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BIOWASTE TREATMENT LATEST TRENDS

Unlocking the value of waste

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BIOVOIMA BRIEFLY

- Established 2014
- Privatly owned company
- Headquarters and factory in Jyväskylä, Finland
- Over 30 employees
  - in 5 different countries
  - Finland, Estonia, Lithuania, Norway, Poland
- Turnover 2024 about 8 M€
  - Forecast 2025: 20 M€
- About 25 projects completed internationally

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3 PILLARS OF BIOVOIMA

Turnkey technology and plant projects

Biovoima technologies

Consulting, maintenance and operation services

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Selected References

TURNKEY PROJECTS FOR BIOMETHANE AND BIOGAS PLANTS

- **2023 Pieksämäki, Finland, Pieksämäen Vesi Oy**
  - Biogas plant using 6000 tons of sewage sludge
  - 1,8 GWh energy (heat and electricity)
  - Biofertilizer
- **2024 Tallinn Area, Estonia, EKT Ecobio**
  - Biomethane plant using 24 000 tons of biowaste
  - 30 GWh biomethane to gasgrid and public transportation
  - Biofertilizer
- **2026 Bergen Area, Norway, BIR AS (ongoing project)**
  - Biomethane plant using 55 000 tons of biowaste and cow manure
  - 26 GWh biomethane for industry and transporation
  - Biofertilizer

Voss biomethane plant 9/2025

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BIOWASTE TREATMENT LATEST TRENDS

The latest trends in biowaste treatment show a clear shift: away from disposal and toward value creation.

Technologies like advanced anaerobic digestion, biogas upgrading, nutrient recovery, and even bioplastic production are redefining the industry.

For businesses, it’s about unlocking new revenue streams, reducing dependence on fossil resources, and strengthening competitiveness

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BIOWASTE TREATMENT LATEST TRENDS

Advanced Anaerobic Digestion & Biogas Upgrading

More efficient digester designs and improved pretreatment methods (thermal / hydrolysis) to handle tougher biowaste feedstocks and to increase methane yields.

Thermal Treatment Technologies

Thermal Hydrolysis: especially for sewage sludge, wet biowastes. It improves dewatering, reduces pathogens, and improves overall performance of anaerobic digestion.

Hydrothermal liquefaction & carbonization, pyrolysis: converting wet or mixed biowaste into bio-oils, biochar, or other carbon-rich materials.

Upcycling / High-Value Products

Using biowaste to produce bioplastics, platform chemicals (e.g. lactic acid, succinic acid).

Insect / larval bioconversion (e.g., black soldier fly larvae) to convert food waste into high-protein feed or fertilizers.

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Smart & Modular / Decentralized Solutions

Smaller scale, modular biowaste treatment plants closer to waste sources (e.g. farms, towns) to reduce transport cost, improve responsiveness.

Use of AI, sensors, IoT, monitoring, automation for feedstock sorting, process control, quality tracking.

Compost, Vermicompost, Soil Amendments & Biochar

Not all biowaste will go to biogas or bio-oils: composting or vermicomposting are still important, especially for green waste.

Biochar from thermal processes (e.g. pyrolysis, hydrothermal carbonization) is being used for carbon sequestration and improving soil health.

Resource Recovery from Digestate / Sludge

Recovering phosphorus (struvite etc.), nitrogen, other micronutrients.

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BIOWASTE TREATMENT LATEST TRENDS

- Biowaste is seen as a valuable resource of energy and high-value product
- Domestic energy production is vital for economic stability, security, and sustainability
- By-products of biogas production, such as digestate, can contribute to improved food security by serving as nutrient-rich fertilizers for agriculture
- Biogas upgrading to biomethane opens up various ways to turn biowaste to profit
- Separate collection of biowaste. Mixing it with other waste makes recovery and recycling much harder.

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“You’re not just running a waste management company — you’re managing an energy asset.”

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The advantages of implementing biogas/biomethane production in waste management

1. Waste Volume Reduction

- Diverts large amounts of **organic waste** from landfills.
- Reduces **landfill space usage** and environmental hazards.

2. Renewable Energy Generation

- Produces **biogas/biomthane**, a clean and renewable source of energy.
- Can be used for **electricity, heating**, **vehicle fuel (bio-CNG), etc.**

3. Energy Security and Diversification

- Reduces dependence on imported fossil fuels.
- Offers **localized energy solutions**, especially for rural or off-grid areas.

4. Greenhouse Gas Emissions Reduction

- Captures methane that would otherwise be released from decomposing waste.
- Helps meet **climate targets** by lowering CO_2 and CH_4 emissions.

5. Improved Sanitation and Hygiene

- Reduces accumulation of unmanaged waste in urban and rural areas.
- Lowers risks of **odors, pests, and water pollution**.

6. Nutrient-Rich By-products

- Produces **digestate**, a valuable organic fertilizer.
- Supports **circular economy** by returning nutrients to the soil.

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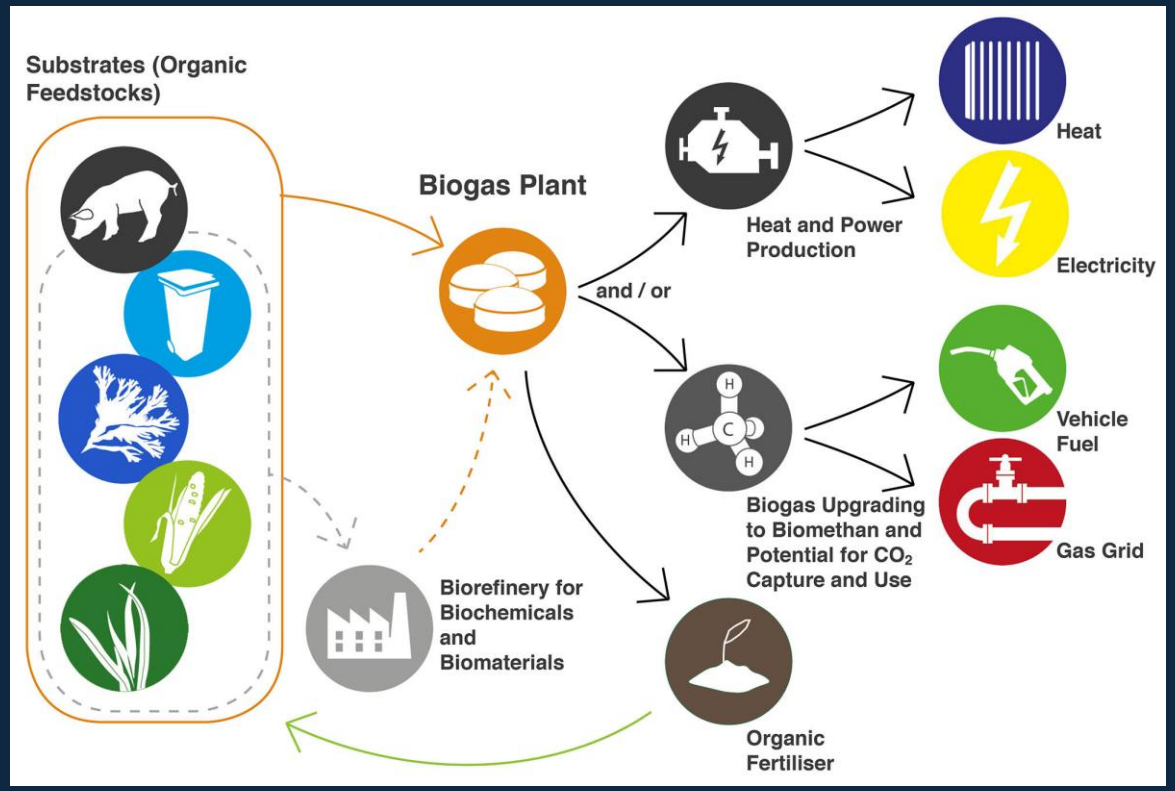
MAIN WAYS TO TREAT BIOWASTE IN LATVIA
BIOGAS PLANTS & COMPOSTING



Renewable Energy Production

- **Biogas plants** generate **renewable energy** in the form of **biogas** which can be:
  - Burned for **heat and electricity (CHP)**.
  - **Upgraded to biomethane** and used as
    - vehicle fuel,
    - injected into the gas grid
    - sell as LNG
  - Using packaging reject as incineration plant fuel.
- **Composting does not produce usable energy , may cause greenhouse gases**

Revenue & Cost Savings

- Selling electricity/heat or renewable gas creates a **revenue stream**.
- **Biomethane** can be sold or used to **reduce fuel costs** for your fleet.
- Can reduce **landfill gate fees** and **waste transport costs**.
- Liquified CO2 to industrial users
- **Composting offers limited financial return.**

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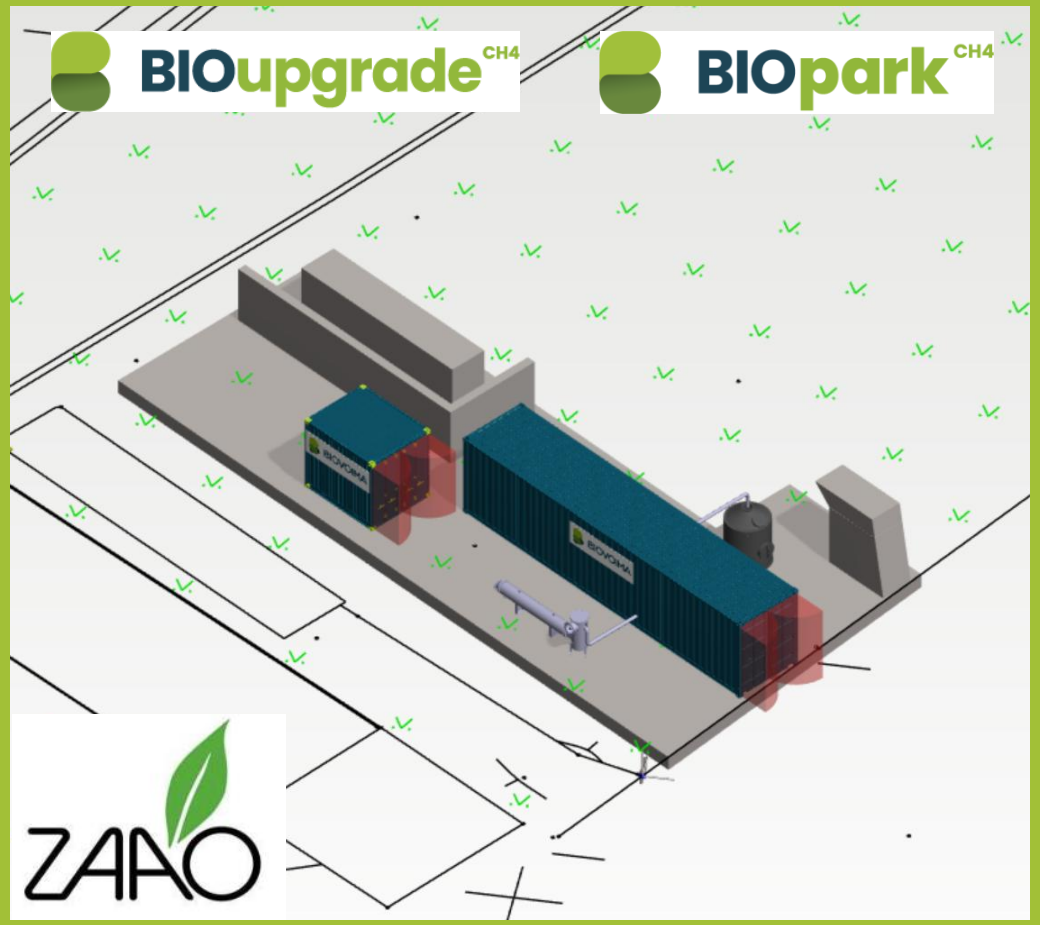
Case ZAAO, Latvia



- Latvian waste management company **SIA "ZAAO"** has ordered **BIOupgrade^{CH4} biogas upgrading unit** and **BIOpark^{CH4} biomethane filling station** from Biovoima.
- ZAAO is investing in non-fossil fuel production solutions in their operations and **will use the produced biomethane in their waste collection trucks** to reduce greenhouse gas emissions for better climate
- With its **own biomethane production** and **BIOpark filling station** ZAAO will also significally **cut their costs in waste collection transportation**.
- The project is executed together with the construction company SIA Rubate.
- Installation at the site is scheduled for December 2025.

"ZAAO's investment in biogas upgrading and biomethane refueling technology reflects its long-term commitment to environmental sustainability, operational efficiency, and energy independence."

- Chief of development at ZAAO, **Mārtiņš Niklass**-

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BIOWASTE TREATMENT CHALLENGES

Collection & Segregation Challenges

- Lack of Source Separation: Households, restaurants, and businesses often don't properly separate food waste from general waste.
- Contamination: Food waste is often mixed with plastics, metals, or hazardous materials, making it harder to process.

Dry fermentation/ batch technology

- Biomethane for transport fuel and industrial use
- Very difficult/expensive to get grid purity biomethane

Financial Constraints

- High Upfront Costs: Composting and anaerobic digestion facilities require significant capital investment.
- Low Revenue from Byproducts: Digestate and compost often have limited market value.
- No Incentives: In some regions, landfilling food waste is still cheaper than treating it.

Regulatory & Policy Barriers

- Permitting Delays: Regulatory approval for biogas or composting plants can take years.
- Unclear Guidelines: Food waste treatment rules are often fragmented across environmental, agricultural, and health agencies

Public Awareness & Behavior

- Many people don't understand the environmental cost of food waste.
- Lack of Education: People think that a biogas plant can be dangerous and cause odor problems..

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EKT Plant in Maardu, Tallinn Area, Estonia

THANK YOU!

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