

Powering a decarbonized
world for everyone

ccWOIMA



The zero carbon emission waste-to-energy power plant

Waste recycling and CO₂ capture enables carbon neutral and negative performing power plants

The waste-to-energy power plants emit roughly 1,000 kg of CO₂ per ton of waste incinerated. This carbon dioxide is divided between fossil and biogenic origin, depending on the waste composition, i.e. the amount of organic waste in the feedstock. Typically, municipal solid waste (MSW) contains 20 to 60% of biowaste, while the more “engineered” waste fuels, like RDF, REF or SRF, contain less

than 10%. The incineration of the biogenic waste represents the renewable share in the recovered energy.

With MSW as fuel this share is on average 55%. The incineration of the fossil waste component generates on average only 136 kgCO₂/MWh, which demonstrates significant emission savings compared to natural gas (202 kgCO₂/MWh) or coal (347 kgCO₂/MWh). WOIMA uses the most cost and energy-efficient technologies utilizing only safe and widely available chemicals in the CO₂ absorption.

The ccWOIMA solution based on hot potassium carbonate (HPC) combines seamlessly with our wasteWOIMA® power plant offering up to 95% capture rate. Modularity allows the customer to optimize the carbon capture level based on the fossil waste fuel ratio, regulatory requirements and/or economic feasibility.

The ccWOIMA offers all the same benefits of robustness, movability and scalability as does the standard wasteWOIMA® plant, but with reduced CO₂ emissions. The plant is designed for a 30-year lifespan in the harshest of conditions. The design is based on 20’ and 40’ sea-container-sized modules that are easy, fast and secure to transport to virtually any destination.



Our trusted partner

Woima Corporation develops innovative modular, standardized solutions that enable the utilization of waste streams to their fullest potential, either as raw material or as energy. It is based in Vaasa, Finland.

SFW has partnered with Woima Corporation since 2021.

As part of the European Green Deal, the European Commission has raised the 2030 greenhouse gas emission reduction target to 55% compared to year 1990. Actions are required across all sectors, including increased energy efficiency, renewable energy generation, as well as carbon capture through storage and utilization. SFW in partnership with Woima is developing the ccWoima solution for waste-to-energy power plant to meet the challenge.. The zero carbon emission plant will produce clean base-load energy and support increased renewable power generation.

ccWOIMA

Modular Carbon Capture Plant

ccWOIMA key facts:

- Capture technology based on the Hot Potassium Carbonate (HPC) reversible process
- Reliable process chemistry with a low cost, low toxicity and oxygen resistant solvent
- Can be powered by electricity or steam
- Capture rate as high as 95%, with high-purity CO₂ product of >99%
- Low energy consumption below 1.5 GJ/ton CO₂ with electricity-based solutions
- District heat as additional by-product from the process
- Proven and widely available commercial equipment and components supported by SFW's project execution capabilities as a technology integrator

The ccWOIMA power plant's modularity is based on a WOIMAline (boiler island) ideology.

The plant consists of one to four WOIMAlines each with the following parameters

- thermal efficiency 89%
- electrical efficiency 25%
- CHP efficiency 19% electricity / 68% thermal

The plant can also generate a combination of steam, thermal energy and electricity, and switch flexibly between the commodities,

while reducing 0 - 95% of the CO₂ emissions.

wasteWOIMA CCUS fuel capabilities:

- municipal solid waste (MSW)
- refined waste fuels (REF, RDF or SRF)
- industrial and commercial waste (ICI)
- construction and demolition waste (CDW)
- agricultural waste (AW)
- waste wood and
- different biomasses

The ccWOIMA supports the two different approaches to carbon capture:

1. Carbon Capture and Storage (CCS), where CO₂ is compressed or liquefied and transported to a geological storage in the sub-surface rock formations, depleted oil and gas fields or deep saline formations.

2. Carbon Capture and Utilization (CCU), where CO₂ is recycled for further usage. Captured CO₂ can be converted to e.g.: hydrocarbons, plastics, concrete and reactants for various chemical synthesis.

The integration of our carbon capture solutions with the existing energy generation unit and co-located green hydrogen and synthesis technology blocks enables the most energy efficient and cost competitive products.

The HPC capture process starts with the cooling and compression of flue gas to enable enhanced efficiency of absorption of the CO₂ by the hot potassium carbonate solvent. The carbon capture system removes CO₂ and regenerate the solvent via the following reversible reaction:
$$K_2CO_3 + CO_2 + H_2O \rightleftharpoons 2KHCO_3$$

The heat recuperated from the flue gas and product CO₂ streams can be either used for internal recovery purposes in

the capture system or exported to an available district heating network. The heat recuperation method is based on CO2 CAPSOL's patented EoP solution. SFW is in agreement with CO2 CAPSOL which covers a non-exclusive cooperation for WtE and Biomass CHP facilities globally





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About us

Since 1891, Sumitomo SHI FW have developed and delivered the highest quality technology solutions within the everchanging energy market. Now the transition to a net zero world is reshaping industries and economies to improve our impact on our environment.

We work in partnership with our customers, cultivating a deep understanding of their businesses, to deliver integrated energy solutions.

We want to be a life-cycle partner, bringing complementary expertise and working closely with our customers across the entire process. This is from customer value creation to design, scope, installation, execution, maintenance, and operations.

We partner with a diverse array of experts to meet rapidly evolving customer needs. With our unique knowledge, proven expertise, leading

technology, and global reach, we go further, together. By working closely with our customers, we enhance customer value and can reach decarbonization goals faster.

Whatever the customer challenge, we endeavor to find the solutions.

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