



From waste to energy. Give waste a second chance.

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1. Problem and Solution

Global population growth is causing problems with waste management, energy supply, environmental pollution, and resource scarcity. Nearly 3 billion people suffer from environmental pollution or shortages of basic supplies. 12.5 billion liters of crude oil are consumed daily for transportation, heating, and energy supply, resulting in 11.5 billion tons of CO₂ emissions per year. Humanity produces 2.5 billion tons of waste annually, and 400 billion cubic meters of wastewater need to be recycled.

Wars and crises are increasingly highlighting the vulnerability of fuel supplies and forcing us to redefine traditional supply chains.

Ecolyd 7.1 is an innovative bridge technology designed to solve the aforementioned problems. It is a mobile, container-based system that resolves many of these issues in a single process. Put simply: unsorted waste such as plastic, used oil, tires, organic waste, etc., and wastewater enter the system at the front end, and through the patented suspension plasma lysis process, the fuels ethanol or methanol are produced. Fresh water, oxygen, and process heat are generated as byproducts. Powered by renewable energy, this process produces CO₂-neutral fuels.

Primary objective:

- Production of CO₂-neutral fuels through the conversion of waste
- Utilization of untapped chemical energy in waste
- Reduction of CO₂ emissions by changing supply and disposal routes

Secondary additional use:

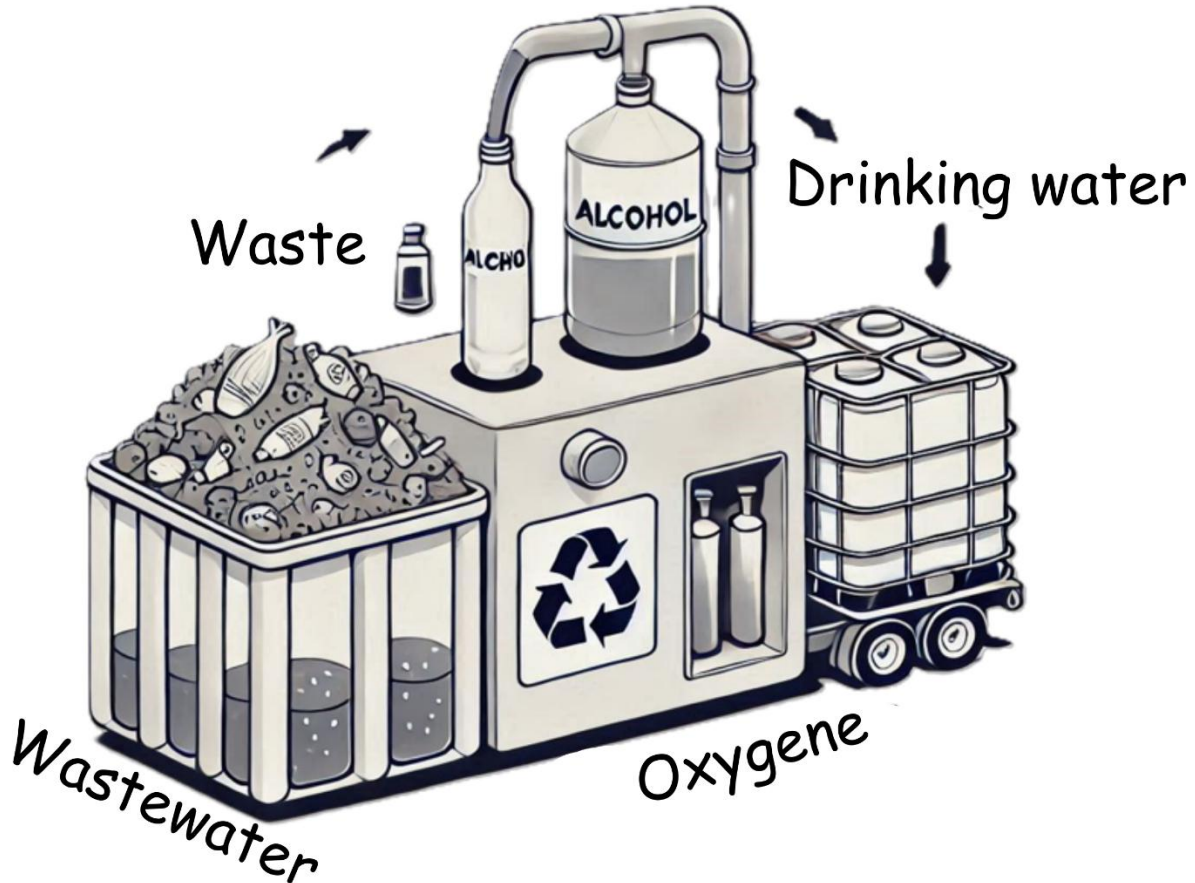
- Treatment and recycling of wastewater into fresh water
- Supply of process heat for district heating

2. Technology

The technology is based on suspension plasma lysis followed by a synthesis process. Plasma does not discriminate. Usable materials are processed in a single joint process without significant sorting. The energy of the plasma breaks down the molecular chains of the waste materials, allowing atoms to be reassembled.

Minimal pre-sorting, the usability of a wide variety of materials, processing in a single joint process, and the output of the three pure substances—alcohol, water, and oxygen—plus the possibility of generating district heating form the basis for high economic efficiency.

Diagram



Ecolyd 7.1 is designed as a container-based technology and, as a mobile unit, is an extremely cost-effective solution for regional

- 24/7 power supply
- Fuel supply with carbon-neutral e-fuel
- Heating via district heating
- Waste disposal and wastewater treatment

3. Energy efficiency

The simulation results yielded a COP of ~140%. To be precise: The thermal efficiency of the process is approximately **77%**, and the Coefficient of Performance (COP) is **1.41**. The energy factor exceeding 100% is explained by the fact that the chemical energy contained in the waste is converted into new usable energy through suspension plasmalysis (underwater plasmalysis) occurring under pressure, and that suspension plasmalysis results in significantly lower heat loss (energy loss).

4. Applications

1 Energy supply:

Independent local energy generation in remote areas (e.g., Africa, where approximately 0.5 billion people lack access to electricity)
Cost-effective long-term storage for renewable energy

2 Water supply:

Global freshwater production from wastewater, brackish water, or seawater
Securing the drinking water supply in arid regions such as Africa
Clean drinking water despite chemical contamination, e.g., in India
Reclamation of steppes into grassland through saltwater conversion

3 Waste and wastewater disposal:

Processing of household waste, plastic waste, used oils, fats, biowaste, scrap tires, brackish and saltwater.

4 Special applications:

Processing of medical waste and provision of drinking water, pure water, heat for heating, electricity, and pure oxygen
Immediate purification of oil-contaminated water in the event of accidents
Reduction of plastic waste mountains through the conversion of plastic waste into e-fuel

5 Mobility:

Synthetic e-fuel or methanol as a carbon-neutral fuel for vehicles, machinery, ships, etc.
Grid-independent, carbon-neutral charging stations for electric cars powered by methanol

6 District heating:

Utilization of process waste heat for carbon-neutral heating.

5. Examples

Heat Supply in Germany

At least 25% of municipalities still have no solution for the heat transition. Approximately 15% of the population, or 12.6 million people, live in these areas. The average heat consumption per person is ~5,000 kWh/year. An Ecolyd 7.1 can supply heat to approximately 1,500 people.



Plastic Waste Worldwide

400 million tons of plastic waste must be disposed of worldwide every year. An Ecolyd 7.1 can process up to 4,000 tons of plastic waste per year into synthetic fuel.

Wastewater treatment plants

Wastewater treatment plants emit more CO₂ than the entire aviation industry. In addition, many treatment plants in Europe's older industrialized nations are dilapidated and would require hundreds of billions to renovate or rebuild. An Ecolyd can convert up to 110,000 liters of wastewater per day into drinking water.

Water Supply in Africa

In Africa, approximately 300 million people have no access to clean drinking water. With a drinking water requirement of 2 liters per person per day, 6,000 Ecolyds would need to operate 24/7 to supply people with fresh water alone.

Fuel and Power

Approximately 10.5 billion liters of petroleum-based fuels are needed EVERY DAY for transportation and mobility. If 1% of that were replaced by synthetic e-fuel, that would amount to 105 million liters daily. An Ecolyd 7.1 can produce approximately 12,000 liters of synthetic fuel, depending on the configuration.

Supply in a Crisis

How does a tank run if there is no fuel? Ecolyd 7.1 ensures the supply of fuel and water in a crisis.

These examples are intended to give a brief glimpse of the vast potential offered by the Ecolyd 7.1 technology. What's fascinating is that it's always the same machine; only the configuration is individually tailored to the desired primary objective—whether that be e-fuel, water, or heat—through minimal adjustments to the design.

6. Cost-Benefit Analysis

a) Multiple Uses

- Fuel production for power generation and mobility
- Efficient storage for renewable energy
- Heating of buildings
- Waste disposal
- Wastewater treatment / Seawater desalination
- Production of industrial, drinking, and process water
- CO₂ reduction

b) Mass production

The container-based machine can be manufactured cost-effectively compared to custom-built large-scale facilities such as nuclear power plants or district heating plants, thanks to the use of standard components and serial production.

c) Small footprint

Thanks to the compact container technology, the space requirement is minimal compared to, for example, a wastewater treatment plant or conventional coal-fired power plants.

d) No use of agricultural land

Synthetic e-fuel is produced through the transformation of waste and wastewater. Unlike biological e-fuel, no valuable agricultural land is required for growing plant-based feedstocks, nor is it diverted from the production of plant-based food.

e) No time-consuming individual permitting processes

Because of the serial production process, no lengthy individual permits are required, allowing operations to proceed “just in time.”

f) Regional supply and distribution

As a transportable container solution, collection and supply can be carried out regionally. This eliminates the high construction and maintenance costs associated with long overland lines and pipes for long-distance distribution.

g) Unsorted

Ecolyd 7.1 requires only rough pre-sorting. The cost-intensive fine sorting required by conventional techniques is eliminated.

h) Simple operation

The machine is designed for “heavy-duty operation” and can therefore be operated by trained regional staff without specialized training.

Ecolyd 7.1 is a “just-in-time” bridge technology and, because it is manufactured using standardized components, requires no time- and cost-intensive research. Thanks to its ease of transport and operation using wind or solar power, “just-in-time” CO₂-neutral operation is possible worldwide. Ecolyd 7.1 is: cheaper and faster to develop, cheaper and faster to manufacture, and cheaper to operate. Ecolyd 7.1 is a game-changer on the path to a carbon-neutral world.