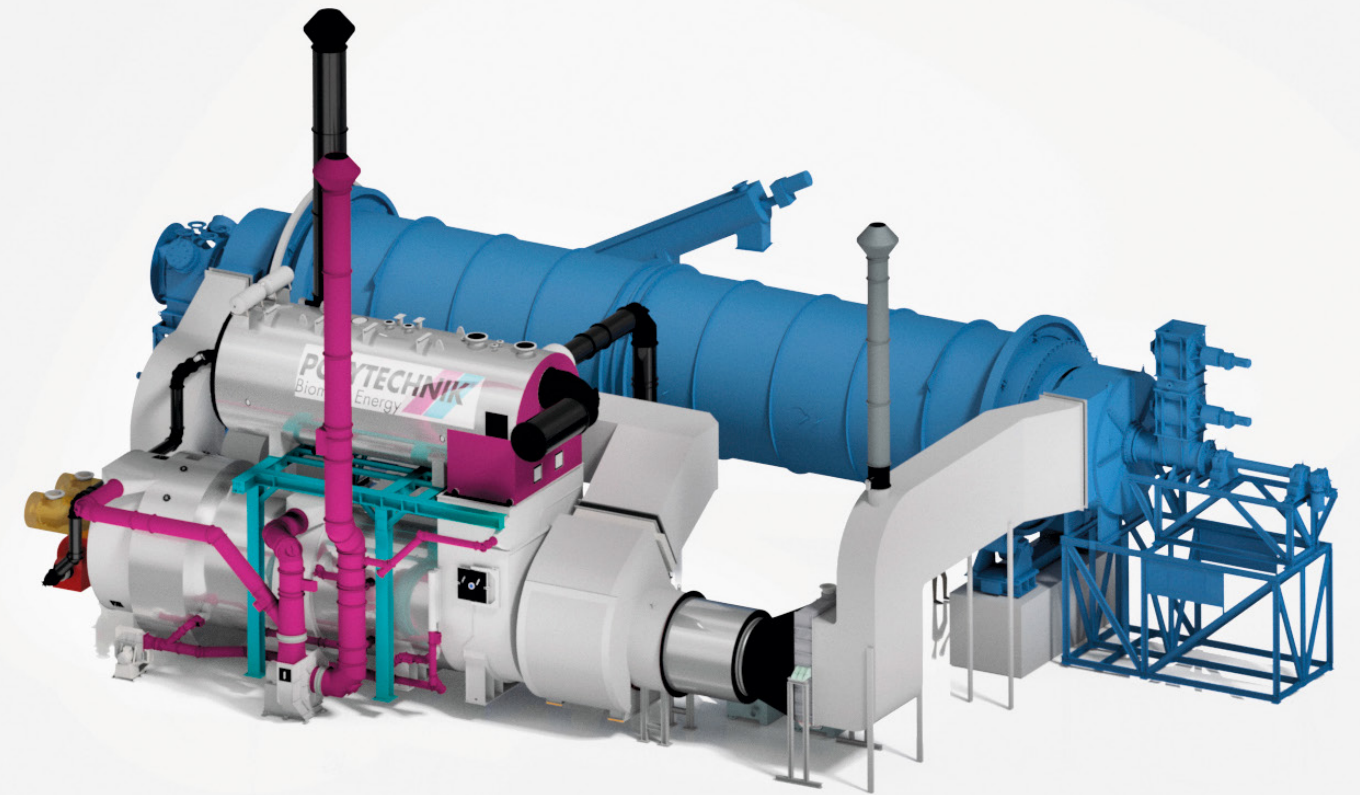


KOMBI POWER SYSTEM®

polycarbonisation

Carbonisation With our proprietary technology, we design and build production plants for biochar and other biochar applications with a carbon content of up to 97%.

Our pyrolysis technique, developed and patented by Polytechnik, converts biomass into energy in an oxygen-free environment using heat. This process is implemented through an automated batch system. The waste gases generated during carbonisation are thermally recycled in a closed loop. Any surplus energy from this process can be used as heat or transformed into electricity. The production cycle (from the delivery of raw materials to the processing of biochar) is predominantly automated, operating round-the-clock in shifts. Polytechnik offers plants with an annual production capacity ranging from 3,000 to 9,000 tonnes.



Torrefaction A special firing unit makes it possible to utilise the lean gas produced during torrefaction in addition to the solid fuel. Polytechnik torrefaction systems are the latest addition to our product portfolio.

Boasting a yearly production output of up to 60,000 tonnes, our systems use pyrolysis to transform a variety of solid biomass into a product that is not only dimensionally stable but also easy to transport and store. This process takes place at around 300°C with the exclusion of oxygen. The excess energy produced, beyond what is needed for the torrefaction, can be used to generate water or steam, or to heat thermal oil, depending on the customer's needs. Torrefied material can be used in many areas to replace fossil coal – for example, as a substitute fuel for fossil fuels. Our torrefaction facilities are customised according to customer specifications, particularly concerning the type of input material used, ensuring optimised performance and profitability for our clients.





We all share the same vision:
We want our cutting-edge
solutions to make a decisive
contribution to the defossilisation
of the global economy.

Transforming visions into reality. Since 1965.

PolyHeld, Germany Commissioned 2023

Two 2,000 kW PolyHeld wood gasification systems reliably and sustainably supply a horticultural business with CO₂-neutral heat. Our cutting-edge combustion technology features exceptionally low dust emissions. As a result, these systems do not need an extra dust filter to comply with legal emission standards.



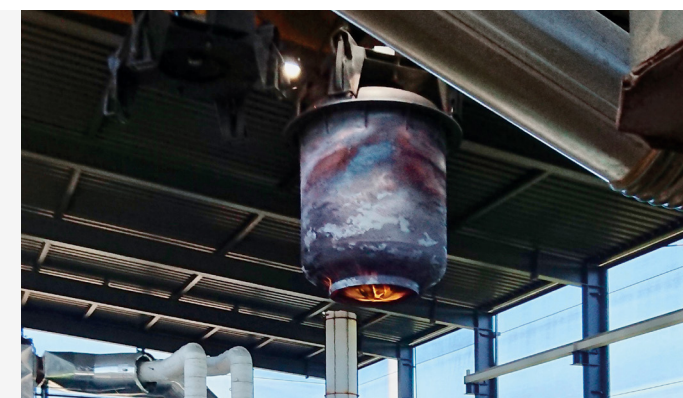
ReGaWatt Kombi Power System, Japan Commissioned 2024

This wood gas power plant with 2x 990 kW_{el} was built in Furudono, Japan. Following successful demonstration and test operation of the gasifiers with Japanese cedar, the expansion of the extension including gas engines was commissioned and completed in the first half of 2024. The high flexibility of the fuel with a water content of up to 60% is one of the key unique selling points of this technology.

Green Carbon, Germany Commissioned 2016

Located in Uelitz, Germany, this carbonisation plant developed by Polytechnik utilises an innovative pyrolysis method to produce high-quality charcoal (biochar). The fully automated and continuous production (production volume: approx. 3,000 tonnes of charcoal per year) uses a newly developed retort batch process. This plant can produce reproducible and certified biochar from biomass residues.

The end product is versatile, finding applications in animal feed, litter charcoal, biochar for agriculture, soil products and barbecue charcoal.



Taaleri / Joensuu Biocal, Finland Commissioned 2024

This torrefaction facility will produce as much as 60,000 tonnes of biochar briquettes annually to replace fossil coal in various industrial processes. The carbon-rich end product created from sustainably sourced forest residue boasts a high energy density, making it easy to transport and store. The construction of the plant is a collaborative effort with Austrian technology partners. Polytechnik is responsible for designing, manufacturing and supplying the lean gas burner and the energy treatment and utilisation technology. This ensures that the process energy is used in a closed loop.

District heating, CHP, Switzerland
Commissioned 2022

This biomass plant has a thermal output of 22,000 kW and is equipped with a high-pressure boiler for superheated steam. It features a turbine with a 6,400 kW electrical output, generating renewable electricity for the local grid. The generated thermal energy is either stored in a buffer tank or channelled into the local district heating network. Designed to utilise various types of wood waste, the plant includes a large 2,000m² bunker to ensure a consistent energy supply for the end-user.



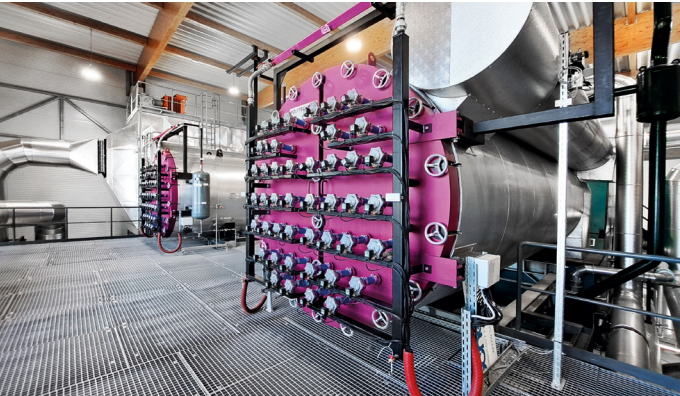
Process steam, Germany
Commissioned 2019

This 10,000 kW saturated steam boiler plant provides process steam to nearby users. It utilises regionally sourced, low-grade waste wood, enhancing its sustainability profile. Completed just nine months after the groundbreaking ceremony, the plant sets new standards for minimal emissions and optimal efficiency. Annually, its operation saves more than 15,000 tonnes of CO₂ emissions.



District heating, Hungary
Commissioned 2023

At the start of 2023, Hungary saw the commissioning of one of its most modern plants, a 2x 7,500 kW hot water power plant. This boiler plant delivers sustainable energy to the district heating network of Kaposvár, a city with 70,000 residents. It aligns with Hungary's strategy to replace fossil fuel-based district heating systems with renewable sources, enhancing sustainability and reducing the overall carbon footprint. The plant uses wood chips sourced from local, state-owned forests.



Industrial steam, CHP, China
Commissioned 2021

This 2x 16,300 kW high-pressure steam boiler plant went into operation in 2021. Polytechnik's first large CHP plant in China uses a steam turbine to generate heat for the local industrial park and 10,000 kW of electricity.



District heating, CHP, Denmark
Commissioned 2016

This cutting-edge CHP plant began operation in 2016 and is the pinnacle of efficiency and innovative technology. The core of this Danish energy centre includes a thermal oil boiler system with 2x 12,700 kW units and ORC turbines, collectively generating over 5,000 kW. Additionally, the plant's overall efficiency and operational flexibility are enhanced by an integrated heat pump with a two-stage condensing boiler. This configuration provides the households in Hillerød with a continuous supply of sustainable energy throughout the year.



Process steam, dairy industry, New Zealand
Commissioned 2023

This 11,600 kW saturated steam boiler system with hydraulic feed grate supplies process steam for the processing of dairy products. At the Stirling site in New Zealand, an existing coal-fired boiler was replaced with a biomass plant, saving 18,500 tonnes of CO₂ per year. The boiler output is 15.6 tonnes per hour (11.5 bar/190°C).

Food industry, CHP, United Kingdom
Commissioned 2016

In 2016, this 2x 10,000 kW thermal oil boiler plant in Wales was commissioned for one of the world's largest dairy industry players. The plant features an ORC turbine with a nominal output of 3,000 kW. It provides sustainable heating for various production processes through hot water and thermal oil while also generating electricity. The electrical energy produced satisfies the majority of the site's energy needs. This plant represents a new benchmark in sustainable energy integration and significant CO₂ footprint reduction for a dairy plant.



Industrial steam, sawmill, New Zealand
Commissioned 2017

This steam boiler system was commissioned in 2016 to provide process steam to a sawmill in New Zealand. Specifically engineered for versatility, the 4,000 kW saturated steam boiler efficiently burns wet (up to 60% water content) and dry sawdust sourced directly from the mill's wood processing. Its primary purpose is to supply thermal energy to the on-site drying chambers and use local residues to fulfil energy needs, effectively minimising the customer's carbon footprint through a closed-loop system.

Process steam, New Zealand
Commissioned 2022

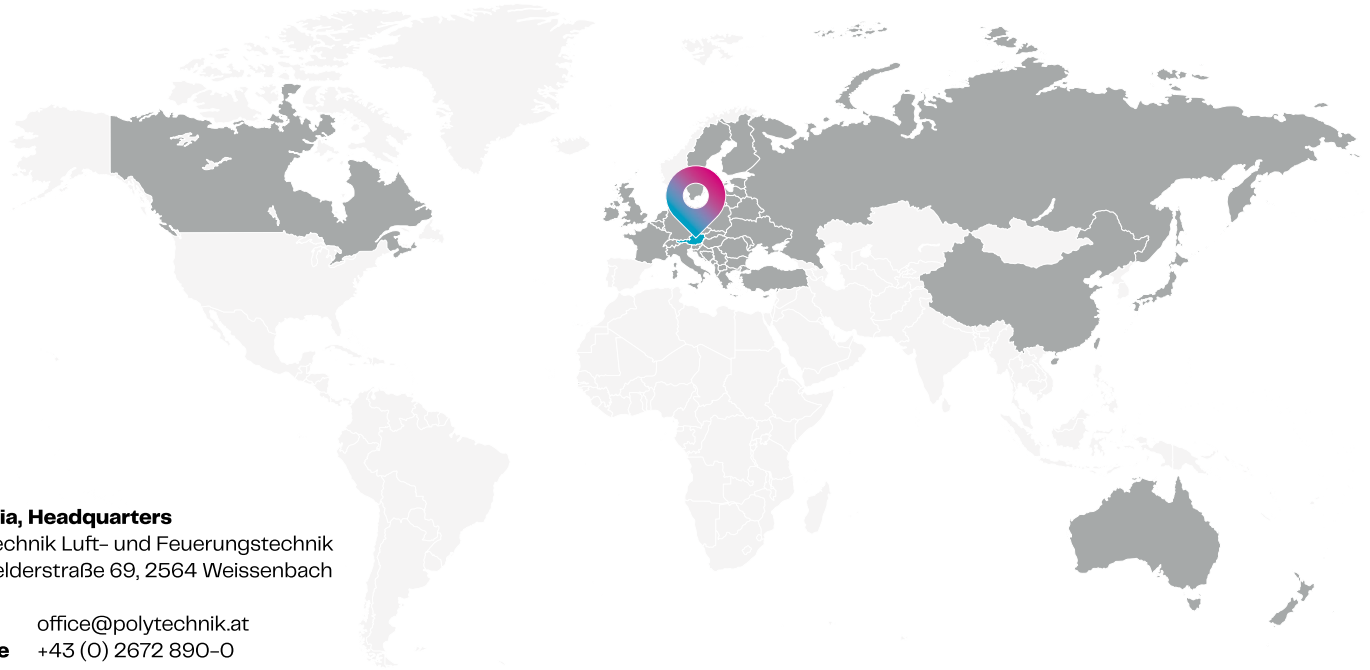
These 2x 7,800 kW saturated steam boiler plants in Christchurch's largest hospital provide the building with continuous and dependable process steam. The plant is designed in accordance with the latest regulations with regard to earthquake safety. The main requirements for this project were the dust-free delivery of the biomass, 100 per cent availability of the plant and the structural integrity during and after very strong earthquakes.



Process energy, CHP, Japan
Commissioned 2018

This 3,815 kW thermal oil boiler system with an ORC module was installed in 2018 for a partner in the local wood processing industry in Japan. The turbine generates 689 kW of electricity, which is used to cover the consumption of the production facilities. Wood waste from the local 20,000 t/a pellet production, mainly consisting of the bark of processed trees, is used as fuel. The plant runs independently of the local power grid.

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Since 1965



Austria, Headquarters

Polytechnik Luft- und Feuerungstechnik
Hainfelderstraße 69, 2564 Weissenbach

Email office@polytechnik.at
Phone +43 (0) 2672 890-0

Polytechnik Group

Hungary

Polytechnik Hungaria KFT
2133 Szodliget, Szeszgyár

Email polytechnik@invitel.hu
Phone +36 273 536 17

Germany

Polytechnik Deutschland GmbH
Mühlstraße 5, 71549 Auenwald

Email office@polytechnik.cc
Phone +49 (0) 7191 911 525-20

Eastern Europe

Email a.polyakov@polytechnik.at
Phone +43 676 849 104 42

Email m.koroleva@polytechnik.at
Phone +43 676 849 104 80

Switzerland

Polytechnik Swiss AG
Zentrum für neue Technologien
Calendariaweg 2, 6405 Immensee

Email swiss@polytechnik.ch
Phone +41 41 784 10 40

Romania

Polytechnik Sieta S.A.
98 Fabricii de Zahar St., Cluj Napoca
400624 Cluj

Email office@sieta.ro
Phone +40 (0) 264 415 032

France and Benelux

Polytechnik S.A.R.L.
Le Grand Breuil N°8, 27190 Portes

Email w.bauer@polytechnik.fr
Phone +33 (0)2 32 30 42 86

New Zealand and Australia

Polytechnik Biomass Energy Pty Ltd
Level 1, 207 Queen Street East,
Hastings 4122, New Zealand

Email office@polytechnik.co.nz
Phone +64 6 211 34 96

China

Polytechnik New Energy Technology
(Beijing) Co., Ltd, 100024 Beijing, China

Email office.beijing@polytechnik.cn
Phone +8610-6575 5201

China, Joint Venture

Guangdong Polytechnik Bio-Energy Co., Ltd.
Jieyang, Guangdong, China

Email info@gdpolytechnik.cn
Phone +86 663-3993322

Poland

Polytechnik Polska Sp.z o.o.
ul. Bytomska 14, 81509 Gdynia

Email biuro@polytechnik.com.pl
Phone +48 58-664-63-12

Southeast Europe

Polytechnik Luft und Feuerungstechnik
Ogranak Novi Sad, Narodnog fronta 89
21000 Novi Sad

Email v.radic@polytechnik.at
Phone + 381 65 202 6424

More locations at
polytechnik.com/contact