



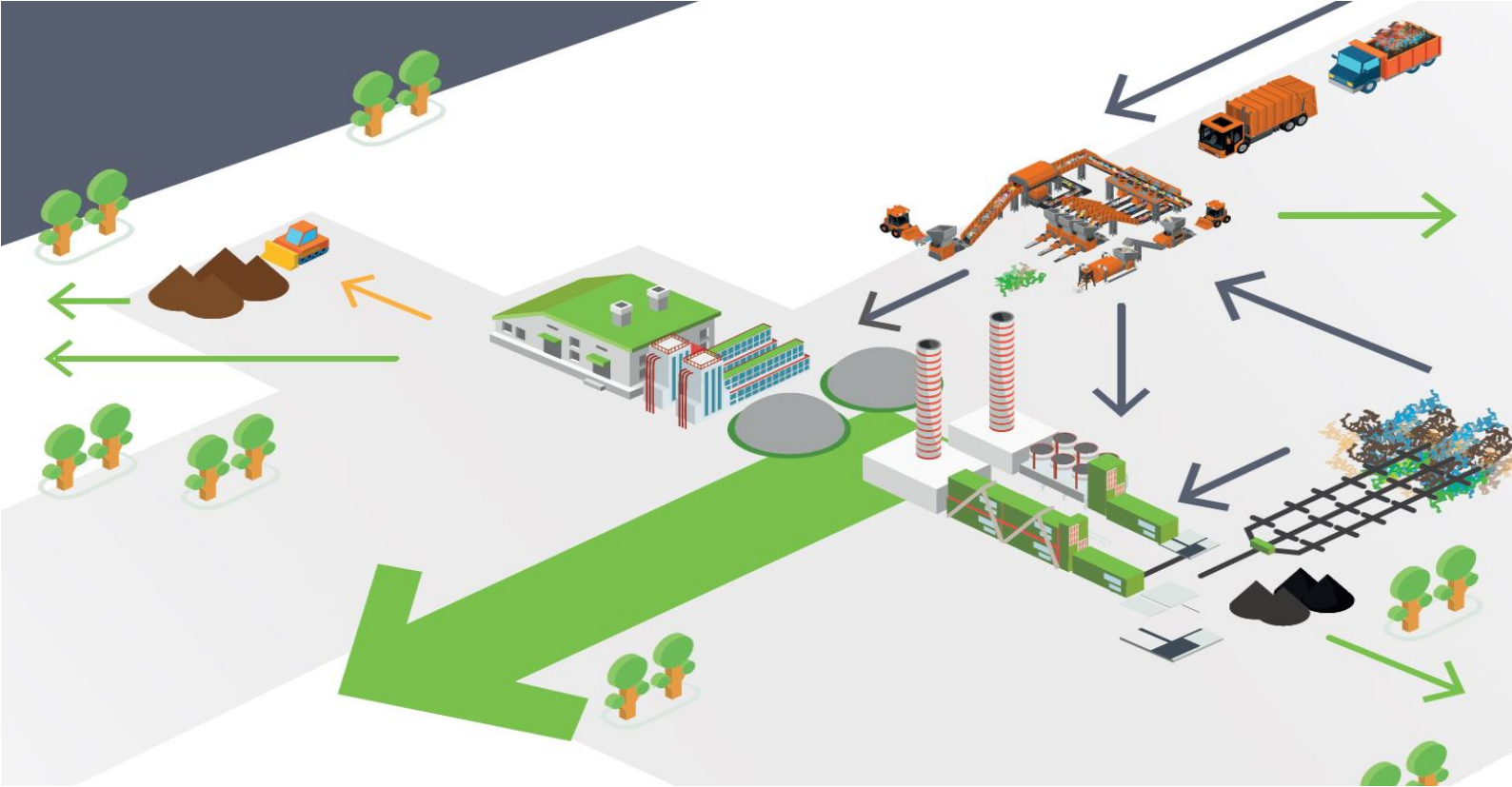
W O I M A

CORPORATION

USE CASE



WOIMA ECOSYSTEM
FOR 250 TPD OF MSW



WOIMA ECOSYSTEM SOLUTION

Optimized for 250 tons of MSW per day

Municipal Solid Waste (MSW) is a challenging fuel for power generation due to its heterogeneous nature, low calorific value, high moisture content and potentially harmful emissions. The WOIMA Ecosystem uses MSW to support circular economy ideology, extracts maximum amount of energy out of it and minimizes all water, soil and air emissions. Practically all the waste is recycled either as raw materials or into energy leaving less than 5% of refuse material for final disposal.

The WOIMA Ecosystem solution 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.

Typically, MSW consists of (relative to 250 tpd)

- 5% of recyclables (-12 tpd)
- 60% of organic matter (-150 tpd)
- 35% of inorganic waste (-88 tpd)

Using half of the organic waste (i.e. -75 tpd) in biogas production will have three key benefits

1. The calorific value (CV) of the remaining waste increases for easier incineration (organics have lower CV than inorganic waste)
2. The moisture content decreases (organic matter contains most of the moisture in waste)
3. Biogas can be utilized to enhance the power generation capacity of the *wasteWOIMA*[®] waste-to-energy power plant

The biogas, with thermal value of 5 MW, will power an external super-heater pushing the net electricity generation capacity of the *wasteWOIMA*[®] power plant from 2.5 MW to 4.4 MW. This represents a 76% increase in power output with only 45% increase in CAPEX and 25% increase in OPEX. Thus, the total power-to-cost ratio of the solution rises by over 30%. Furthermore, the biogas production digestate is an excellent natural fertilizer containing all the nutrients and micro-nutrients necessary in modern farming; including nitrogen, phosphorus and potassium. Thus, it has significant economic value.

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 1000 tons per day. For waste streams larger than 1000 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 industrial customers; electricity, saturated steam and thermal energy (heating / cooling).

The WOIMA Ecosystem's modularity is based on a WOIM*Achain* (powerchain) ideology. Each WOIM*Achain* contains a waste pre-sorting, biogas production and waste incineration solution size-optimized to operate together in sync. The Ecosystem consists of one to four WOIM*Achains* each capable of producing

- 5.2 MW (gross) or 4.4 MW (net) electricity or
- 4.4 MWe (net) and 10 MWth (heating) or
- 4.4 MWe (net) and 6 MWth (cooling) or
- 18 tons of steam (500°C @ 90 bar)

The WOIMA Ecosystem is capable of handling a wide range of non-toxic solid waste fuels, such as

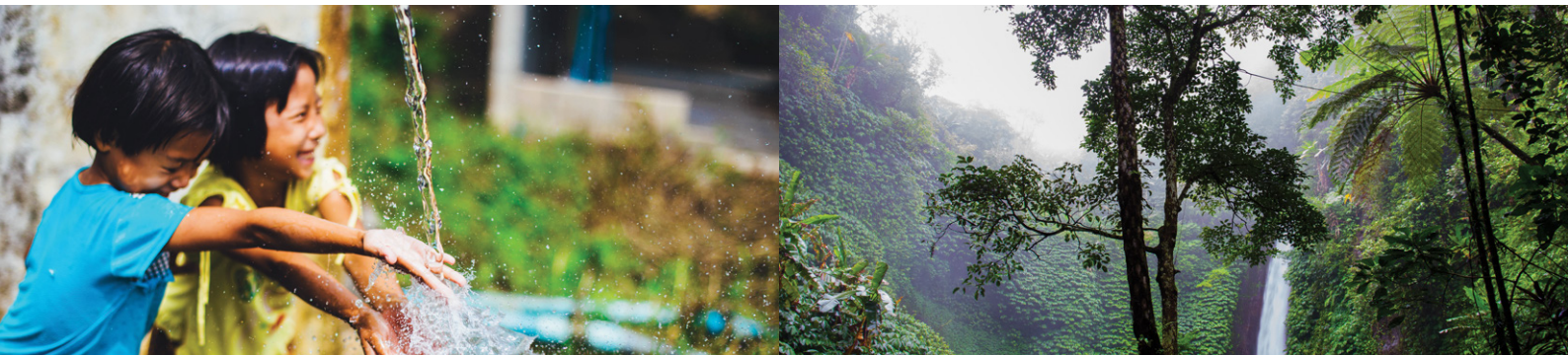
- municipal solid waste (MSW)
- refined waste fuels (REF, RDF or SRF)
- industrial and commercial waste (ICI)
- construction and demolition waste (CDW)
- wastewater treatment sludge
- agricultural waste (AW) and
- different biomasses, such as EFB, rice husk...

The fuel calorific value range is 5 – 24 MJ/kg with moisture up to 65%. The Ecosystem automatically adjusts itself to the variations in fuel quality and quantity to deliver a constant stream of energy.

The basic WOIMA Ecosystem solution can be complemented with several standardized auxiliary systems, designed to fit into the modular Ecosystem approach, such as

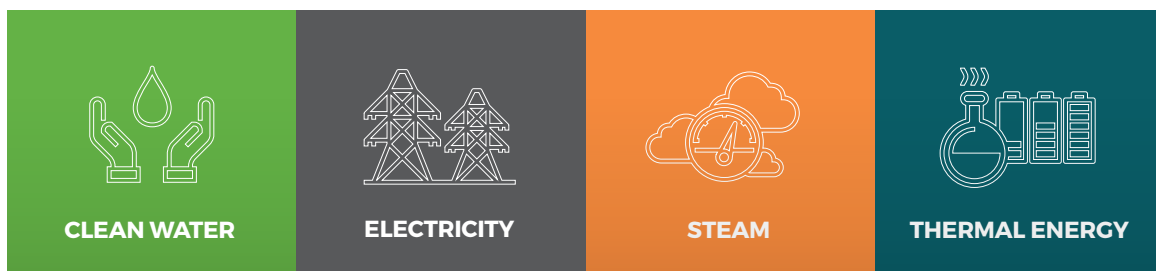
- pyrolysis solution transforming tires or plastics back into oil
- hydro-thermal carbonization (HTC) producing activated carbon
- biofuel refinery generating traffic fuels (CBG, LBG, bio-diesel) out of excess biowaste
- animal by-product rendering solution
- landfill gas collection and utilization

The WOIMA Ecosystem Solution is easy to deliver, quick to install, cost-efficient to run and simple to maintain offering all stakeholders significant economic, social and environmental benefits.



KEY FACTS

- Easy to build; established on a concrete slab of 3,000 m²
- Delivery time below 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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CONTACT INFORMATION

Henri Kinnunen

Chief Executive Officer

henri.kinnunen@woimacorporation.com

+358 40 835 8974

Tapio Gylling

Chief Operations Officer

tapio.gylling@woimacorporation.com

+358 50 347 2799

Tapani Korhonen

Chief Technology Officer

tapani.korhonen@woimacorporation.com

+358 44 989 1513

Joona Piirto

Chief Project Officer

joona.piiro@woimacorporation.com

+358 50 387 9883

POSTAL / VISITING ADDRESS

Virtaviiva 8F

65320 Vaasa, FINLAND

www.woimacorporation.com

info@woimacorporation.com

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