

DEMECA

Biogas plant for farms



CONTENT

Demeca's history	3
Energy efficient and a Finnish innovation	4
Comprehensive service	5
Biogas plant for farms	6-7
Biogas production	8
Biogasprocess	9-10
Benefits of biogas production	11
Technical information	12-13
Technology	14-15
Why to choose Demeca?	16
References on the map	17
Reference pictures	18-19

**Shared values and commitment
are the basis of our operations.**



Trust and appreciation



Boldly together



Effective doing

Demeca's history

Our story began **in 2008** at a Finnish dairy farm in Haapavesi, where the first Demeca solutions were developed and installed in the robot yard of our founder, Pekka Vinkki's home farm.

Pekka had already worked with a **farm-sized biogas plants** before this, and today biogas plants based on Kiintomädätys® technology are part of the Demeca product family. Our product family consists of solutions that, in accordance with our Maatilat kuntoon™ slogan (farms are put in a better condition), improve the profitability of farms and the well-being of people, animals and the environment.

We develop our products together with you, our customers. Why? Because we believe that farmer knows the best of farms operations. And, because we want our products to serve exactly your needs and we require that our solutions are carefully thought out and sustainable long into the future.

The functionality of our solutions is supported by expert sales, careful implementation and training, and our own installation and maintenance organization. **We promise** to always use our know-how for the benefit of high-quality agricultural production. We get our energy from clean, Finnish food, and we want to ensure its production with the best Finnish solutions.

We want to make it possible to live in the countryside and our task is to improve the profitability and well-being of farms. We promise your farm sustainable growth, and we are able to fulfill our promise by looking at your farm as a whole and offering solutions that improve the whole and support growth. This is our Maatilat kuntoon™ thinking.

Energy efficient and a Finnish innovation

The energy efficient Demeca farm biogas plant does careful pre-treatment, which enables efficient and abundant biogas production.

Demeca biogas plants have a modular structure, which allows the plant to be modified, expand and moved if necessary.

The biogas plant has been tested to work in a cold conditions and its purchase is profitable even with a reasonable number of animals. The steel-framed, element-structured and insulated reactor and the efficient biogas treatment process guarantee the best gas production.

Biogas production is a significant step forward in reducing greenhouse gases and utilizing the nutrient cycle.

Demeca **Kiintomätys®** biogas plant is Key flag-product.



DEMECA

demeca.fi/en

Phone +35810 340 8000

Comprehensive service

The Demeca biogas plant comes from Finland.

Sales, design, installation, maintenance and spare parts locates and comes from Finland. From us, you get **predictive remote maintenance**, which facilitates monitoring of the biogas plant.

The effortless **Demeca maintenance contract** ensures the operation of the biogas plant without a separate maintenance order.

Maintenance monitors the operation of the biogas plant using a remote connection and plans maintenance in advance.

With us, you will not be alone at any stage of the project.

Demeca has **the best farm experts**.

We get our energy from a clean and domestic food, and we want to ensure that it is produced with the best solutions.

Follow us on social media!



Biogas plant for farms



Thanks to **Kiintomädätys®** technology, the plant can use both wet and dry fractions as feed. The main component of the plant's feed is slurry manure from the cattle. You can also feed the dry feeds: grass, straw and external waste biomass.

Thanks to its modular structure, the plant can be modified and expanded, and it is even possible to resell it. The plant has been tested to work in the conditions of our home country and its purchase is profitable already with a reasonable number of animals.

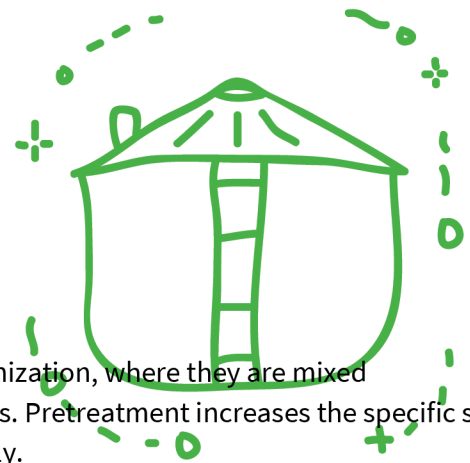
The frequency converter center commands the sludge pumps, which are controlled from the biogas plant. The biogas plant regulates the sludge supply, and the surface guard takes care of the operational reliability of the sludge in the barn.

The crushing “Kaira” slurry pump raises the sludge into the pressure booster pump, from where the pressure booster pump pushes the sludge into a large feed pipe, from where the sludge goes to the homogenization of the biogas plant.

The dry fractions are pretreated in the **gFeed** unit by crushing and homogenizing with the liquid fractions. After that homogenized, highly biodegradable mass is pumped into the reactor for digestion. The Gfeed unit processes dry feed, whereby the specific surface area of the plant parts increases, enabling efficient bacterial activity.



Biogas plant for farms



1

Dry feed pre-treatment

The Gfeed unit mixes dry feeds and transfers them into homogenization, where they are mixed to the sludge. With the input device can be feed e.g. surplus grass. Pretreatment increases the specific surface area of the feed, which increases the gas production considerably.

2

Slurry pre-treatment

The “Kaira” slurry pump together with the booster pump feeds sludge from the barn into the biogas plant. The Kaira slurry pump homogenizes sludge and thus enhances gas production through a heat exchanger located in the plant space.

3

The process of digestion

The homogenized feed is pumped into the reactor, where biogas is produced in an oxygen-free environment. The gas is mainly methane and carbon dioxide. The gas rises through the patented biofilter of the gas dome. Biogas which is filtered by a biofilter is dried using with ground cold and blown through activated carbon. This ensures the purity of the gas that is led to utility. After digestion, the fertilizer effect of the sludge is better (phosphorus /nitrogen) and a very little odor nuisance.

4

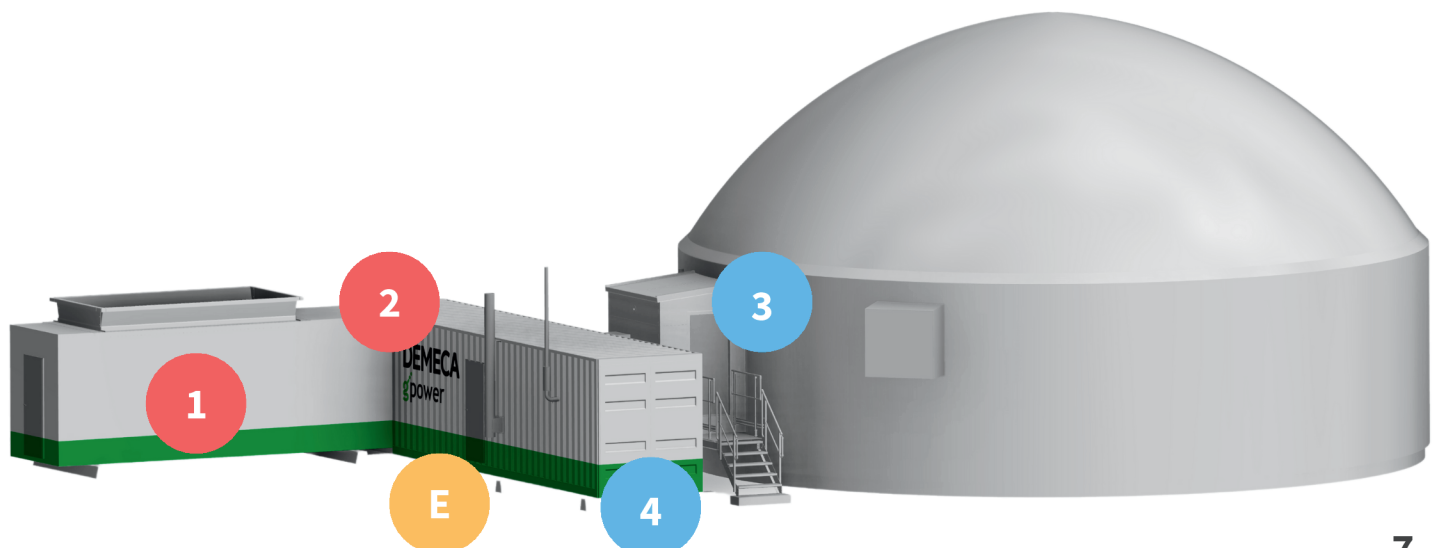
Utilization of biogas

A combustion engine uses gas as fuel and runs an electric generator (biogas boiler). In addition to electricity waste heat and the heat of the exhaust gases are taken from the generator for utilization. Additional heat can be produces with a gas burner in a separate heating boiler. Only water vapor and carbon dioxide are produced as emissions. In addition to own use, it is possible to sell the electricity produced to the national grid. Gas can be also further refined into vehicle fuel (CBG) in a separate Demeca gFuel Upgrade 100 unit.

E

Electric and control center

All the biogas plant's main connections and equipment control are centralized in one space, where they are easily serviceable and available. The plant is connected to a remote operating system and can be managed and controlled from anywhere.



Biogas production

*1 cubic meter of sludge
corresponds on biogas
production about 18 liters
of fuel oil*

Biogas production happens under the most visible part of the biogas plant, i.e. the reactor's gas hood, in an oxygen-free environment and at a controlled temperature. Gas production is a continuous process and is caused by anaerobic bacteria that digest the feed.

As a result of digestion, biogas is produced, which is mainly methane and carbon dioxide + a small amount of other gases, such as sulfur compounds. The reactor's patented biofilter effectively removes sulfur compounds from the gas that have bad odors and hinder further processing.

The plant or the digestate doesn't smell into the environment. Odors on the farm are reduced because the slurry is pumped directly into the biogas reactor. The reduction of odors on the farm can have an impact on the environment permits and the comfort of working. With a sufficient delay, the digestate doesn't smell much, because the easily decomposable organic matter has already decomposed.

When methane (CH_4) burns, only water vapor (H_2O) and carbon dioxide (CO_2) are formed. No environmentally harmful emissions or unpleasant odors will be released into the air.

H_2O CO_2

Reactor technology and reactor operation affect the amount of gas obtained. The first task is to take care of the freshness of the feedstocks, so that the gas production potential is not lost by unnecessary storage and the subsequent decomposition of organic matter.

In Demeca's solution, slurry is pumped to the biogas plant directly from the barn, making the slurry as fresh as possible.

When feeding dry feeds, it is a good idea to aim for a steady feed flow. The gas yield can be affected by storage methods on the farm.



Biogasprocess

Solids have a significant effect on gas production!

In the reactor, one of the most important things is to ensure a **large contact area** between the feed and microbes. The contact area is increased by crushing the feed. The rapid contact between feed and microbes is stimulated by the mixing of dry feed with the contents of the reactor in the homogenization unit. If the dry feed were fed directly into the reactor, it would take longer for microbes to start utilising the organic material in the feedstock.

Mixing affects gas yield, stimulating contact between microbes and feed and preventing the formation of dead zones in the reactor. The microbes in the **biogas plant** are clearly smaller size than hay blades, so the mix allows the microbes to "feed". Non-mixing or mixing by pumping may lead to a situation where there are areas in the reactor, where the mass doesn't change.



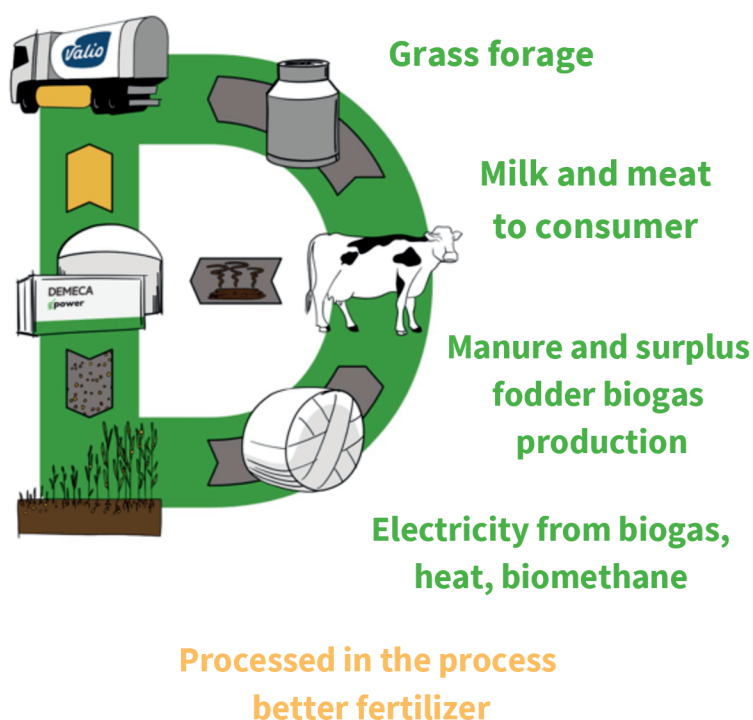
The lingering of the feedstocks in the reactor, the size of the reactor affects the gas yield: the longer the microbes have time to break down organic matter, the further the decomposition occurs. Decay slows down over time, so choosing a reactor size is about optimizing the amount of gas yield and the magnitude of the cost of the reactor.

The plant's own gas use affects the amount of gas recovered. The plant's gas consumption is prevented by minimising the need for heating and electricity. **At Demeca's plants**, the need for heating is reduced by good insulation, an intermediate floor that also serves as insulation, and efficient **heat recovery**. Heat is recovered from the water circulation of the engine and boiler, as well as from exhaust and sludge heat exchangers. The heating of the reactor is handled by heating the inlet feed and the internal heating of the reactor, which ensures efficient heat transfer, which means that a lower temperature is sufficient for the heating circulation. **Measurements and adjustability** can optimize the process. This includes, for example, the fact that the speed of the pumps can be actively adjusted and not pumped unnecessarily. At Demeca plants, it is possible to choose between a blade mixer or a propeller mixer.

Homogenization consumes electricity, but promotes gas production and reduces electricity consumption for mixing and pumping. It is possible to purchase remote monitoring and maintenance contracts for Demeca's plants, which means that not only the plant owner but also the plant supplier's employees react to disturbances. The plant's steady supply and predictive maintenance directly reduce the number of incidents.

Biogasprocess

The gas can be further processed, e.g. by means of a gas treatment. as fuel for vehicles in a separate gFuel Upgrade unit, which can be connected to all DEMECA biogas plants at a later stage. The combustible component of the gas is methane, the concentration of which is raised to the level required for recovery by removing carbon dioxide and water from the gas. The resulting gas is pressurised and stored in gas tanks, from where it can be refuelled directly to vehicles from a refuelling meter or sold in a gas container. The production and sale of biofuel opens up completely new business opportunities for farms.



The electricity and heat that comes to the farm is produced by a generator installed in the gPower unit, and in severe frosts, additional heat can be produced with a gas burner in a heating boiler. There is a muffled hum from the equipment in the immediate vicinity of the plant and there are no odours.

Only carbon dioxide and water vapor are emitted as emissions from combustion. Carbon dioxide comes from plants growing in fields, a renewable raw material, and is considered to bind back to new growing plants. Therefore, biogas is a completely carbon-neutral form of energy and otherwise completely emission-free. Biogas is an environmentally advantageous form of energy at all stages.

The biogas expert and the seller are your contact person in questions related to the procurement of a biogas plant. Through them, you will receive, among other things, a cost estimate for the plant, energy and profitability calculations, as well as assistance in applying for financing and the necessary permits.

*Find out your farms
Biogaspotential!*

Benefits of biogas production



Produce clean energy from manure from your own cattle as well as, for example, from cattle. surplus feed.



Improve the fertilizer effect of sludge and reduce the amount of purchased fertilizers.



Reduce the nutrient load and greenhouse gas emissions of the environment.



Biomethane production becomes new business.



Improve your farm's self-sufficiency.



The predictability and risk management of farm operations will improve.

Energy and euros!

Technical specifications

gReactor

- Process volume 600-2800m³
- Paddle mixer (+propeller mixer)
- Patented biofilter (sulfur removal)
- Most energy-efficient in the market
- Modular structure

Includes gas pre-treatment unit:

- Activated carbon filtration
- Gas pressure boost for operating devices with active pressure control
- Measurement of gas quantity, reactor surface, and temperatures

gPower

- Biogas boiler 225-380 kW
- CHP unit 50-200 kW

gFeed

- Dry feed screw crushing and homogenization
- Vogelsang Premix
- Capacity approximately 19 m³/day
- Remote control of feeding lid

gFuel Upgrade

- Biomethane refining 50-100 Nm³/h (BG)
- 3-stage membrane refining
- Methane recovery +99%
- Energy consumption 0.3kW/refined gas cubic meter (*at nominal capacity)
- Refining capacity 50-300Nm³/h

Technical specifications

gFuel Compress

- Biomethane compression to 300 bar
- Filling and emptying control of transport container
- Refueling station and card payment terminal
- Tukes (Finnish Safety and Chemical Agency) licensing and inspection process

Includes gas pre-treatment unit:

- Activated carbon filtration
- Gas pressure boost for operating devices with active pressure control
- Measurement of gas quantity, reactor surface, and temperatures

gFilter

- Biogas drying, filtration, and pre-treatment

gGrid

- Biogas transfer pumping unit

gFuel Station

- Biogas refueling station (CBG)
- Card payment terminal
- Meter
- Refueling for passenger vehicles and heavy-duty vehicles

Technology

Biogas production



The 600-2800 m3 patented reactor with biofilter is a modular and steel-structured biogas reactor with excellent insulation. It uses 400 mm of blown wool insulation and is designed to withstand very cold conditions. It features a paddle and/or propeller mixer, and a double membrane dome.



The combustion engine uses gas as fuel and drives an electric generator. In addition to electricity, waste heat from the engine and heat from exhaust gases are utilized. Electrical power 70-200 kW and gas power 225-380 kW. The unit includes the plant's main electrical center with remote control and monitoring. Additional heat production is possible.



Dry feed unit capacity approximately 19 m3/day. Includes Vogelsang Premix feeding device. Screw crushing and homogenization. Processes excess grass, solid manure, straw, and external waste biomass⁴. The Vogelsang PreMix system is a versatile solid matter feeder that combines separation, mashing, preparation, and pumping into a single compact unit⁵. It efficiently mixes and grinds organic solids and liquids to form a homogeneous suspension optimized for bacterial digestion in biogas production

Demeca Feed Pumping Station - Slurry Pre-treatment

In Demeca's solution, liquid manure is pumped to the biogas plant directly from the barn's pump well, ensuring the slurry is as fresh as possible. A feed pumping station is required in connection with the biogas plant, which allows controlled pumping of the liquid feedstock into the digestion process, for example from a feedstock reception tank or directly from the barn. The Kaira slurry pump, together with a pressure booster pump, feeds the slurry from the barn to the plant through a heat exchanger located in the gPower container. The Kaira slurry pump homogenizes the slurry, thus enhancing gas production

Technology

Biogas upgrading



The 3-stage membrane upgrading of biomethane (50-300 Nm³/h) into vehicle fuel takes place in a separate Demeca gFuel unit. The gFuel unit is located in the vicinity of the biogas plant



Compress: After biomethane upgrading, the gas is pressurized (300 bar) in the gFuel Compress unit adjacent to the refueling station and stored in gas tanks, from which it can be refueled directly into vehicles from a refueling meter or sold in a gas container for further distribution. The refueling station, payment terminal, and Tukes (Finnish Safety and Chemical Agency) permits are provided by Demeca



Station: The biogas refueling station includes a meter, canopy, and payment terminal. The refueling station is suitable for both passenger cars and trucks.



Biogas drying, filtration, and pre-treatment.



The biogas transfer pumping unit is necessary, for example, when gas is being directed for sale into the natural gas network.

Whyt to choose Demeca?



Demeca Kiintomädätys® biogas plant

The result of passionate development work

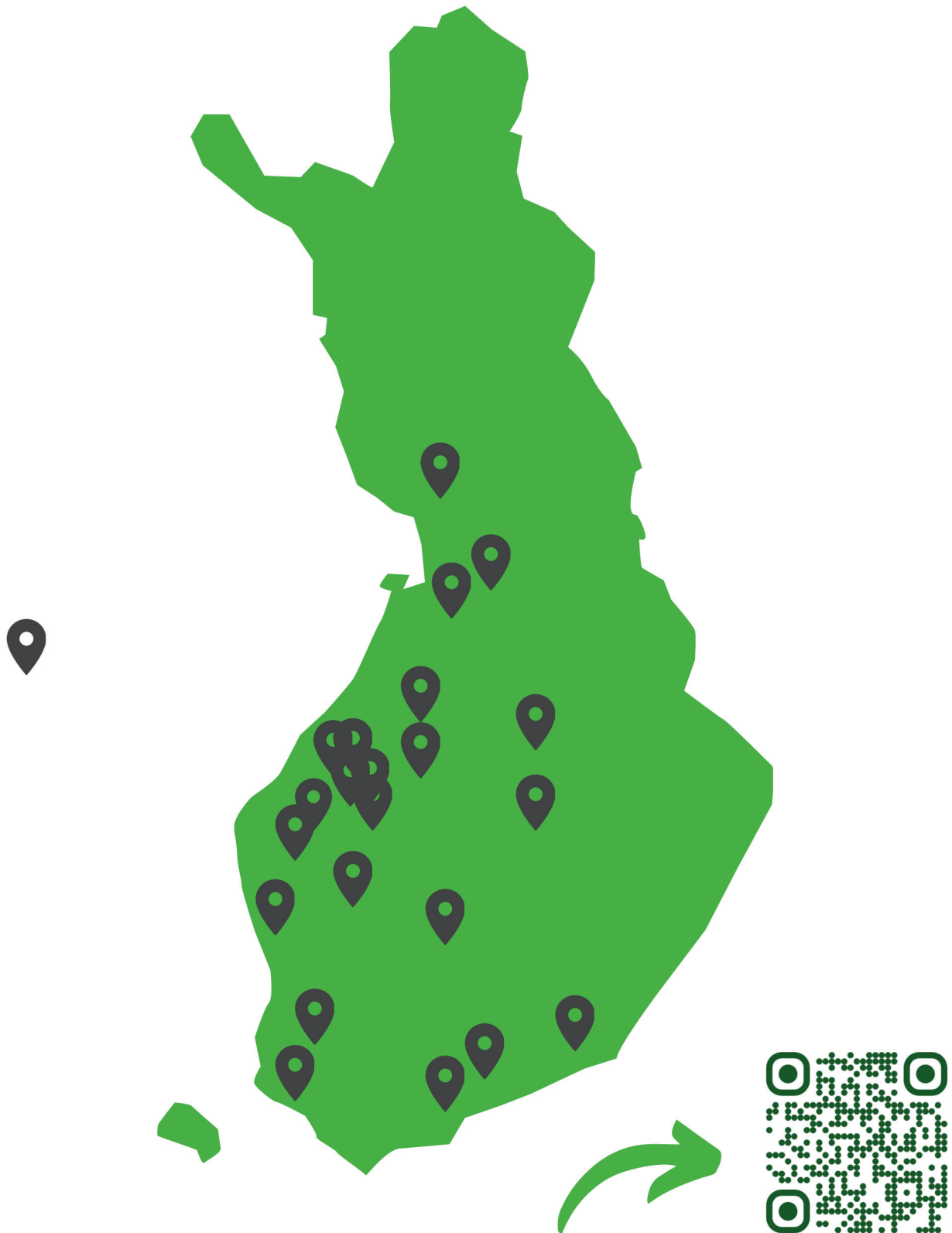
- ★ Reliable technology created after 15 years of work
- ★ Profitable even on a small scale
- ★ Fully Finnish solution, designed and tested to work in our conditions
- ★ Efficiently handles both wet and dry feeds in the same unit
- ★ Easy to acquire and safe to own
- ★ The biogas plant has been turned into a machine with the possibility of hire purchase or leasing financing
- ★ After-sales services and spare parts are nearby
- ★ Hassle-free maintenance contracts
- ★ Modular design: adaptable, scalable and resold
- ★ Advanced automation system - remote management and advice - anticipating maintenance needs

Why to choose Demeca as a partner?

Get the greatest financial benefits

- ★ Long experience and extensive knowledge of Finnish agriculture
- ★ A comprehensive review of the treatment of manure and farm side streams
- ★ Unique feed processing, more and cleaner gas
- ★ Turnkey plant delivery
- ★ The biogas plant is easy to acquire and own, you get the plant delivery ready for use
- ★ Support and service in the plant project
- ★ Energy and profitability calculations
- ★ Selection and application of financing solutions
- ★ Help in applying for an environmental permit, building permit and investment aid
- ★ The best and most reliable partners in the industry

References on the map



See more detailed information about references using the QR code.

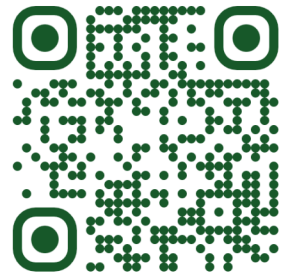
Referenssi kuvat





DEMECA

*Look contact details
from website!*



demeca.fi/en

Sales & service

Phone +35810 340 8000

Maintenance & spares

Phone +35810 340 8020

Follow us!

