



HISTORY - SLURRY AND DIGESTATE EVAPORATORS

MKR CLEANWATER GMBH AT A GLANCE

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EXPORT
WORLDWIDE

CUSTOMERS / INDUSTRIES
AGRICULTURE
LIVESTOCK FARMING
WASTE MANAGEMENT
BIOGAS

TODAY

Operating throughout Europe, particularly in the field of food waste recycling plants and slurry treatment systems.

2024

Start of the MVR slurry evaporation project

2017

Multi-stage modular evaporator systems with a thermal capacity of 180–600 kW.
With a digestate throughput up to 40 000 m³ per year



2012/2013

Single-stage evaporator systems with a heat input of 200–300 kW th. and a capacity of 2,000–3,000 m³ of distillate per year.

2009/2010

PROJECT LAUNCH: BIOGAS EVAPORATOR

First digestate pilot evaporator at a biogas plant.



WHETHER IT'S DIGESTATE OR SLURRY – WE OFFER INNOVATIVE SOLUTIONS

Flexible, modular systems tailored to your requirements and the specific medium:



01

THE DV SERIES: THERMAL EVAPORATORS FOR DIGESTATE TREATMENT

for digestate from waste
materials, food and organic
waste, slurry and farm waste

page 6



02

THE MVR SERIES: ELECTRICALLY POWERED EVAPORATORS

for slurry and liquid media

page 11

THE ADVANTAGES

WHY MKR? 19 UNBEATABLE ADVANTAGES.

2 CONTROL PANEL and CONTROL UNIT

MKR delivers a complete solution, covering control cabinet design, construction, and control unit programming.



1 IN-HOUSE LABORATORY

With our own in-house laboratory for pilot-scale evaporation and analysis, we lay a solid foundation for the next stages of the project.



3 HIGH-QUALITY MATERIAL

All components in contact with digestate are made of stainless steel, ensuring maximum durability, a long service life, and adherence to the highest standards.



4 FLEXIBLE and MODULAR STRUCTURE

Our systems feature a clear, logical design that ensures excellent accessibility. Moreover, the modular structure of MKR evaporators enables straightforward expansion with additional stages.



5 AUTOMATED SENSOR FLUSHING SYSTEM

The sensors are automatically cleaned while the system is in operation, thereby preventing deposit formation, even with challenging media.



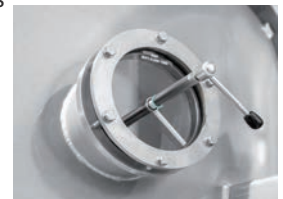
6 PREMIUM BRAND QUALITY

We use high-quality components from leading manufacturers.



7 AUTOMATIC CLEANING (CIP)

The entire evaporator system is regularly cleaned using automatic acid and alkaline flushing cycles, removing even the finest organic and mineral deposits.



8 RENURE FERTILISER

RENURE – Recovered Nitrogen from Manure
ASL of mineral fertiliser quality has a pH of 5.5–6.5 and contains no chemical additives. There is no mixing of sulphuric acid and digestate.



9 LOW MAINTENANCE REQUIREMENTS

With no moving parts such as brushes in the digestate, maintenance requirements are significantly reduced.



10 PLASTIC – CORROSION-RESISTANT

All components for sulfuric acid handling and the vapor scrubber are made entirely of high-quality plastic materials.



11 FAST ON-SITE ASSEMBLY

All evaporators are delivered to the site preassembled, allowing for fast, reliable, and on-schedule final installation of the systems.



12 OPTIMAL ACCESSIBILITY

Easy access and a clearly arranged piping layout.



13 DISTILLATE QUALITY

We have the expertise to generate odor-free distillate suitable for discharge, or, with lower treatment effort, for use as process water or nitrogen-free recirculate.



14 BEST ENERGY EFFICIENCY

Delivering excellent thermal efficiency of up to 4.3 liters of distillate per kWh, the evaporator automatically adapts to the available heat and operates with exceptional flexibility from 65 °C to 85 °C.



15 QUICK HEAT-UP PHASE

Because only a small amount of digestate is present in the system, heat-up times and response times to temperature fluctuations in the heating circuit are significantly reduced.



16 PRODUCTION and PRE-ASSEMBLY

We place great importance on precise manufacturing and assembly by our qualified specialists at our company.



17 SERVICE and MAINTENANCE CONTRACTS

Spare parts management with maintenance contracts: The correct spare part, kept up to date and optimally stored and maintained, is available for delivery at any time.



18 FORWARD-THINKING PROJECT PLANNING

System design and planning are developed in close cooperation with our customers. We also offer customized project analyses, including comprehensive economic evaluations.



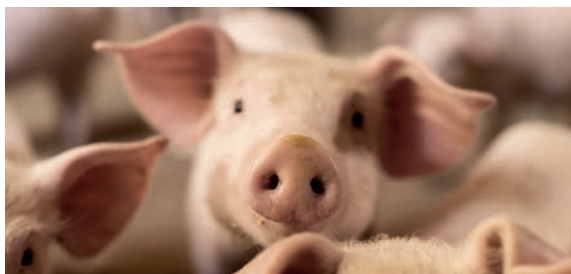
19 EXPERT-LED IMPLEMENTATION

As early as the planning phase, the system and all relevant interfaces are developed in detail. Installation layouts and all documentation required for the permitting process are professionally prepared.



02 MVR-SERIES – ELECTRICAL DRIVEN EVAPORATION SYSTEMS

Fully electric evaporators with mechanical vapor recompression for slurry and wastewater treatment up to complete zero-liquid discharge.



The MVR evaporator is a fully electrically driven evaporation system with mechanical vapor recompression, designed for the efficient treatment of slurry and wastewater. The vapor generated during evaporation is compressed and directly reused as heating energy within the process.

This allows the thermal energy contained in the vapor to be almost completely recovered and reused. As a result, the system achieves outstanding energy efficiency, very low operating costs, and enables cost-effective operation up to zero-liquid-discharge applications—entirely independent of external heat sources.

KEY ADVANTAGES

No heat supply required – a fully electric vapor recompression evaporator solution.

Proven evaporation technology adapted to the challenges of slurry and organic media.

Closed, odorfree evaporator concept.

Stainless-steel construction for all media-contacting components.

Manufactured to the **latest industrial standards**, including premium control cabinet design.

Minimal maintenance costs.

Capacity range **from 5,000 m³ to over 20,000 m³** of slurry per year per modul.

Outstanding energy efficiency – delivering more than 20 liters of distillate per kWh of electricity.

Small footprint.

MVR-SERIES // ECONOMIC EFFICIENCY

FIGURES THAT SPEAK FOR THEMSELVES

UP TO
90 %
REDUCTION

FROM
7€
OPEX

UP TO
20 l
PER KWH_{el.}

MVR15 - ELECTRICAL EVAPORATOR



KEY DATA

Intake flow rate	1.500 l/h
Distillate efficiency	20 liters / kWh_{el.}
Distillate flow rate	max. 1.350 l/h
Heat demand	0 kW
DM digestate	ca. 2 % DM
Particle size	< 50 - 100 µm
Dimensions LxWxH	4,50 m x 2,80 m x 3,10 m
Operating Voltage	3/400 N PE 50 Hz
Empty Weight	approx. 8 t

PRE-EVAPORATION OF SLURRY BEFORE AD

An innovative process chain tailored to farmers and biogas plant operators.

You Know the Challenge

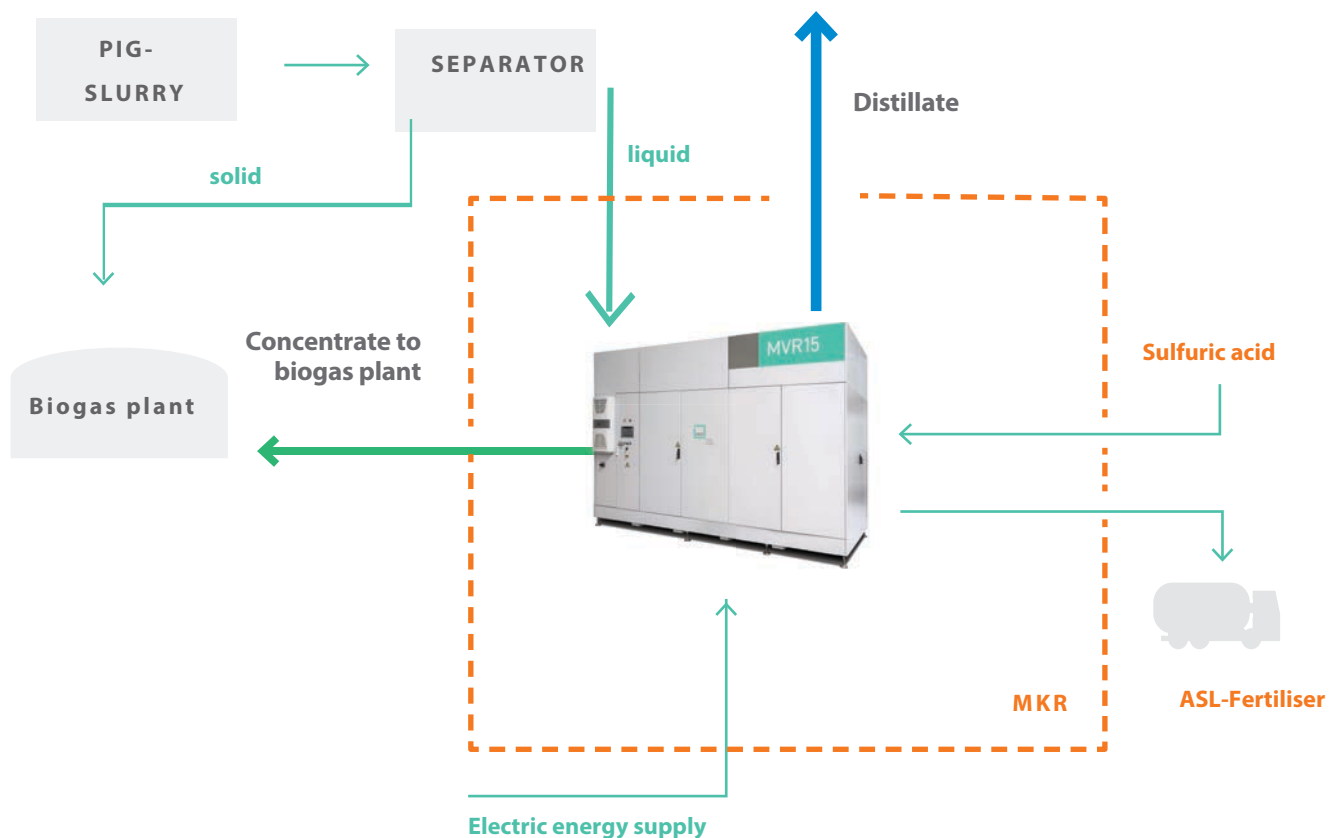
Large volumes of pig slurry are generated on a daily basis, posing increasing challenges for farms operating biogas plants: rising storage and transport costs, high nitrogen loads, and limited plant capacities.

The Solution: A Well-Designed Process Chain

Step 1 – Separation First the pig slurry is mechanically separated. The solid fraction is fed directly into the biogas plant, where it provides valuable organic material for the digestion process.

Step 2 – MVR Evaporation The liquid fraction is then treated in a mechanical vapor recompression (MVR) evaporator. The result is a volume reduction of up to 90%. The remaining concentrate, with a significantly higher nutrient density, is also supplied to the biogas plant.

Step 3 – Nitrogen Recovery The volatile nitrogen released during evaporation is not lost. Instead, it is selectively captured in ammonium sulfate solution (ASL), producing a high-quality liquid fertilizer that can be used directly.



Key Advantages at a Glance

Significant Volume Reduction Thanks to a 90% reduction in the liquid phase volume, the amount of substrate fed into the biogas plant is significantly reduced, substantially relieving plant capacity.

Reduced Nitrogen Load Volatile nitrogen is safely removed and captured as ammonium sulfate solution (ASL), leading to markedly improved operating conditions for the biogas plant.

Lower Costs, Long-Term Savings Less volume means fewer transports, smaller storage tanks, and permanently reduced operating costs.

PROVEN IN PRACTICE - REFERENCE PROJECTS

1 HOUSEHOLD ORGANIC WASTE



In this project, the efficient utilization of waste heat was a key focus, combined with optimized nutrient management. By operating three single-stage RT400 evaporators, catering waste, food residues, and organic waste are treated efficiently. The resulting distillate achieves a quality suitable for discharge into surface waters. The plant was commissioned in early 2016. With a total installed thermal capacity of 3×220 kW, approximately $6,800 \text{ m}^3$ of distillate are produced annually.

2 PROCESSED FOOD WASTE



This installation focused on relieving the nutrient balance while avoiding the need for additional storage construction. Processed food materials, blood, and flotates are efficiently treated using a three-stage DV1000 evaporator system. The plant was commissioned in Germany in mid-2017. With an installed thermal capacity of 180 kW, the system produces approximately $5,000 \text{ m}^3$ of distillate per year, providing a reliable and economically efficient solution for digestate and waste stream management.

3 EXPANSION OF PLANT 2



In mid-2018, reference project 2 was extended by an additional three-stage DV1000 evaporator. The expansion added a further thermal capacity of 180 kW and increased the overall distillate capacity by approximately $5,000 \text{ m}^3$ per year. The upgrade further improved system performance and flexibility, ensuring continued efficient and reliable operation.

4 GREASE SEPARATOR CONTENTS



This reference focused on avoiding additional storage construction, optimizing digestate transport through contract service providers, and producing marketable mineral fertilizer. Grease separator residues, flotates, slurry, and plant-based by-products are efficiently treated using a three-stage DV4000 evaporator system. Commissioned in late 2018, the plant operates with a maximum thermal capacity of 600 kW and processes up to $30,000 \text{ m}^3$ of input material per year, delivering a robust and economically efficient treatment solution.



5 RESTAURANT AND KITCHEN WASTE



This project aimed to avoid high digestate spreading costs, with particular emphasis on emission-free plant operation. A wide range of substrates—including catering waste from restaurants and commercial kitchens, expired food products, and pig slurry—are efficiently treated. The plant was commissioned in Switzerland in early 2020 and is equipped with a four-stage DV4000 evaporator system. With a maximum thermal capacity of 550 kW, the system processes approximately 35,000 m³ of material per year, ensuring efficient and environmentally sound operation.

6 ZERO LIQUID DISCHARGE PROJECT



This reference focused on efficient nutrient management for agricultural operations while avoiding unnecessary transport movements. Slurry, residual materials, and renewable raw materials (NaWaRo) are treated using a three-stage DV1000 evaporator system. The plant was commissioned in northern Germany in early 2021. With an installed thermal capacity of approximately 180 kW, around 10,000 m³ per year are processed. In combination with an existing belt dryer, the system enables complete digestate treatment up to zero-liquid-discharge operation.

7 SLAUGHTERHOUSE BY-PRODUCTS



This installation focuses on avoiding additional storage construction while reducing dependency on external digestate off-takers. Catering waste, slaughterhouse waste, and blood are efficiently treated using a DV4000 evaporator system. The plant was commissioned in early 2021 and operates with a maximum thermal capacity of 600 kW. With an annual processing capacity of approximately 40,000 m³, the system provides a reliable and economically efficient solution for high-volume organic waste treatment.

8 SLAUGHTERHOUSE BY-PRODUCTS



This project focuses on reducing nutrient surpluses, saving storage capacity, securing reliable digestate disposal, and significantly lowering high nitrogen loads. Flotates and other organic residues from food production are efficiently treated using a DV4000 evaporator system. The plant was commissioned in early 2020 and operates with a maximum thermal capacity of 600 kW. With an annual processing volume of approximately 35,000 m³, the system provides a robust and economically efficient solution for high-nitrogen organic waste streams.

MKR WORLDWIDE

Australia, Belgium, Brazil, Bulgaria, China, Denmark, England, Finland, France, Greece, India, Iran, Ireland, Italy, Croatia, Liechtenstein, Luxembourg, Malaysia, Mexico, Netherlands, Norway, Austria, Poland, Portugal, Russia, Romania, Sweden, Switzerland, Slovakia, Slovenia, Spain, South Africa, South Korea, Taiwan, Czech Republic, Turkey, Hungary, USA



GET IN TOUCH

Get in touch with us. Benefit from our competent and professional products and services. We look forward to hearing from you!

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