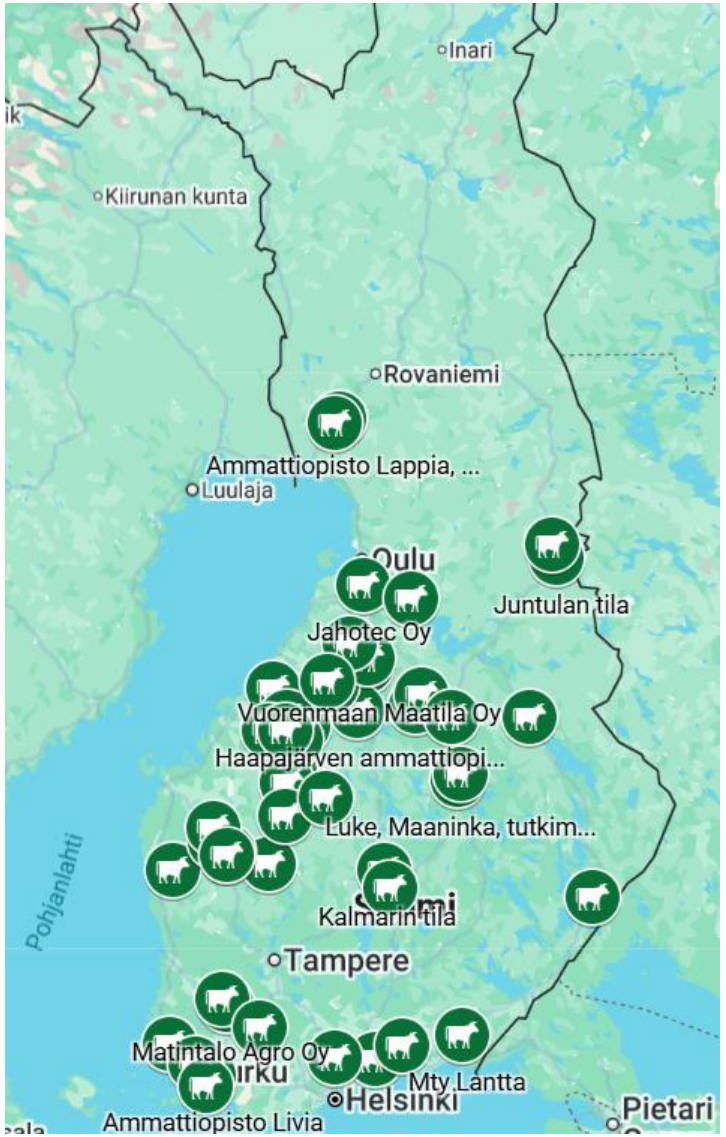
How farmers can engage with biogas systems in finland

Biogas plants in Finland

- There are currently about 55 biogas plants in Finland that operate on farm-based feedstocks.
- The majority of these are on-farm plants.
- Most of these biogas plants are wet fermenters.
- There are at least five joint biogas plants operating under different concepts.



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Biogas plants in Finland

- The joint plants are either limited liability companies jointly owned by farms or limited liability companies that may also include other owners.

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Profitability challenges

- A key challenge to the wider adoption of biogas plants is the profitability of the investment.
- On farms, there may not be enough energy use that can be cost-effectively replaced with biogas.
- On-farm plants typically produce either heat only, or electricity and heat through CHP operation.

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Profitability challenges

- Only a few plants produce transport gas (CBG), and only in locations suitable for it.
- One challenge for transport gas is the small number of gas-powered vehicles and agricultural machinery.

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Profitability challenges

- At present, the threshold of profitability depends on the amount of feedstock available on the farm.
- In practice, on a dairy farm the number of manure-producing animals should be at least 300.
- Energy use, the value of the energy, and the investment cost of the plant are, of course, decisive factors.

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Sustainability

- In Finland, biogas sold for energy use must be sustainably produced
- The feedstocks used in digestion must be waste materials, not materials suitable for human or animal consumption.
- Field biomass used as feedstock for must not be produced on peat soils

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Opprotunities for improving productivity

- Digestate is easier to handle during spreading to the fields:
  – it is easier to pump,
  – odor nuisance is reduced
  – the nitrogen in digestate is more readily available to plants.
- We currently have an ongoing project studying these changes over a two-year period on farms that are using in this summer raw slurry manure and will use digestate next year
- The utilization of carbon dioxide produced in biomethane upgrading is also one opportunity to improve profitability. It is also a topic for future research.

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Farm experiences with biogas production

- We conducted a survey of 12 farms that had a biogas plant.
- 75% of the respondents were dairy farms.
- Field area: 145–800 ha, average 373 ha
- Grassland: 60–450 ha, cereals: 0–260 ha

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Biogas reactor feedstocs

- Cattle slurry was used by 10 out of 12 farms, with an average of 8,780 m³/year.
- Solid manure was used by 9 out of 12 farms, with an average of 1,300 m³/year.
- Bedding materials included straw, wood shavings, peat, and separated solids.
- Most farms used several bedding materials in parallel.
  One plant used turkey barn bedding (wood-shaving-based litter)

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Biogas reactor feedstocs

- Most farms used several bedding materials in parallel.
- One plant used turkey barn bedding (wood-shaving-based litter)
- One plant used only field biomass (approximately 200 hectares).
- One plant used pig slurry in addition to cattle slurry.

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Reactor types

- 11 slurry reactors (77–2,300 m³), average 1,325 m³
- 2 dry digesters (400–600 m³)
- Most common brands: Demeca, Metener, Sauter
- Commissioned between 2019 and 2024

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Do biogas plants work?

- 10 out of 12 plants operated by the interviewed entrepreneurs are functioning as expected.
- In two cases, product development is still ongoing or innovative modifications have been made.
- There have been issues outside the process itself, particularly with adding dry feedstock and in CHP equipment.
- The digestion process itself is quite robust and does not fail easily.

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Does biogas production require a lot of work?

- Slurry feeding is generally automated.
- Dry feedstocks are added 2–7 times per week.
- About 10–15 minutes per day are used for monitoring.
- Monitoring is mainly done remotely, and not all plants require daily visits.
- Weekly tasks include greasing, monitoring gas quality, etc.
- Power outages often require a visit to the plant.

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General comments

- “There is a lot of unused potential in slurry — it’s surprising that it hasn’t been utilized before!”
- “A biogas plant should be an extension of every cowshed!”
- “Nothing is lost in the process — on the contrary, even the environment benefits!”
- “Be bold! The plant requires so little work that there is nothing to be afraid of!”

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Thank you!

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