



W O I M A

CORPORATION

BROCHURE

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WOIMA ECOSYSTEM  
NEGATIVE CARBON  
FOOTPRINT SOLUTION



# WOIMA ECOSYSTEM

## THE NEGATIVE CARBON FOOTPRINT SOLUTION

Landfill methane emissions are the 5<sup>th</sup> largest greenhouse gas source with a 10% share, only after power generation (31%), transportation (15%), manufacturing (12%) and agriculture (11%). In fact, they match the CO<sub>2</sub> equivalent emissions of all 28 EU countries. The WOIMA solutions mitigate these emissions by controlled use of methane in power generation, which cuts down on the use, or even replaces fossil fuels. The annual negative carbon footprint of the WOIMA Ecosystem solutions adds up to 60 kg of eqCO<sub>2</sub> for each ton of waste. This equals the carbon capture capability of over 10 ha of Finnish spruce forest per each WOIMA Ecosystem unit.

The WOIMA Ecosystem combines three simple and robust waste-to-value technologies into one comprehensive solution. The waste pre-sorting solution separates the waste into recyclables (glass, metals, plastics etc.), organics and inorganics. Recyclables will replace virgin raw materials in manufacturing, organics will be used in biogas production and inorganics incinerated for energy. The refuse materials from the Ecosystem are ash for the construction industry and digestate for fertilizer production. Thus, each waste fraction is recycled optimally.

The controlled anaerobic digestion process reduces the organic materials into biogas, mainly containing methane (CH<sub>4</sub>) and carbon dioxide (CO<sub>2</sub>). It directly replaces fossil fuels, such as LNG, CNG, LPG, HFO and LFO, and different biomasses in power generation e.g. at the *wasteWOIMA*<sup>®</sup> power plant's external superheater. Or it can be further purified to produce transportation fuels. The "left-over" CO<sub>2</sub> is clean enough to be utilized in greenhouses or as welding gas.

The carbon footprint of the waste-to-energy power generation consists of direct and indirect CO<sub>2</sub> equivalent emissions. The direct emissions are based on the combustion of fuels. There is only minimal difference between pre-sorted MSW or fossil fuels. Both generate roughly 40,000 tons of CO<sub>2</sub> p.a. in generating 5MW of electrical power. The indirect implications, on the other hand are huge. They consist of the production, transportation and distribution of fuels, which, in the case of LFO, adds 4,500 tons p.a. Waste, on the other hand, is a locally abundantly available fuel and has no such impact.

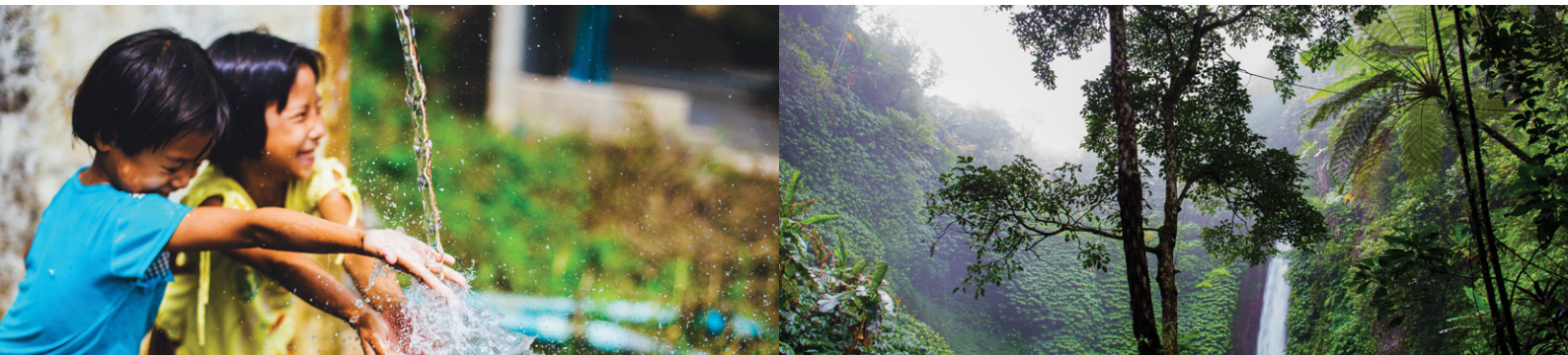
Another indirect impact is the opportunity value of reduced uncontrolled landfill methane emissions. The decomposition of organic waste is an ongoing process, which is not rendered inert at any point. The landfill methane generation rises steadily throughout the waste deposition time and amounts up to an estimated 45,000 tons of eqCO<sub>2</sub>. Thus, adding the direct and indirect impacts together, the WOIMA Ecosystem power generation solution has a negative carbon footprint worth 5,000 tons of eqCO<sub>2</sub> p.a.

The reduction of landfilled waste will automatically also minimize the amount of potentially hazardous substances, such as volatile organic compounds (VOCs) and polychlorinated biphenyls (PCBs). It also prevents the emission of nutrients like nitrogen, ammonia and phosphorus, as well as chloride and other salt components and heavy metals into the groundwater, soil and air. Reduced waste quantities also mean less microbes, pests and rodents, which has a positive impact on people's health and the environment.

All in all, the WOIMA Ecosystem has roughly 50,000 tons less eqCO<sub>2</sub> emissions than fossil fuel power plants p.a., and with the additional environmental benefits from waste reduction. This is mainly due to the reduction of uncontrolled methane emissions, a greenhouse gas 28 times more potent than CO<sub>2</sub>.

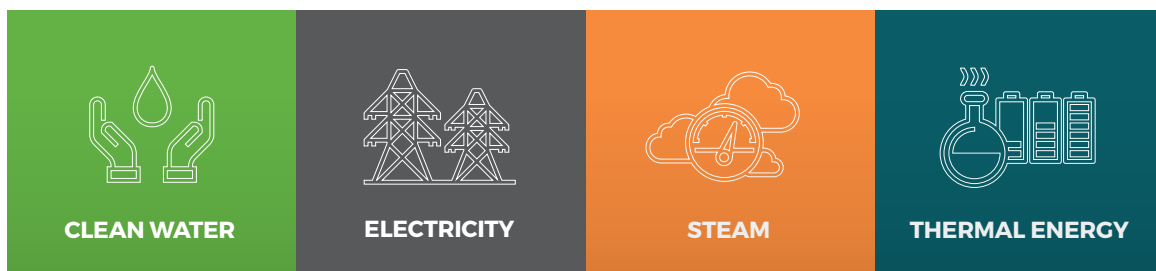
The WOIMA Ecosystem uses waste fuels with a calorific value range of 5 – 24 MJ/kg with moisture up to 65% with one standardized solution. The Ecosystem automatically adjusts itself to variations in fuel quality and quantity to deliver a constant stream of energy. And the energy mix can fluctuate over time according to local needs.

All WOIMA Ecosystem solutions are modular and pre-fabricated, and can easily be replicated simultaneously or at a later date to receive multiples of the 250 tpd feedstock, i.e. 500, 750 or 1,000 tons per day. For waste streams larger than 1,000 tpd, decentralization is the right solution. MSW is transformed into energy close to where it is generated and the WOIMA Ecosystem offers locally more versatile energy commodities to e.g. industrial customers; electricity, saturated steam and thermal energy (heating / cooling).



## KEY FACTS

- Easy to build; established on a concrete slab of 5,000 m<sup>2</sup>
- Delivery time under 18 months
- Simple operation; robust and proven technology
- Safe operation under any conditions
- Easy exchange of broken or worn-out plant components
- Remote monitoring of plant performance
- Capable of producing saturated steam, electricity and thermal energy (heating / cooling)
- Complies with the strict EU Emission Standards





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