POLYTECHNIK
Biomass Energy

INNOVATIVE *BIOMASS TECHNOLOGIES.*

Our contribution to defossilization.

POLYTECHNIK
BIOMASS ENERGY

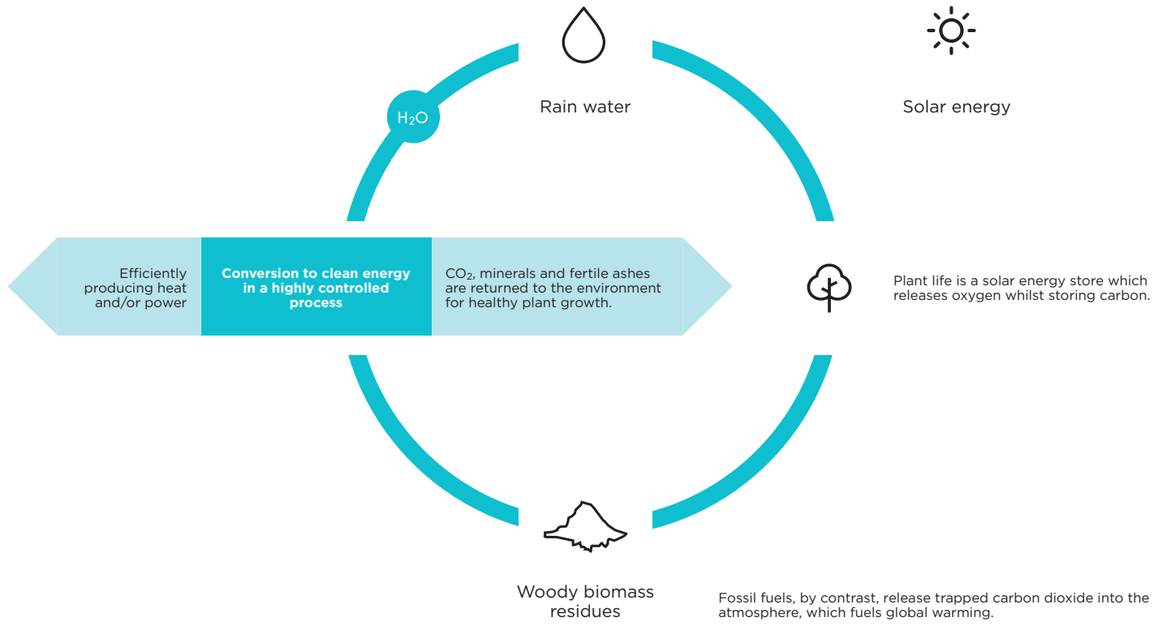
We are a world leader in sustainable and carbon-neutral biomass energy solutions and renewable carbon technologies.

We strongly believe that using energy resources that are readily available, renewable, sustainable and economical is a long-term solution to depleting fossil fuels that gives companies a competitive advantage. We have seen the difference our efficient and carbon neutral processes makes to businesses and the local environment in over 3000 successful installations around the world.

Lukas Schirnhofer (CEO) states the company vision as follows: “From early on, our company concentrated on the thermal utilisation of renewable biogenic resources as an ecological and economical alternative to the limited energy reserves and as a long-term solution for the achievement of the climate protection targets.”

Next to biomass combustion and new gasification technologies, Polytechnik into research and development of innovative carbonisation solutions since 2010. The focus of current research is on the development of solutions for the substitution of fossil carbon in the metal industry with CO_2-neutral, high-quality biochar made from various inexpensive biomass raw materials.

KEEPING THE BALANCE



The world is moving away from fossil fuels towards clean energy and renewable carbon because nations have decided they are no longer willing to accept the costs of pollution, the security risks of importing oil or the threat of global warming.

Biomass provides us with one of the most environmentally friendly energy sources. Carbon dioxide (CO_2) produced during biomass combustion is a fundamental building block for all organic compounds. Via photosynthesis, plants use the energy of the sun to convert carbon dioxide and water into more energy-rich carbohydrates, thereby releasing oxygen. Polytechnik offers you a genuine ecologically sound solution to reduce your carbon footprint, whilst also making perfect business sense.

Everything we do through our advanced combustion systems, plant designs and highly developed control systems, is geared towards efficiently and reliably producing heat and/or power using carbon neutral biomass with the minimum environmental impact.

DISTRICT HEATING / CHP / SWITZERLAND
INSTALLED 2022

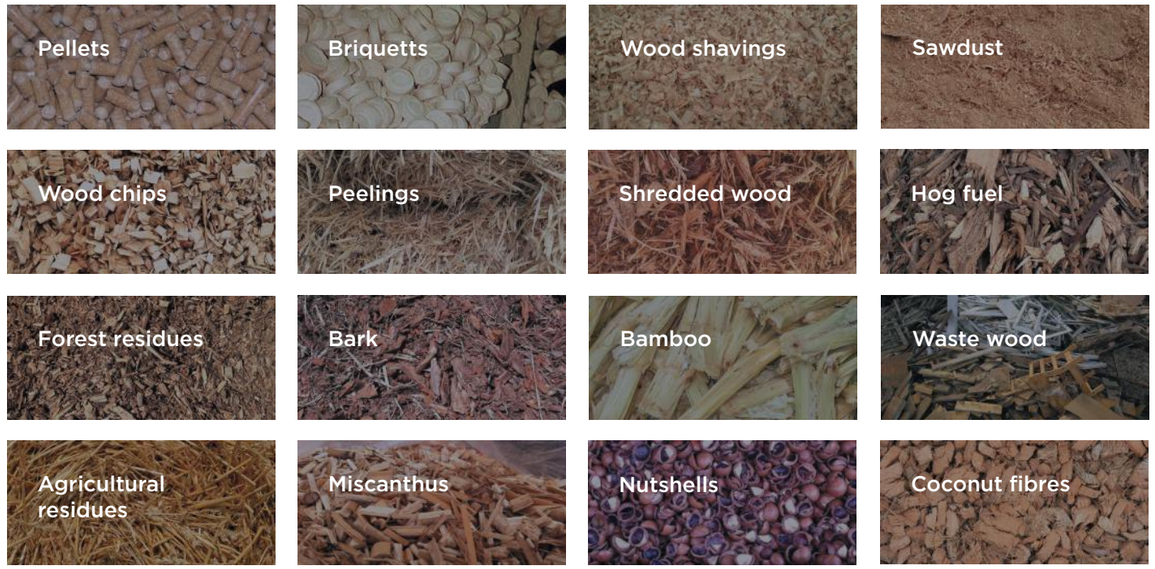
The biomass plant has a thermal capacity of 22,000kW and is equipped with a high-pressure superheated steam boiler. The turbine, with a rated electrical output of 6.400kW, generates green electricity which is fed into the local grid. The thermal energy produced is either stored in a buffer tank or provided to the local district heating network. The plant is designed to use various grades of waste wood as fuel, which is stored in a bunker area of over 2,000m² to ensure a stable supply of energy to its consumers.

COST ***EFFECTIVE***

An immense advantage of our technologies is their ability to efficiently use high and low quality fuels and residues, which allows our costumers to reduce their energy costs and add value to their residues. Low quality fuel does not mean reduced reliability or higher emissions.

Because reliability is critical to you, it's hugely important to us. Our reputation is built on our proven track record for supremely dependable plants with low service and maintenance costs. A Polytechnik plant is a fully tailored solution for the typical price of a standard plant. The combination of cheap and available fuel, outstanding reliability and low service and maintenance costs, makes our plants the most cost effective over their life cycle. Our world-leading energy plants offer you unprecedented control and plant data access at any time and from anywhere through secure internet access. Fuel, load, oxygen, temperature, combustion and other control systems monitor, analyse and continuously optimise all relevant parameters for the most efficient operation and lowest possible emissions.

Flexible use of biomass feedstocks



POWERING ECONOMICS

One of the advantages of biomass is that it's in plentiful supply. Using it creates a demand for material that is often dumped in landfill, openly burned or left to rot. This in turn stimulates the economy at a local, regional and national level. The standard thermal output of our boilers ranges from 1000 kW to 30 MW per unit, with power plants ranging from 200 kW to 20 MW electric. Advanced emssion control and heat recovery ensure highest efficiencies and minimum environmental impact.

STEAM POWER PLANTS In Polytechnik's decentralised cogeneration plants, which are well known for high availability, efficiency and lowest emissions, a biomass boiler produces steam, which drives a turbine generator to produce "green power". The plant also supplies energy in the form of steam and/or hot water to industries and communities. High steam tempreatures and pressures well-matched to the fuel, together with various condenser options guarantee the highest thermal and electrical efficiencies.

ORC POWER PLANTS We've installed over 40 Organic Rankine Cycles (ORC) plants, which use a thermal oil boiler. The dry steam it produces, enables operation at lower temperatures and pressures, without the need for a superheater. Other advantages are:

- Low mechanical stress of the turbine and no erosion of turbine blades
- Long operational life span
- No water treatment system
- Simple start-stop and low turn down
- Condenser water at up to 115°C is used for drying, heating and/or cooling

INDUSTRIAL HEATING / GERMANY
INSTALLED 2019

The 10,000 kW saturated steam boiler plant was commissioned in 2019. Its main purpose is to supply process steam to nearby consumers. The plant is fuelled and designed for low grade waste wood, which is supplied locally to ensure high sustainability. The plant was erected in just 9 months from ground-breaking and sets new standards in terms of lowest emissions and highest efficiencies. The operation of this plant will save over 15,000 tonnes of CO_2 emissions per year.

DAIRY INDUSTRY / CHP / UNITED KINGDOM
INSTALLED 2016

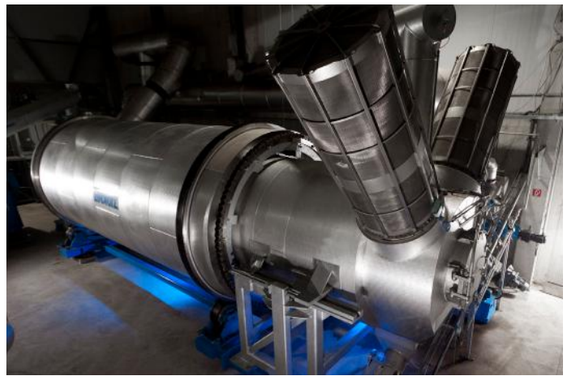
A 2x 10,000 kW thermal oil boiler plant was commissioned in 2016 for one of the world's largest players in the dairy industry in Wales. In addition to providing sustainable heat in the form of hot water and thermal oil for various manufacturing processes, the installed ORC (Organic Rankine Cycle) turbine with a rated output of 3,000 kW also produces electricity. The electrical energy produced is used to cover the majority of the site's consumption. This plant sets new standards in the combination of providing sustainable energy while significantly reducing the carbon footprint of a dairy plant.

DRIVING CHANGE

We are convinced about the economic and environmental benefits of biomass technologies and use our knowledge and experience to lead successful industries and policy makers towards change. Some of the areas where we are already making a change:

- Reducing reliance on and replacing fossil fuels like coal, diesel and gas
- Encouraging new markets and industries by generating revenue streams from unused biomass ressources
- Minimising landfill use through the use of wood waste and agricultural residues as a valuable fuel
- Assisting communities and governments in meeting emissions targets and cleaning airsheds
- Setting highest health and safety standards when it comes to servicing and operating our plants
- Offering high-tech solutions for the production of soil fertilizers and carbon-neutral heat and power at the same time

Driving change requires a deep understanding of the fuel, the industry, the environment and the economic drivers. Our credentials are a result of huge experience gleaned more than 55 years, over 3,000 installations, intensive R&D, and continuous customer feedback.



TORREFACTION PILOT PLANT / AUSTRIA
INSTALLED 2013

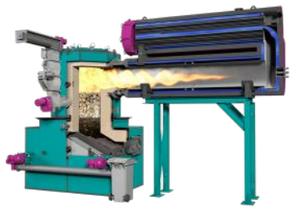
TORREFACTION

CARBON NEUTRAL INDUSTRY SOLUTIONS
We not only provide solutions for the substitution of fossil carbon in the metal industry with CO_2-neutral, high-quality biochar made from various inexpensive biomass raw materials. Polytechnik even goes one step further in its research by setting itself the goal of coupling decentralized biochar production with a highly efficient generation of green electricity and heat from the pyrolysis gases.

Heinz Grossmann, CEO of the company, emphasizes the meaning of torrefaction in speeding up the defossilization of the global industry: “Biomass torrefaction is going to play a key role in global coal substitution. Biomass sourcing and increasing the production capacity up to a reasonable scale will be key to achieve this.“

GASIFICATION

POLYHELD®
HIGH EFFICIENCY LOW DUST



(Dust < 20 mg/Nm³)
without additional flue gas purification

Output Range
400 – 3,000 kW thermal

Effective output range
Combined with ORC module by DÜRR (Cyplan ORC)
120 / 220 / 330 / 500 kW electric

Fuel Flexibility
up to a moisture content of M45

ReGaWatt

REGAWATT

High efficient clean gasification technology

Producing
electricity, heat, cold, steam, synthesis gas, bio-oil

Output Range
2,000 – 10,000 kW thermal
250 – 2,000 kW electric

Modular and easy to scale
Great fuel flexibility

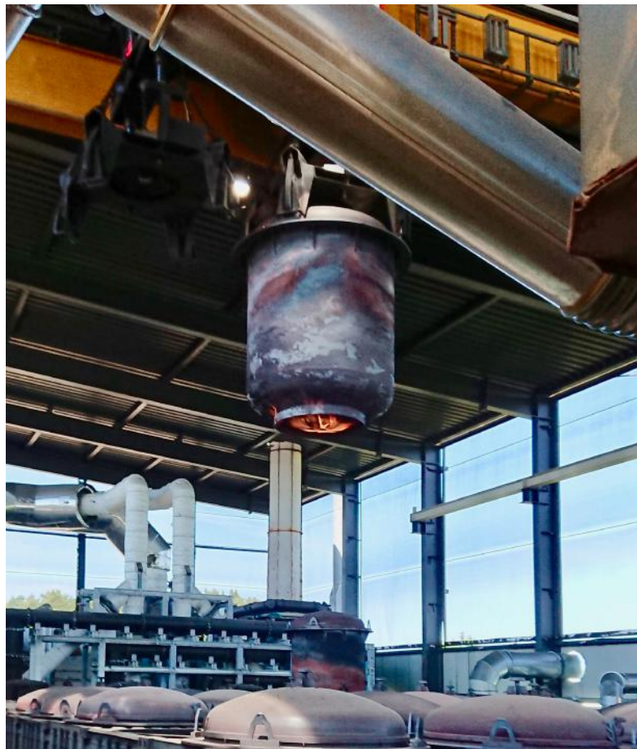
KOMBI POWER SYSTEM®

CARBONISATION

GREEN CARBON /
INDUSTRIAL PILOT PLANT / GERMANY
INSTALLED 2016

CARBON NEGATIVE ENERGY BALANCE
Polytechnik’s Green Carbon Technology can transfer approximately 50% of the plant’s carbon into an inactive carbon pool, which means it is not released. This is done by processing it through pyrolysis under low-oxygen conditions. The remaining 50% of the carbon can be used for heat or electricity production – enabling you to produce biochar with up to 97% carbon and carbon negative energy at the same time (provided sustainable sources are used).

- Carbon capture and storage products
- High-quality biochar from renewable ressources
- Biochar with up to 97% carbon content
- Energy-efficient, closed-loop process
- Possible combination with cogeneration technologies
- Automated batch process



GLOBALLY LOCAL

For more than 55 years we have been designing, engineering, manufacturing, installing and commissioning wood and biomass fuelled heat and power plants around the world.

The Polytechnik group with headquarters in Weissenbach, Austria, builds on the experience of more than 3000 implemented systems. Founded in 1965 as a two-man enterprise, the company became one of the globally leading suppliers for biomass combustion plants. Around 250 highly motivated, experienced and customer orientated people provide advanced products and services to customers worldwide, either through Polytechnik or one of our many joint ventures and partners. They share the same vision to produce energy in the cleanest and most efficient way possible for our customers, the community and the environment. Always geared towards sustainable industrial research and technology development, the company has continued to expand its competitiveness on the international market with innovative products and services.

We're a truly global company, exporting over 95% of our products to thousands of installations in both the northern and southern hemisphere. With subsidiaries in almost a dozen countries and carefully selected partners in every region in which we operate, you will receive a fast and efficient local service from experts and technology leaders in their field. You'll find our subsidiaries worldwide including Switzerland, France, Germany, Hungary, Poland, Romania, China and New Zealand. Our global service network and its trained engineers and service personnel are available 24 hours a day throughout the year over the globe.

PROCESS STEAM / NEW ZEALAND
INSTALLED 2022

The 2x 7,500 kW saturated steam boiler plant in Christchurch is one of a kind and was commissioned in 2022. Its sole purpose is to provide a continuous and safe process steam supply to the Christchurch Hospital. Due to the effects of the major earthquake in 2011, the standards and requirements for ensuring the hospital's steam supply in such catastrophic events were set to a new high level. There was a clear focus on structural integrity of all components and redundancy to achieve highest availability, for this critical energy supply asset, at the lowest possible emissions.

DISTRICT HEATING / HUNGARY
INSTALLED 2023

A 2x 7,500 kW warm water plant, as one of the most modern plants in Hungary, was commissioned in early 2023. It provides sustainable energy to the district heating network of the town of Kaposvar, which currently has 70,000 inhabitants. This plant is one of the first to be based on the Hungarian strategy of replacing fossil fuel-fired district heating sources with renewable energy to increase sustainability and reduce the overall carbon footprint. Wood chips from the local state forests are used as fuel.

INDUSTRIAL STEAM / SAWMILL / NEW ZEALAND
INSTALLED 2017

The plant started supplying steam to a sawmill in New Zealand in 2016. The 4,000 kW saturated steam boiler is specially designed to be fired with wet (up to 60%) and also dry sawdust directly from the wood processing. The thermal energy is mainly used to supply the drying kilns on site. Utilising local residues to meet on-site energy needs increases overall sustainability and reduces the carbon footprint with a closed loop approach.

INDUSTRIAL HEATING / CHP / CHINA
INSTALLED 2021

The 2x 16,300 kW high pressure steam boiler plant went into operation in 2021. Polytechnik's first largescale CHP plant in China generates not only heat for the local industrial park but also 10,000 kW of electricity by the means of a steam turbine.

INDUSTRIAL HEATING / CHP / JAPAN
INSTALLED 2018

A 3,815 kW thermal oil boiler plant with an ORC module was installed 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 production facilities own consumption. As fuel, the wood waste of the 20,000 t/a local pellet production is utilised which mainly consists of bark of the processed trees. The plant operates independently from the local power grid in island mode.

DISTRICT HEATING / CHP / DENMARK
INSTALLED 2016

This state-of-the-art CHP plant combines the highest efficiencies with innovative technology. The thermal oil boiler system with 2x 12,700 kW and the ORC turbines, producing a total of more than 5,000 kW, are the heart of the Danish energy centre and were commissioned in 2016. In addition, a heat pump works together with a 2-stage condensing unit to not only increase the overall efficiency of the plant but also to create technical and commercial operational flexibility to ensure that green energy is supplied to households of Hillerod all year round.

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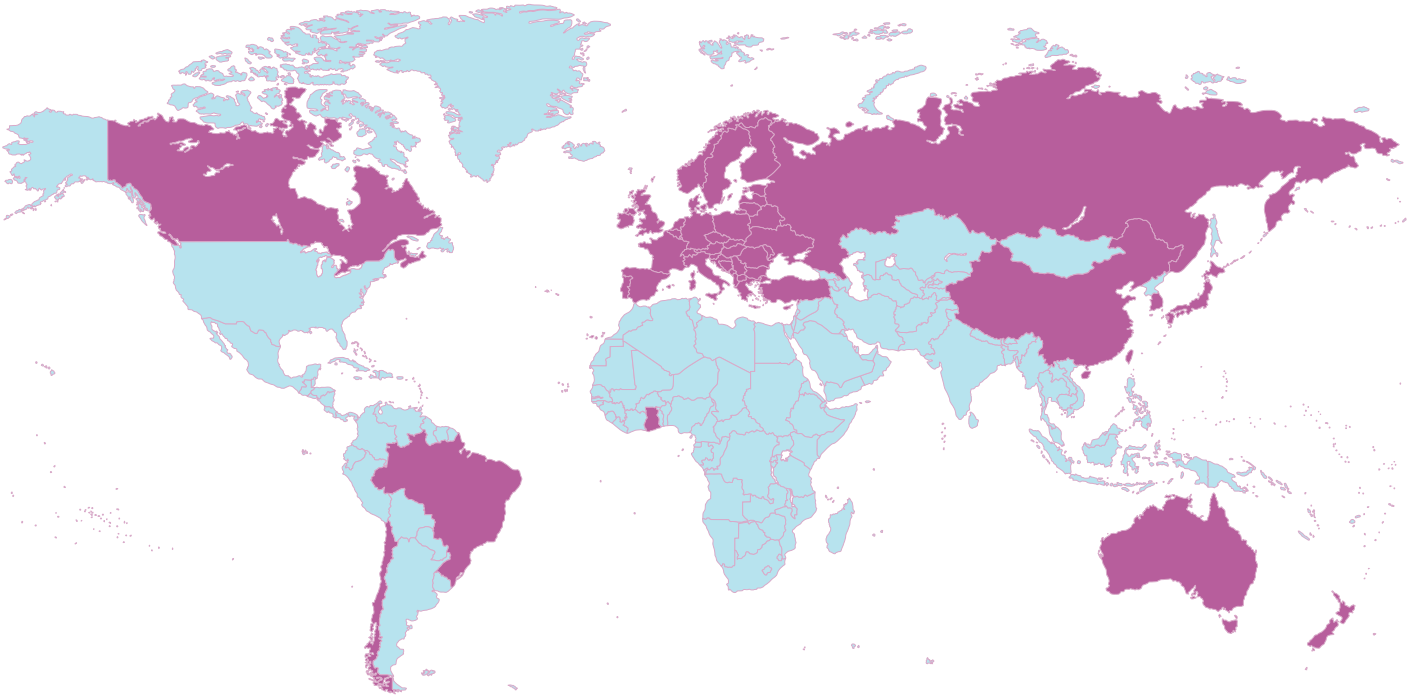

INNOVATIVE *BIOMASS TECHNOLOGIES.*

Turnkey solutions including front-end engineering

Design, sale and detail engineering

Manufacturing

Supply, installation and commissioning

POLYTECHNIK Luft- und Feuerungstechnik GmbH

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