

Valmet Gasifier

Smart power from biomass and waste



Proven power solutions from biomass and waste

Gasification is a rapidly developing combination of technologies and services for effectively converting biomass, recycled material and waste into a usable form of energy. The CFB (circulating fluidized bed) gasification process works by partially combusting the biomass at high temperatures using a controlled amount of oxygen and/or steam. The resulting product gas is a versatile energy carrier offering a range of benefits across diverse industries.

Benefits across the board

The benefits of gasification are both wide-ranging and significant. The advantages of a reliable and renewable substitute for expensive fossil fuels are readily apparent. It is easy to modify existing boilers to the gasification process – even while leaving your existing systems operational for backup as needed. Modifying your operations to gasification creates a system that can accept many types of fuels, and it can be constructed even on a scale of up to several hundred MW/unit size. What's more, modifying one's existing plant can extend its lifecycle significantly.

Healthy planet – healthy profits

Reducing CO₂ emissions is important – and doing it in an efficient and economically viable way is absolutely critical. From this perspective gasification technologies are quite relevant as they enable partial or complete replacement of fossil fuels with renewable fuels. At the same time, CO₂ emissions are cut significantly – and the service life of an existing facility is measurably extended.

A clear advantage of waste gasification is that the process provides much better electrical efficiency compared to direct combustion of waste materials. Also materials that would otherwise have been disposed of, such as unclean plastic, paper, cardboard and wood and other problematic waste are used.



An application that uses biomass to partly or completely replace fossil fuels in heat and power plants.



Valmet Solution:

Fuel conversion for power boilers

Case: Vaskiluodon Voima Oy, Vaasa, Finland

The biggest in the world

The biggest biomass gasification plant in the world is the one Valmet completed in late 2012 in the city of Vaasa, Finland. The CFB gasifier for Vaskiluodon Voima Oy was built in response to the critical need to reduce the environmental load of a traditional coal-fired power plant.

Short delivery, efficient integration

By simply integrating the gasification capability with the original coal-fired plant, the investment cost was kept to about one third of a similar-sized new biomass plant. The new plant was up and running quickly and the integration process did not interfere with the ongoing energy production. At the same time the full original coal capacity was retained.

Flexible – and eco-friendly

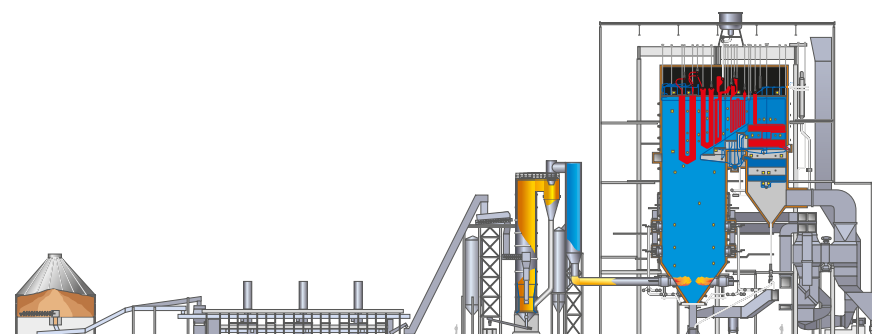
By using a broad range of local and often-inexpensive biomass fuels – such as wood, peat and straw – the upgraded plant consumes one third less coal. Further, the plant generates both heat and electricity, resulting in a very high efficiency rating. District heating is already environmentally friendly, but the biomass gasifier makes the district heating in Vaasa even more so. In part this is because the biomass to be gasified corresponds precisely to the amount of fuel required for the production of district heating and co-generated electricity.

Solution related technical features:

- Replaces coal with biomass
- A flexible range of local biofuels can be used
- Highly scalable – can be any size
- Also works for oil and gas as well as other solid fuels
- Ratio of biomass to fossil fuel use is freely selected
- Short delivery time with minimal down time disturbances in existing energy production
- Significantly extends your plant's service life

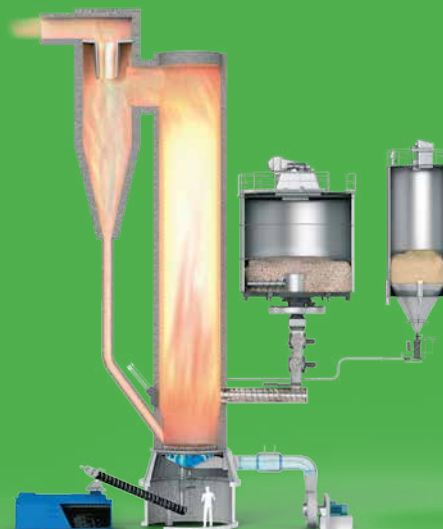
Vaskiluoto case:

- 140 MW biomass gasifier; including Valmet DNA Automation system and dryer and fuel yard
- Adjoined to existing coal-fired 560 MW power boiler
- Plant generates 230 MW electricity and 170 MW district heating
- 140 MW capacity is enough to heat 10,000 single-family houses even during the coldest winter spells
- Gasification replaces up to 40% of coal



Valmet Gasifier – a world of possibilities

As a global leader in CFB gasification technologies and services Valmet offers a range of targeted solutions to meet the needs of various power and process industry sectors. Each of these solutions generates energy from biomass and waste in economically efficient and environmentally sound ways.



Valmet Solution:

Biomass for industrial kilns

Case: Södra Cell, Värö, Sweden

A time-tested solution

Drying and gasification of biomass for increased fuel value is an innovation pioneered by Valmet. In fact, since 1987 a Valmet lime kiln gasifier has been operating at the Södra Cell pulp mill in Värö, Sweden. The process utilizes by-products from pulp production and offers pulp mills increased independence from the availability and unpredictable price developments of fossil fuels. The use of biomass-derived energy is generating considerable savings compared to oil or natural gas firing.

A natural fit

Powering a lime kiln with a biomass gasifier has proven to be a smart solution for several reasons. As the lime kiln is the only user of fossil fuels in a modern pulp mill, the mill can become CO₂ neutral by replacing these fuels with biomass. Further, these biofuels are readily available at the plant, meaning that substituting oil or gas with excess bark or waste wood delivers the most economical result. The switch also removes the uncertainty of short and long-term oil shortages or price-hikes.

An application that uses biomass as a replacement for fossil fuels in industrial furnaces such as lime kilns.



Lime kiln related technical features:

- Fuel options include sawdust, forest residues, fresh wood, bark
- Large scale applications with a single unit (20 -200 MW)
- Valmet dryer technology secures full capacity of the existing system
- Gas cleaning can be used as needed

Solution is also applicable for other industrial uses such as:

- Iron and steel production
- Metal processing
- Cement production
- Chemical processes

An application that uses solid recovered fuel (SRF) for generating heat and electricity.

Valmet Solution:

Highest electrical efficiency from waste

Case: Lahti Energia, Lahti, Finland

World-leading technology

100 kilometers north of Helsinki, Finland, in the city of Lahti, is the world's first eco-gas fueled power plant. Lahti Energia's new Kymijärvi II power plant runs on SRF that is gasified, cooled and cleaned before combustion. The plant produces 50 MW of electricity and 90 MW of district heat for the city of Lahti. It was officially inaugurated in May of 2012.

Eco-friendly – and eco-smart!

The fuel at the new plant consists of various types of industrial, commercial and building site waste, and some treated household waste is also used. This waste is first converted into product gas that is then combusted in the ordinary gas boiler.

When gas is cleaned before combustion it is possible to produce high pressure and temperature steam for the turbine without risk of boiler corrosion. In the Lahti case the electrical efficiency is over 30%, which is possible as the steam parameters of the boiler are extraordinary for a waste boiler (540 C° and 120 bar).

By doing this, the electricity and heat produced equals the amount generated by 170,000 metric tons of coal in a traditional coal-fired power plant. In recognition of this impressive advance, the Kymijärvi II plant was awarded Finland's Climate Act of the Year Award in 2012.

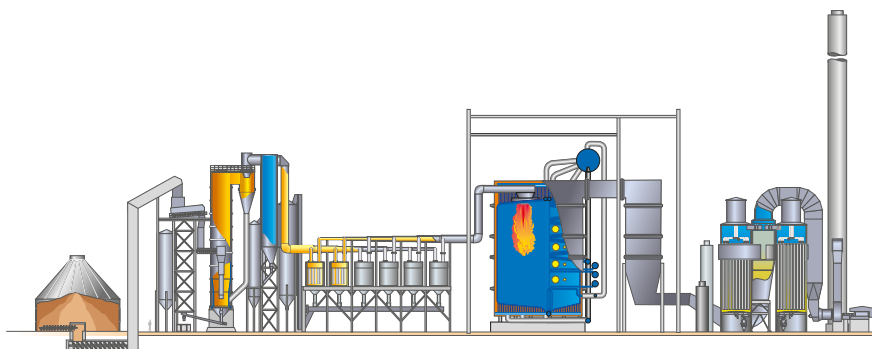
Valmet excellence – from end to end

Valmet delivered the CFB gasification process, plus gas cooling and cleaning, steam boiler and flue gas cleaning system. And the production of electricity and heat is kept consistent thanks to Valmet's DNA automation system that covers the entire plant, starting from fuel reception.



Solution related technical features:

- Solid recovered fuel (SRF), 250,000 tons per year
- High electrical efficiency
- Complete new power plant
- Gas filtering -> clean product gas
- Clean and corrosion free operation





Our professionals around the world work close to our customers and are committed to moving our customers' performance forward – every day.



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