

# KAJASTUS-project

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# Basic information

<b>Funded by</b>	Economic Development Centre of Northern Finland
<b>Budget</b>	€636,990, of which funding is 80%
<b>Project period</b>	1.5.2025 – 30.4.2027
<b>Lead partner:</b>	Kiertokaari Ltd
<b>Co-partners</b>	Jätekukko Ltd, Lounais-Suomen Jätehuolto Ltd and Häme University of Applied Sciences (HAMK)



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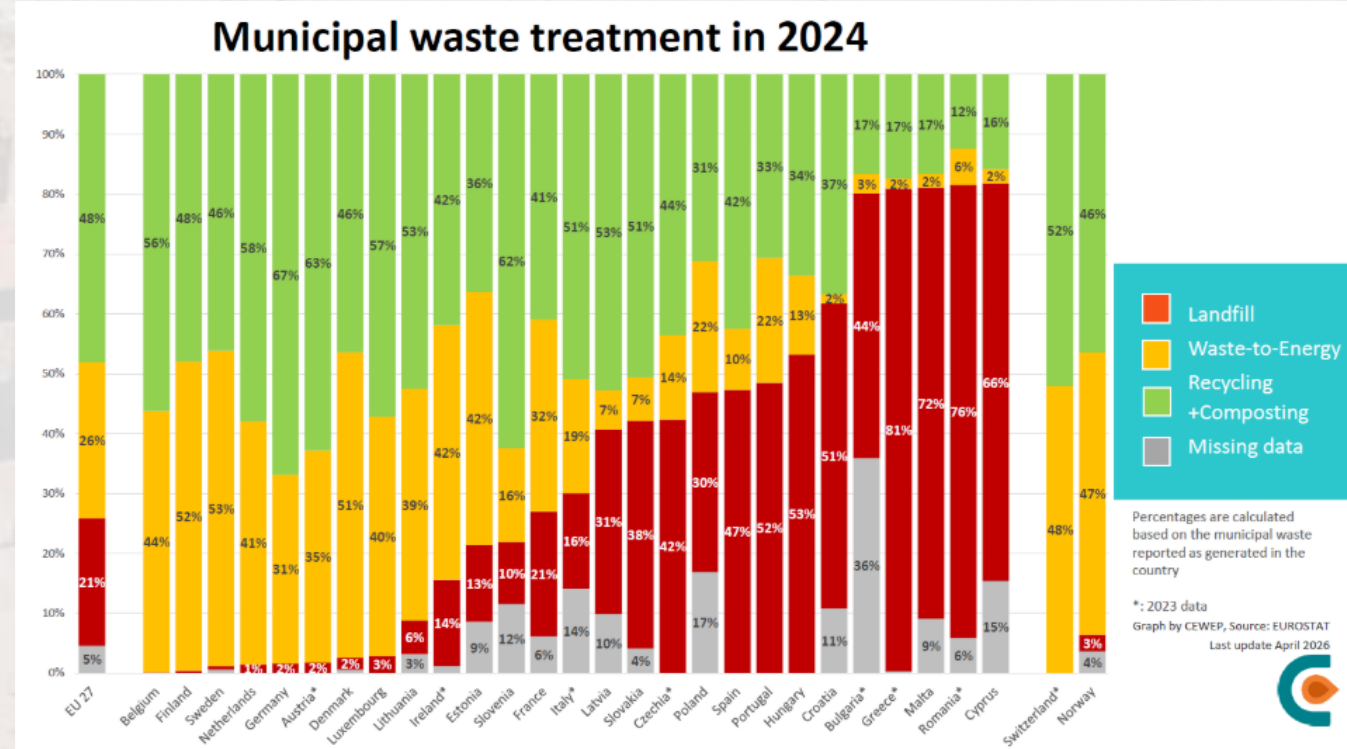
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# Background

- Landfill gas typically contains 20 to 55 % CH<sub>4</sub>, 25 to 50 % CO<sub>2</sub>, 10 to 30 % N<sub>2</sub> and small amounts of other compounds such as H<sub>2</sub>S and O<sub>2</sub>
- Landfilling of organic waste is not permitted in Finland (since 2016)
  - Typically a waste management company landfills < 1 % of total waste (asbestos, insulation wool etc.)
- Waste management is a top 5 source of emissions by sector
  - Landfills release approximately 12,000 tonnes of methane annually, (336,000 tonnes of CO<sub>2</sub>eq)
  - ~ 1 % of all emissions



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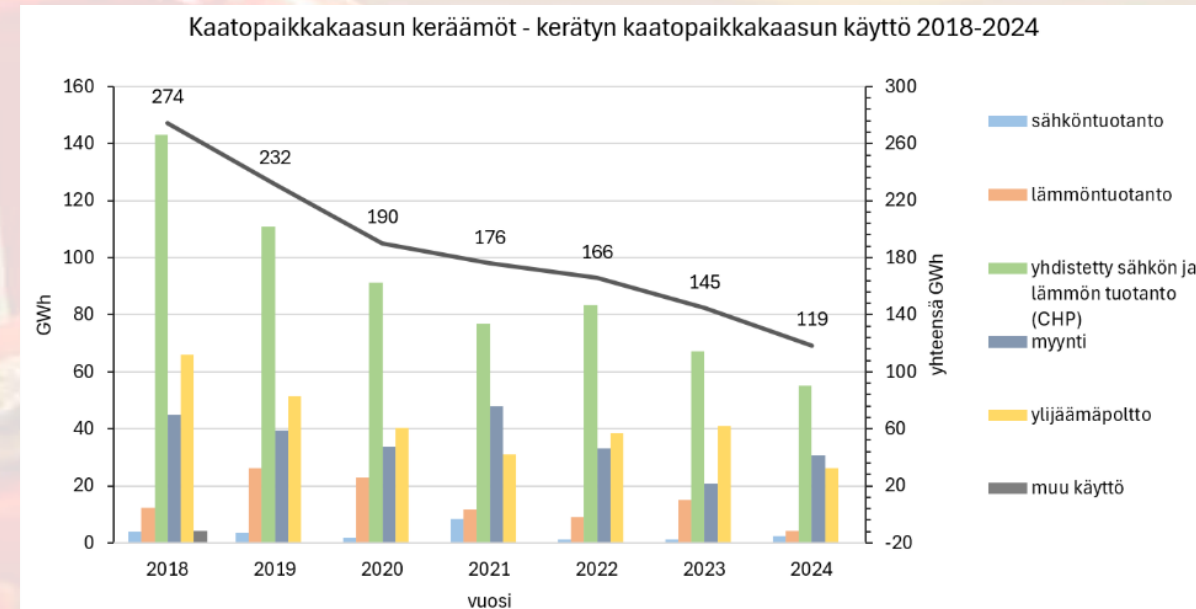
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# The necessity of the project

- The decrease of methane content creates challenges to its utilization and investment decisions
- Landfill gas is commonly used in CHP production,
  - Approximately 10-20 % of the production is flared
- Expertise related to landfill gas is lacking, local and fragmented
- Impurities such as H<sub>2</sub>S can make the gas unusable or affect highly on profitability
- The regulation related to landfill gas is complex and require time and knowledge



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# Mission and purpose of the project

- The project focuses on generating national benefits for stakeholders involved in landfill gas
  - Refining, purifying and improving the recovery of landfill gas → improving quality, increasing profitability and utilization and reducing emissions
- The project will provide stakeholders information, tools, document templates and support, as well as visibility into landfill gas and its challenges and opportunities
- The project aim to find concrete solutions to the right problems and challenges
  - Example: measurement and control tool for national use (possibly international)



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**Pumping station**

- New entry
- Latest measurement session
- Line analysis
- Site analysis
- Forecast
- Optimization**
- Station settings

### Flow optimization (demo)

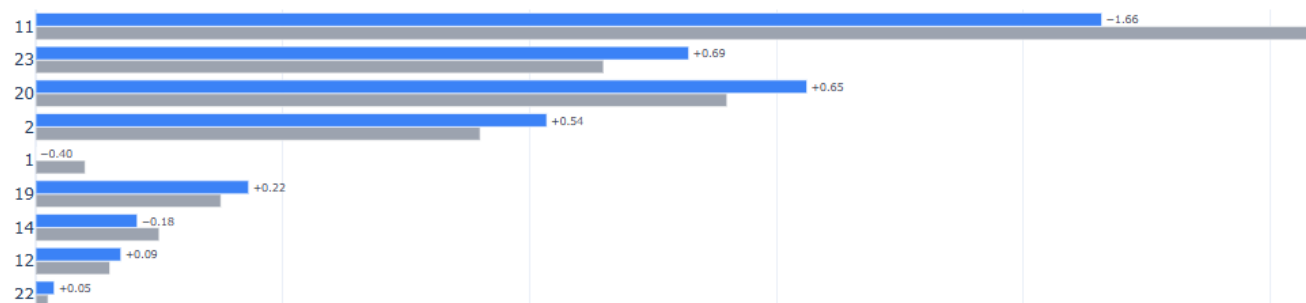
Visual demo: per-line linear response  $CH_4(\%) = a - b \cdot Q$  fitted from recent history; equimarginal allocation under a constant site-wide flow budget. Assumes operators can hit the proposed flow with valve adjustments. Numbers are directional, not set-points to commit to.

Measurement session:  Max change per line:  History window:

<b>STATION</b> <b>Oulu — BKP-500</b> <b>(Kiertokaari 2)</b> <small>session #397</small>	<b>TOTAL FLOW (HELD)</b> <b>53.20 m/s</b> <small>unchanged after rebalance</small>	<b>CH4 PROXY BEFORE → AFTER</b> <b>19.65 → 20.43</b> <small>Σ Q·CH4/100 (m/s · fraction)</small>	<b>METHANE GAIN</b> <b>+4.0%</b> <small>Δ +0.78 (proxy units)</small>	<b>WEIGHTED EXPECTED CH4</b> <b>36.94% → 38.41%</b> <small>Δ +1.47 pp · flow-weighted across active lines</small>
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**LINES MOVED / HELD / INACTIVE**  
**9 / 10 / 11**  
of 30 lines in session #397

Proposed flow rebalance — Session 397 (2026-06-10)  
 Held lines in grey · Total flow held constant at 53.20 m/s · CH4 proxy 19.65 → 20.43 (+4.0%)



# Concrete outputs of the project

1. Literature review on landfill gas collection and utilization in Finland and Europe (WP1) ●
2. Legislation review (WP1) ●
3. Measurement and control tool & modelling tool (WP2) ●
4. Pilot reports from 9 different pilots (WP3) ●
  - i. Landfill irrigation ✓, heat recovery from pumping station, automatic measurement and control units, hydrolysis gas utilization ✓, hooding for leakage measurement, M/C/M tool testing
5. Process description of gas data collection (WP3) ●
6. Advanced landfill gas refining and processing technologies (WP4) ●
7. Landfill Gas Forum (WP5) ●

## Work packages

- |     |   |
|-----|---|
| WP1 | Clarifying the current situation                              |
| WP2 | Tools to improve quality and power and production forecasting |
| WP3 | Pilots aimed to improve the landfill gas production           |
| WP4 | Comprehensive technology study                                |
| WP5 | Communication   |



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# Pilot results



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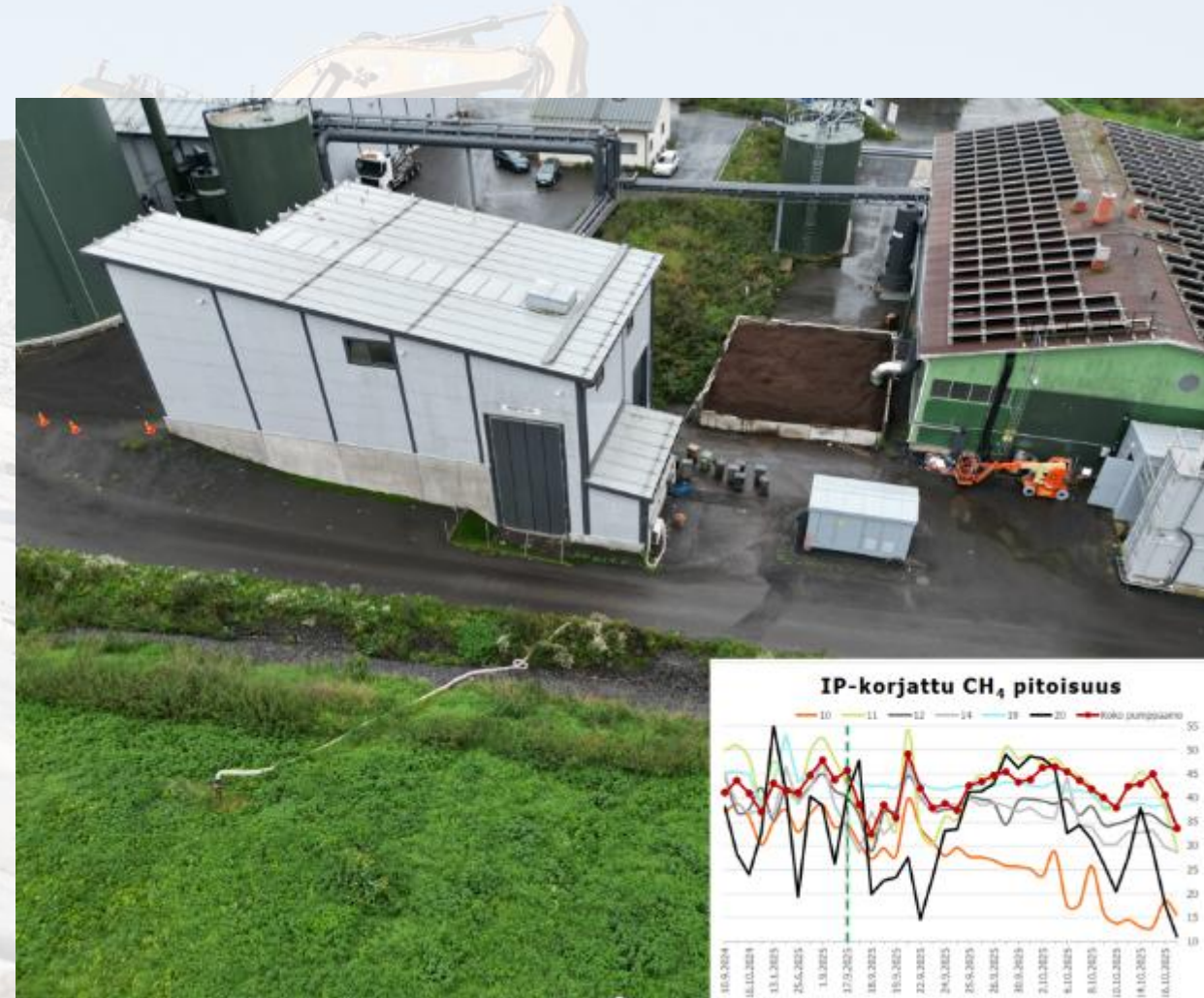
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# Hydrolysis Gas Pilot

- Carried out 17.9-17.10.2025
- Aimed to improve landfill gas quality via hydrolysis gas
- Results:
  - The blowing of hydrolysis gas into the landfill did not cause any significant pros or cons in the quality of the landfill gas
  - Positive effects on air quality were observed
  - Hydrolysis gas was collected for utilization
  - A permanent solution would achieve cost savings, especially on biofilter materials



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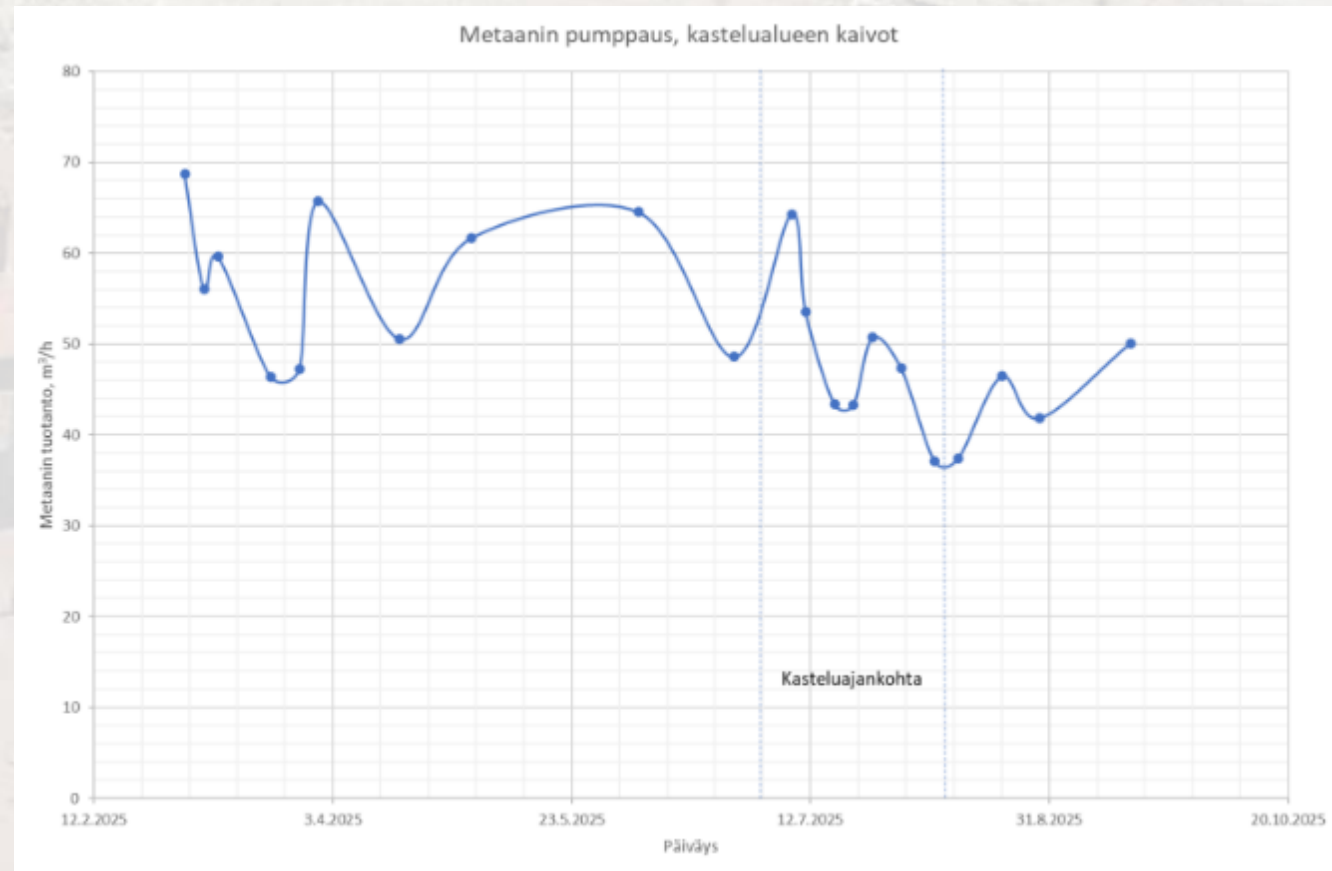
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# Irrigation Pilot

- Carried out 1.7-11.8.2025
- Aimed to pilot irrigation to old landfill
- Results:
  - The quality of landfill gas did not improve during the investigation period
  - Showing the benefits of landfill irrigation is very challenging and requires long-term pilots
  - The irrigation is challenging due to the density of the landfill



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# Following the project

- Project website: <https://circhubs.fi/en/kajastus-en/>



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# Thank you!

