WOIMA

CORPORATION

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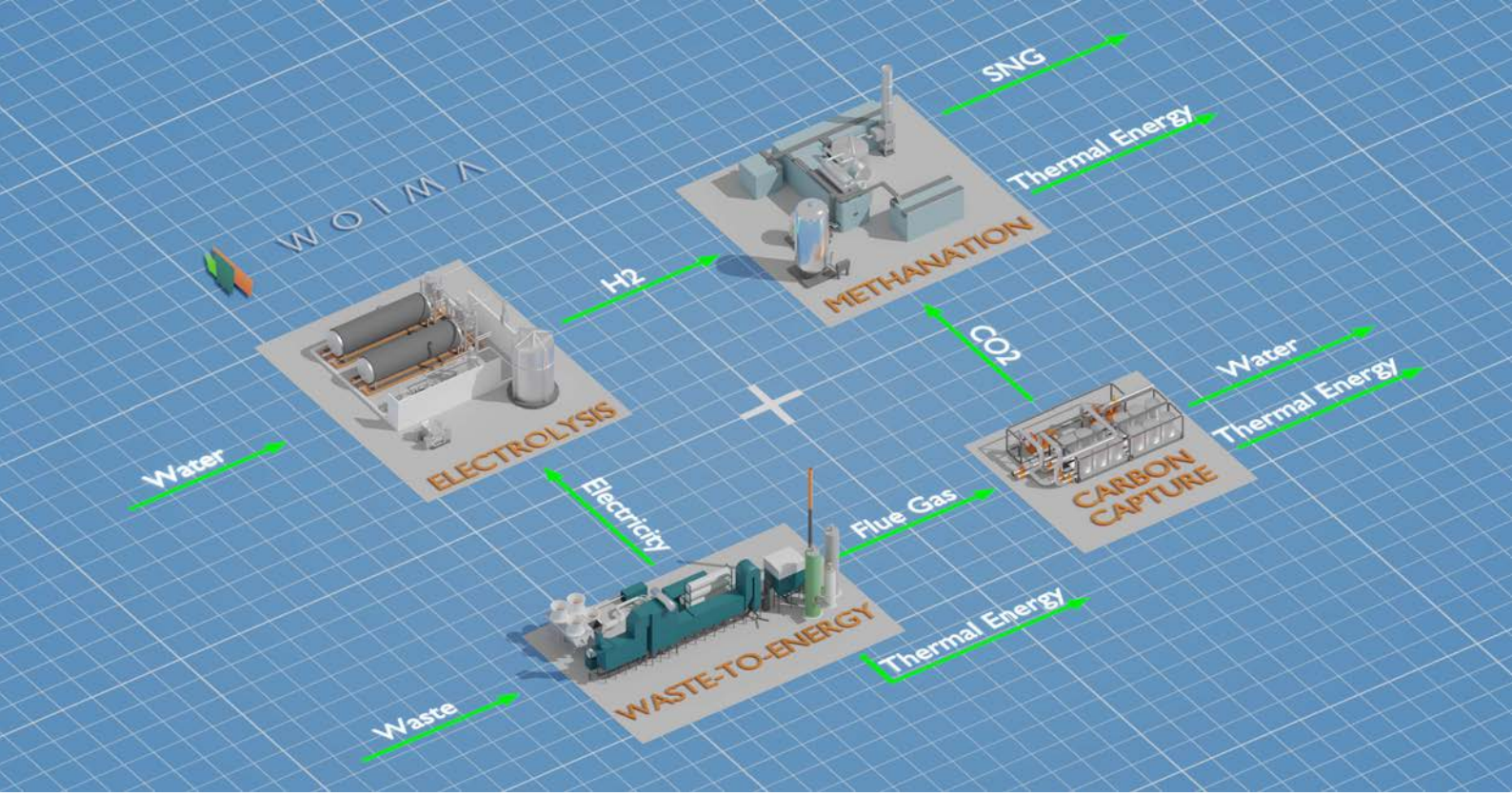
WOIMA *Ecosystem*

SYNTHETIC METHANE
PRODUCTION



WOIMA *Ecosystem*

SYNTHETIC METHANE PRODUCTION

Recently, the fossil fuel prices have soared due to the volatility in international oil and gas markets further exacerbated by geopolitical insecurity and the actions of oil producing countries (OPEC). This, combined with the global drive towards zero carbon solutions, has led to fossil-fuel-dependent industries looking into cheaper low-carbon options. One answer is *e*Fuels, synthetic fuels produced by synthesizing renewably-produced hydrogen with captured carbon to create a new environmentally-friendly hydro-carbon fuel.

Transport, in particular sectors of high-carbon heavy transport, such as aviation and shipping, is one of the highest carbon emitters in the global economy. Solving the challenge of decarbonizing it is essential on our path to net zero.

*e*Fuels are a high-energy-dense liquid fuel that can be 'dropped-in' as a direct replacement for existing petroleum fuels used in shipping and aviation and, in effect, offer a chemically identical low-carbon alternative to replace oil-derived fuels. *e*Fuels can provide the missing link needed to decarbonize heavy transport sectors, whilst making best use of existing transport assets and abundant low carbon electricity.

Whilst *e*Fuels are unlikely to replace conventional fuels entirely, they will have a role to play in the diverse energy mix decarbonizing specific segments of the heavy transport market. Substituting *e*Fuels into existing assets rather than scrapping them, will avoid the cost and carbon emissions associated with replacing the vehicle fleet.

The WOIMA *Ecosystem* for synthetic methane production combines four robust and established technologies - waste-to-energy, electrolysis, carbon capture and methanation - into one comprehensive solution. Capturing the required CO_2 directly from the power plant's flue gas stream offers significant efficiency benefits and synergies. Combining the green hydrogen and CO_2 in a methanation process results in synthetic natural gas (SNG) which can be further liquefied to LSNG for easier transportation. It will utilize existing natural gas and biogas storage and distribution networks, thus enabling efficient utilization of the methane-bound green hydrogen.

A typical setup consists of incinerating 50,000 tpa. of waste to energy, capturing the fossil part of the CO_2 generated by the *waste*WOIMA20 power plant, i.e. 20,000 tpa. and producing 5,100 Nm^3 of hydrogen. Combining these will result in 7,300 tpa. of SNG, which can replace 9,500 tpa. of diesel fuel equivalent to 30,000 tpa. of CO_2 emissions. In addition to the SNG, there will be oxygen and thermal energy available for industrial customers.

Globally, over 70 billion tons of waste is generated every year divided roughly as (in millions tons p.a.)

- industrial waste 40,000
- agricultural waste 10,000
- wastewater sludge 8,000
- construction & demolition waste 5,000
- animal-based waste 4,000
- municipal solid waste 3,000
- medical waste 1,000

Furthermore, there is another estimated 200 billion tons of waste stored in landfills and dumpsites waiting to be utilized.

These waste streams create ample opportunities for waste-to-value solutions, such as WOIMA *Ecosystem*. Suitable processes for these wastes include e.g.

- biogas production
- hydro-thermal carbonization (HTC)
- pyrolysis
- carbon and nitrogen capture
- fertilizer production

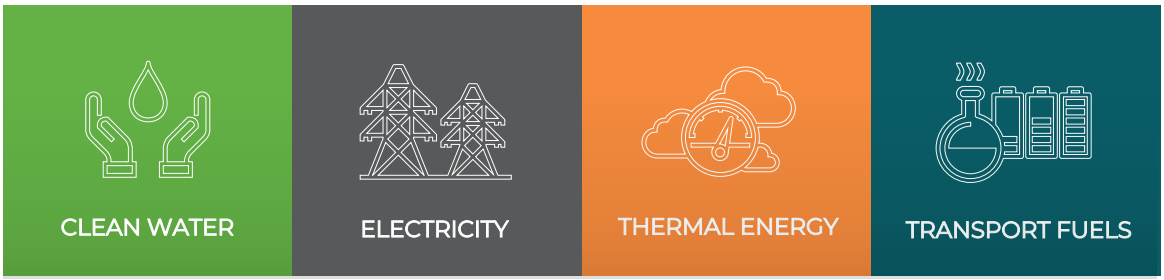
WOIMA *Ecosystem* in SNG production uses waste fuels with a calorific value range from 7 to 24 MJ/kg with moisture up to 55% and water. The heart and soul of the WOIMA *Ecosystem* is the *waste*WOIMA® waste-to-energy plant generating power for all the ecosystem processes.

All WOIMA *Ecosystem* solutions are modular and pre-fabricated enabling fast project turnaround time, short on-site construction time and ensuring on-time, in-budget and high-quality deliveries. Modularity offers also significant benefits in plant equipment transportation, maintenance, upgrading and scaling.

WOIMA *Ecosystem* consists of several waste-to-value technologies ensuring that the available waste fractions are always utilized to their fullest potential including maximizing the internal synergies within the ecosystem. WOIMA *Ecosystem* is capable of transforming over 95% of the incoming waste fuel into valuable products and energy.

KEY FACTS

- Delivery time under 18 months
- Designed according to EN standards
- Complies with the strict EU emission limits
- Safe operation under any conditions
- Remote monitoring of plant performance
- Simple processes; robust and proven technology
- Easy to build; established on a solid concrete slab
- Easy exchange of broken or worn-out plant components



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