

flotates wastewater  
digestate greasetrap  
percolate FOG slurry  
leachate COD

# MKR Evaporation Systems

ROBUST. SAFE. FLEXIBLE. EFFICIENT.

- Heat driven Systems
- Hybrid Systems with Heat Pump
- Electric MVR Evaporators

flotates wastewater  
digestate grease trap  
percolate FOG slurry  
leachate COD

Digestate and slurry are valuable organic fertilizers, but transporting and storing them is costly and can affect the nutrient balance of soils. Evaporators are an innovative and ecological solution for the treatment of digestate from biogas plants, pig slurry or any liquid media.

With MKR Cleanwater's evaporators, you can solve these problems and obtain clean water and a mineral fertilizer at the same time.

#### Waste heat and hybrid system DV:

Two sizes: 180 kW<sub>th</sub> and 500 kW<sub>th</sub>, with 1–4 stages each.

Maximum efficiency of 4 stages: 4.3 litres of distillate per kWh of heat.

#### Electric evaporators (Mechanical Vapour Recompression):

Several sizes, with distillate production rates ranging from 0.3 to 2.0 m<sup>3</sup>/h.

Power consumption is approx. 40 kWh<sub>el</sub> per m<sup>3</sup> of distillate.

# History

MKR Metzger develops industrial recycling technology since 1990



2009/10 Project start digestate evaporator

First pilot projects based on existing industrial evaporators



2012/13 first practical plants single-stage, approx. 2000 m<sup>3</sup> reduction



Since 2016/17 multi-stage evaporators with >20,000 m<sup>3</sup>/a reduction per line



Starting in 2024 adapting electrical MVR evaporation systems for pig slurry and other thin organic media with ammonia recovery

# Today

Active throughout Europe, mainly residual / food waste plants and farm manure plants.

# MKR Evaporation Systems

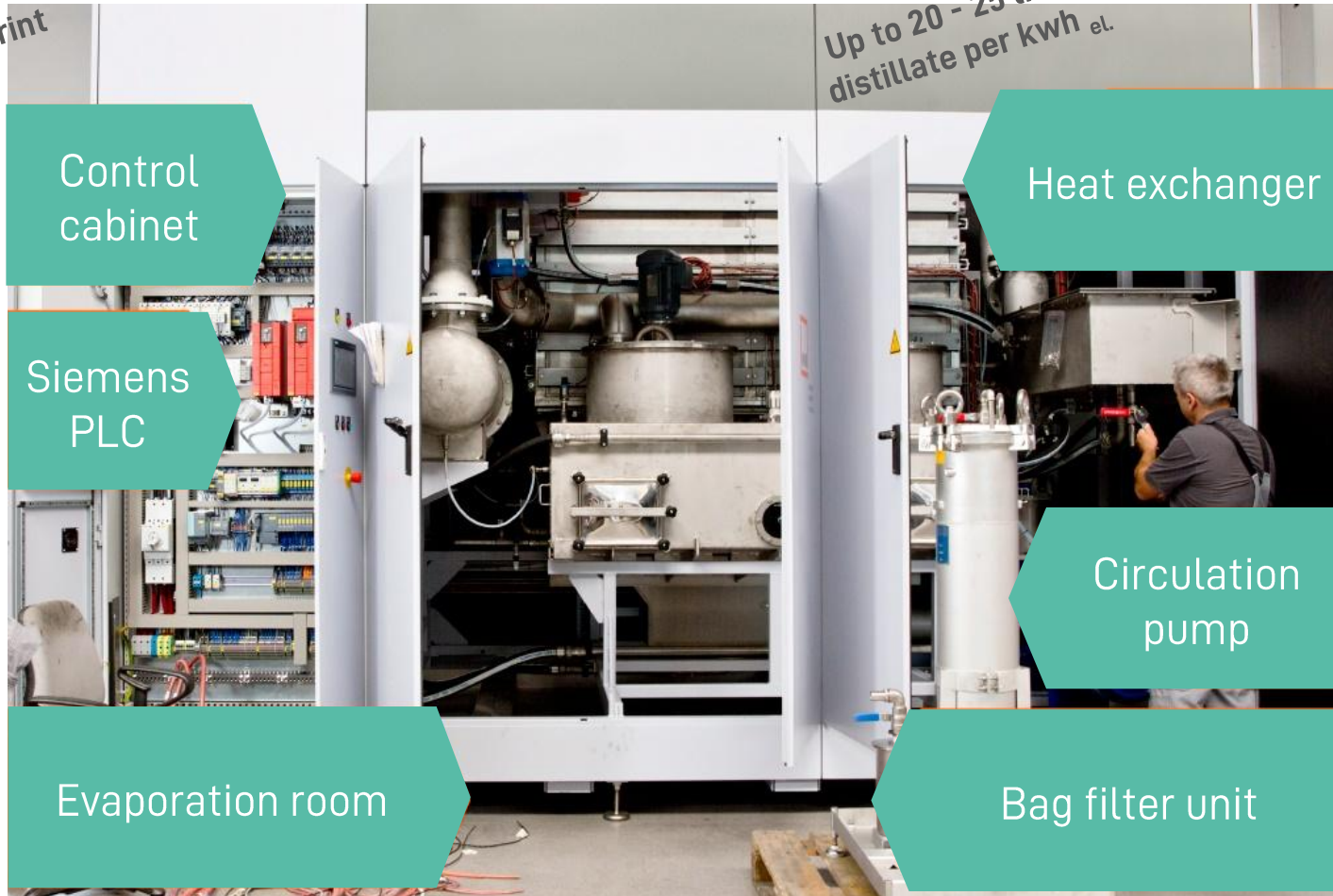
ROBUST. SAFE. FLEXIBLE. EFFICIENT.

- Heat driven Evaporators (DV Series)
- Hybrid Systems with Heat Pump
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# Electrical Driven Evaporators (Mechanical Vapour Compression)

Small footprint

Up to 20 - 25 litres  
distillate per kwh el.



Control cabinet

Heat exchanger

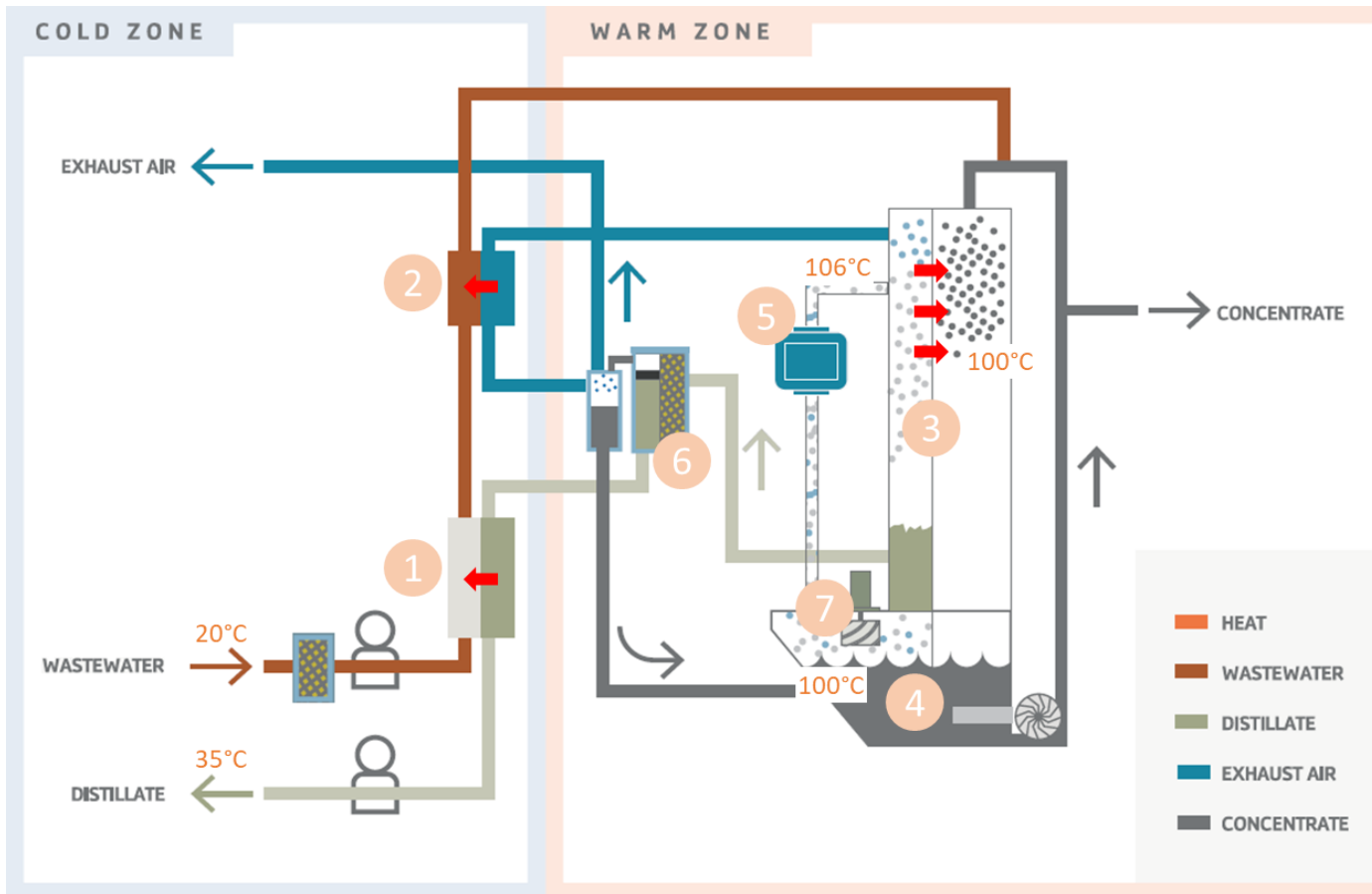
Siemens PLC

Circulation pump

Evaporation room

Bag filter unit

# Operating Principle

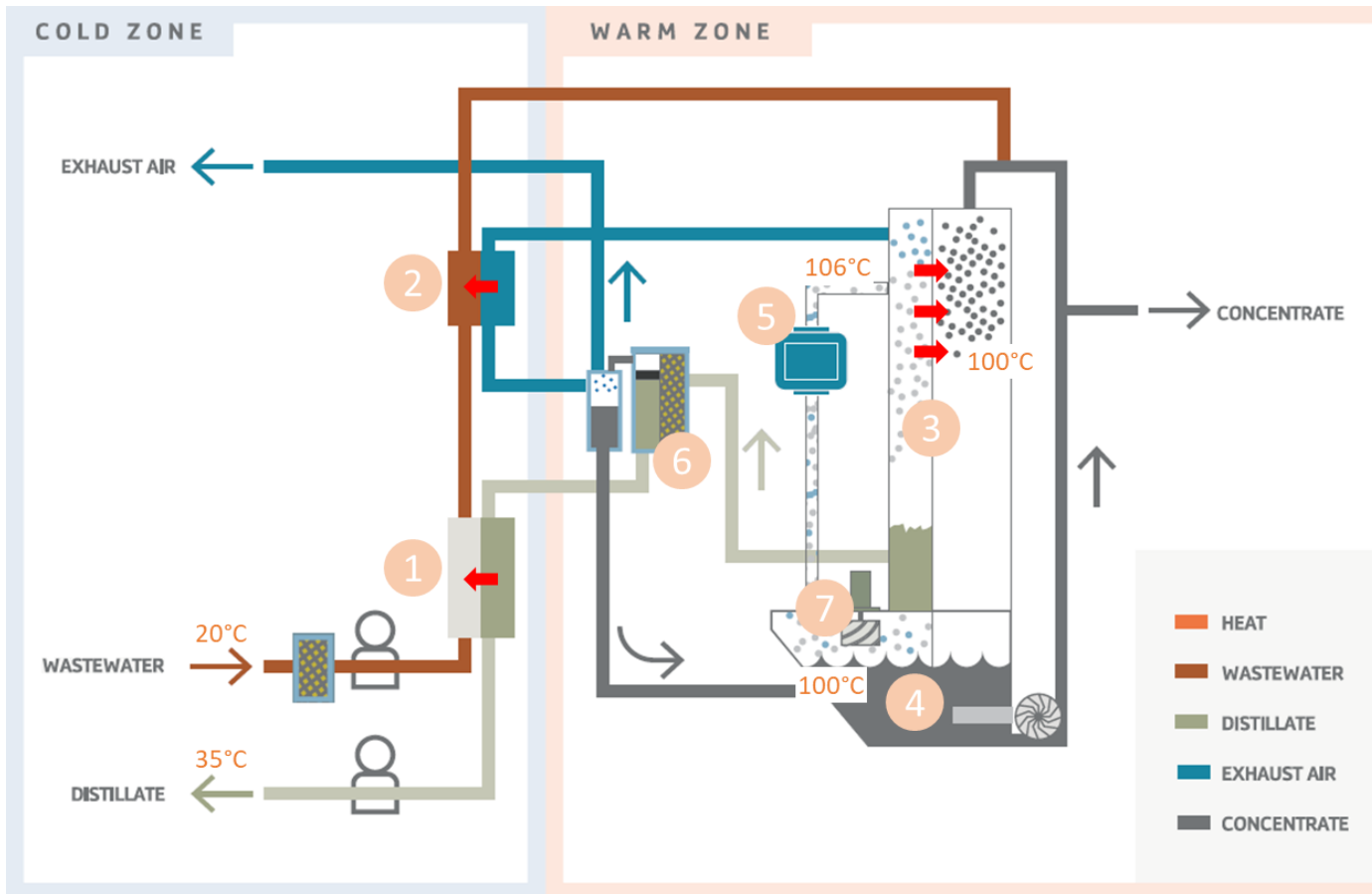


The slurry goes through three heat exchanger (1,2 & 3) to the process tank (4). Here it is circulated and heated by the main heat exchanger (3).

The steam (7) is compressed (5) (approx. +200mbar) and has now a temperature of about 106°C.

On contact with the heat exchanger (3) the steam condensates and becomes distillate(6).

# Operating Principle



For media containing ammonia, a vapor scrubber is installed to remove ammonia from the vapor before condensation at the heat exchanger (3).

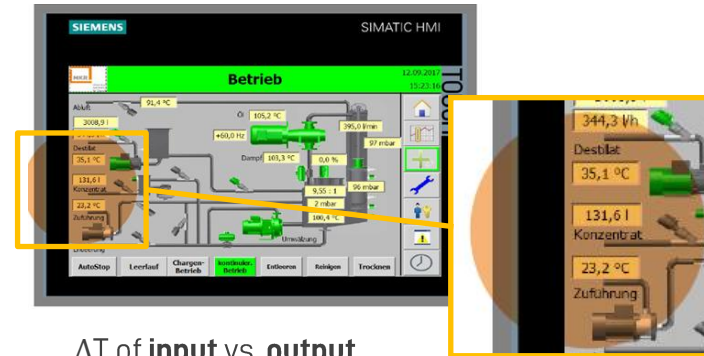
The exhausted air (via heat exchanger 2) and the distillate (via heat exchanger 1) leave the evaporator. The concentrate (from tank 4) is pumped regularly out of the machine.

# Some Insights: Energy Efficiency



## HIGH ENERGY RECOVERY

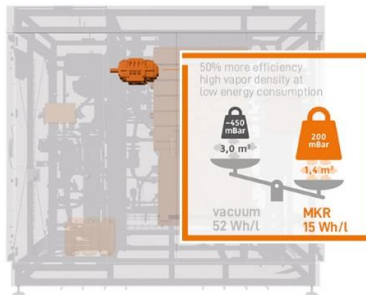
A 3-stage recuperation paired with the largest heat exchanger in its class enables a smooth and energy-saving evaporation.



$\Delta T$  of input vs. output

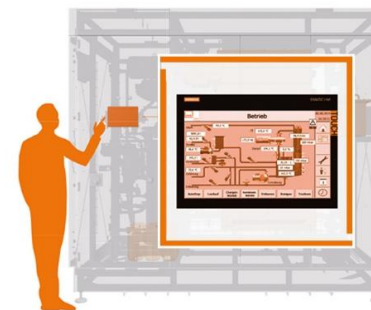
- MKR Evaporator just ~ + 12-15 °C

⇒  $\Delta T$  is equivalent to the **losing energy** during the process



## 50% LESS ENERGY CONSUMPTION

The highest steam density requires less compressor capacity and thus a lower energy demand. (< 50%)



## 20 % MORE PERFORMANCE DUE TO INTELLIGENT CONTROL

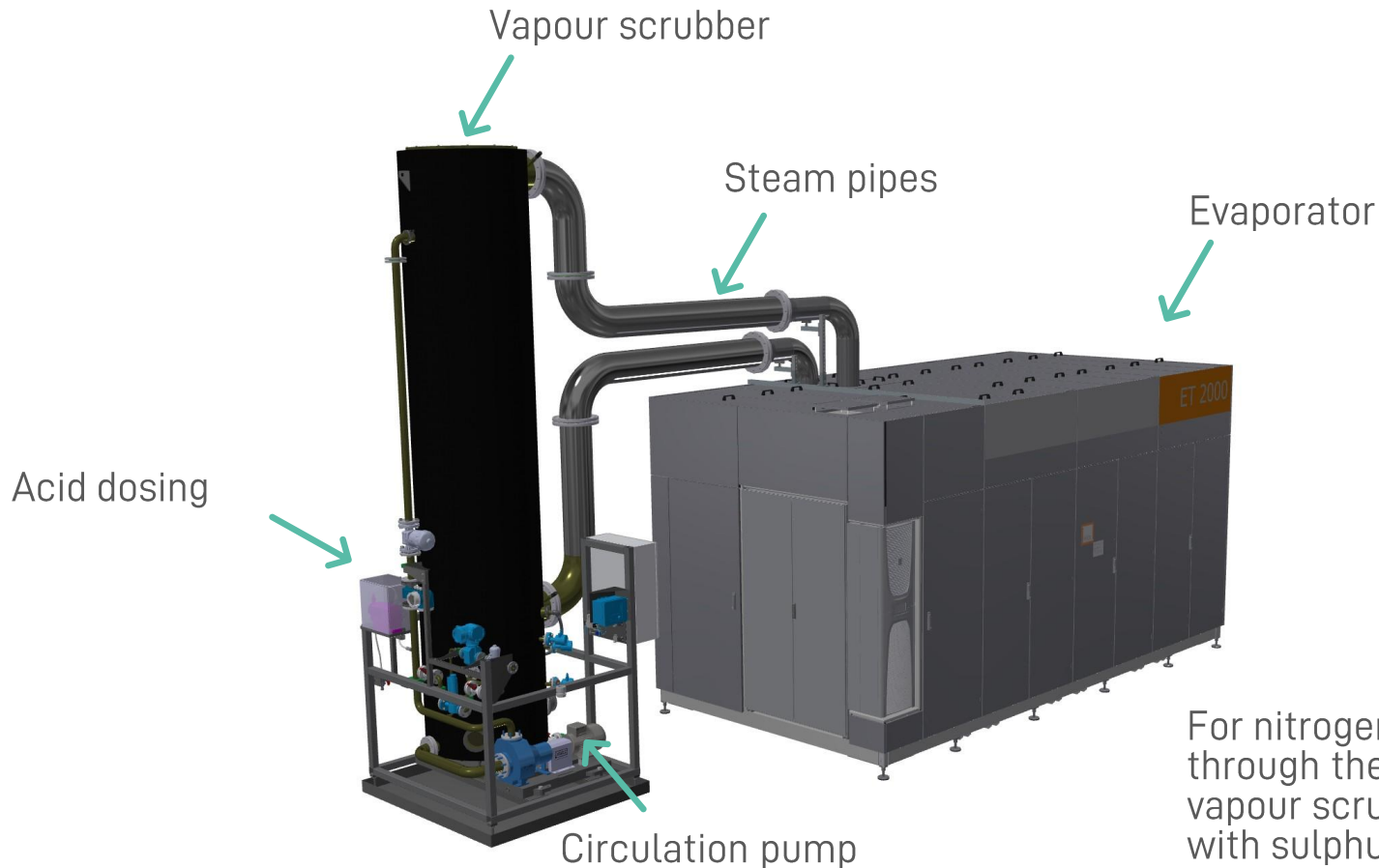
An intelligent and simple system control enables the maximum utilization of the energy used.

# Operating Data

	MVR05	MVR10	MVR20
Intake Volume Flow	500 l/h	1000 l/h	2000 l/h
Distillate Flow (max.)	450 l/h	900 l/h	1800 l/h
Vaporisation Performance	25 l/kWh <sub>el</sub>	25 l/kWh <sub>el</sub>	25 l/kWh <sub>el</sub>
Unladen Wight	4,8 t	8 t	14 t
Length	4,45 m	4,45 m	5,6 m
Width	2,35 m	2,8 m	2,8 m
Hight	3,1 m	3,1 m	3,1 m
Operating Voltage	3/400 V N PE 50 Hz	3/400 V N PE 50 Hz	3/400 V N PE 50 Hz
Dry Matter Content (Input)	< 2 % TS	< 2 % TS	< 2 % TS

Intermediate sizes available too.

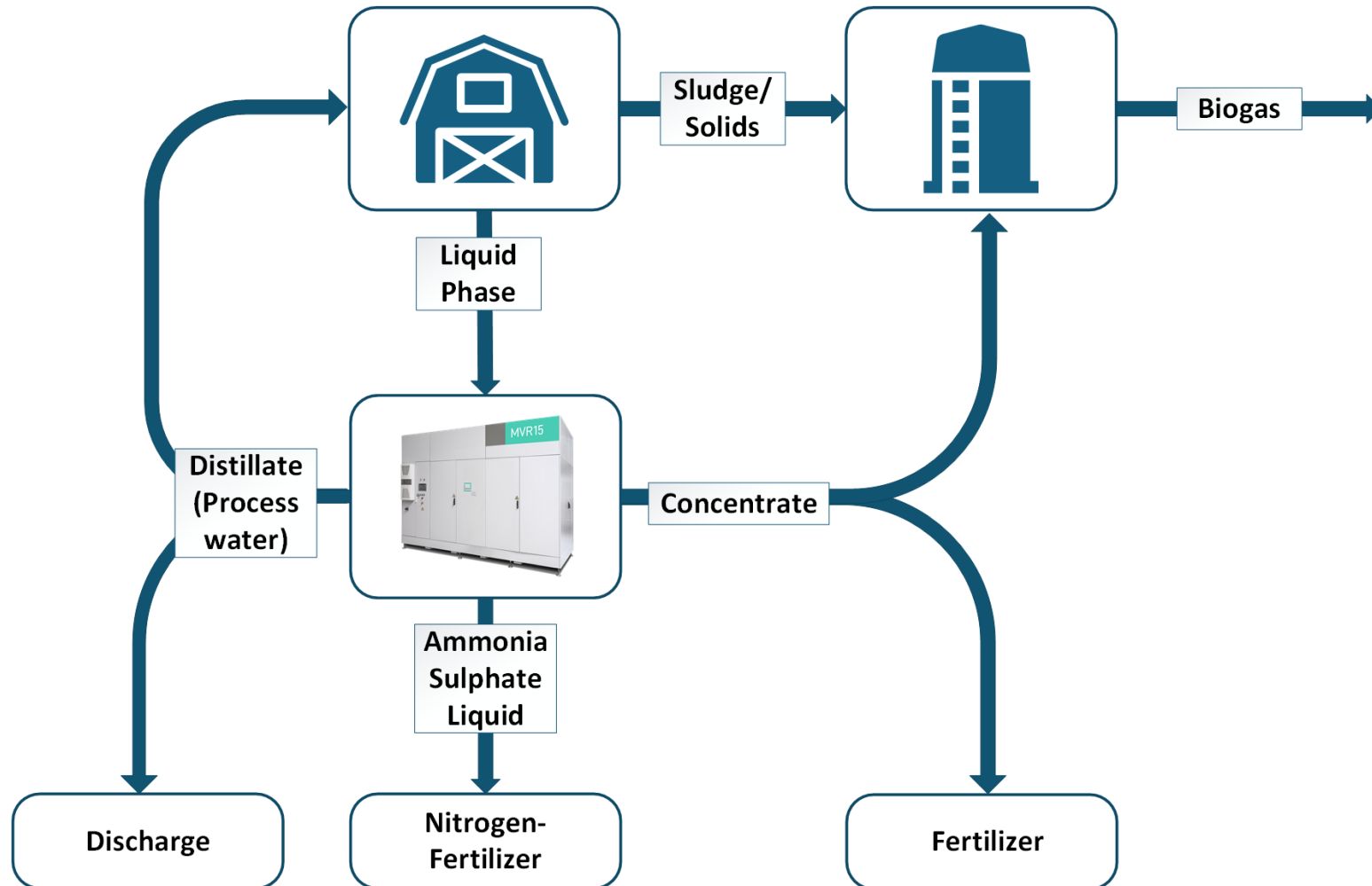
# MVR Evaporator with Vapour Scrubber



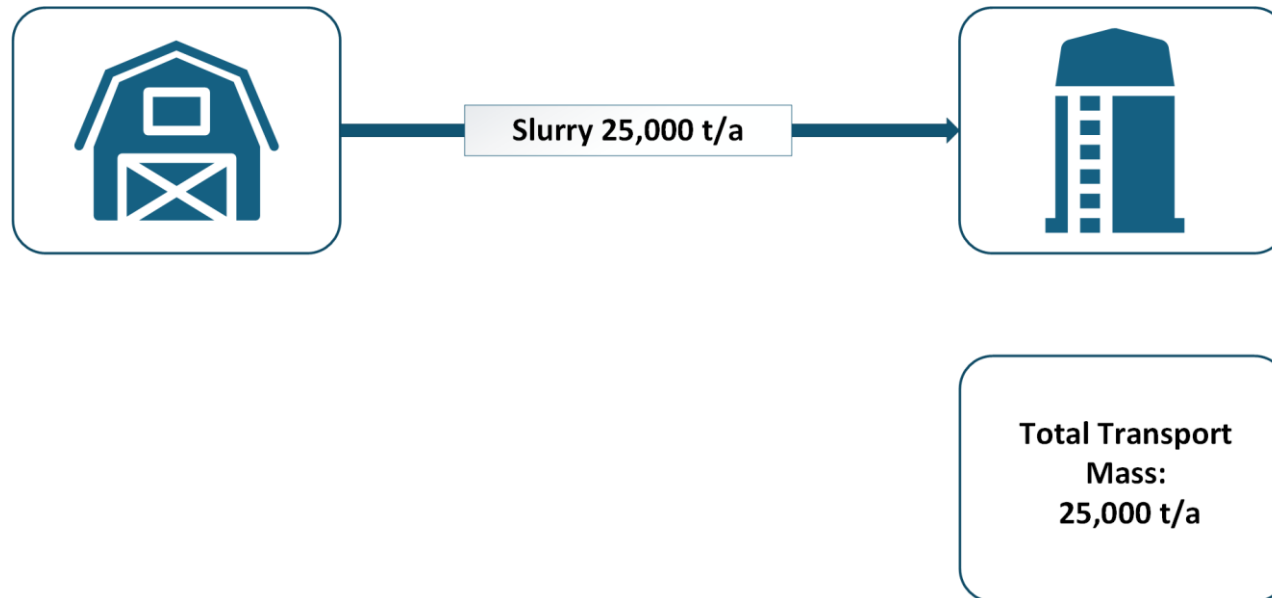
For nitrogen binding, the steam is fed through the steam pipes into the vapour scrubber, where it is washed with sulphuric acid in a counterflow process to produce ASL.

→ *Integrated steam stripping*

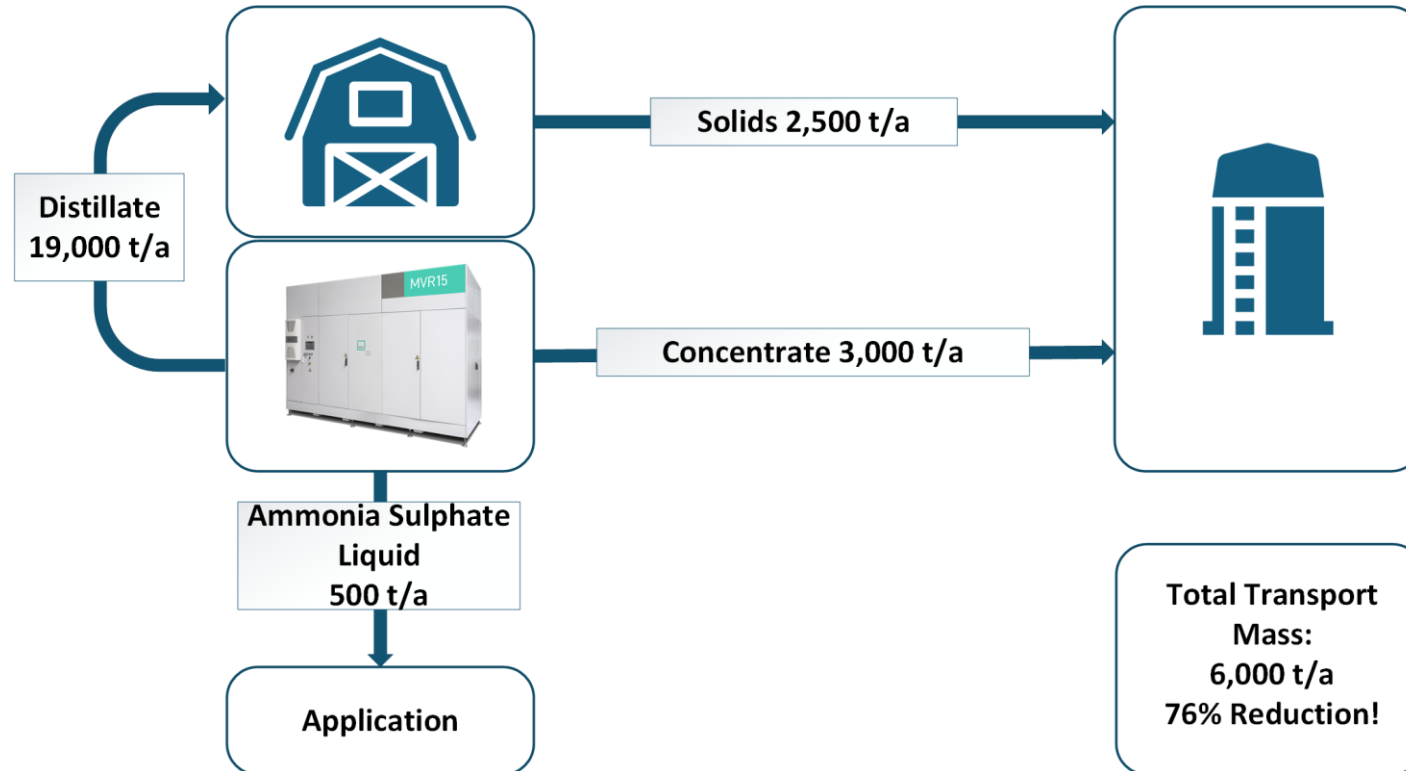
# Application Case: Decentral Slurry Evaporation



# Comparison: Not reduced Slurry



# Comparison: Reduced Slurry

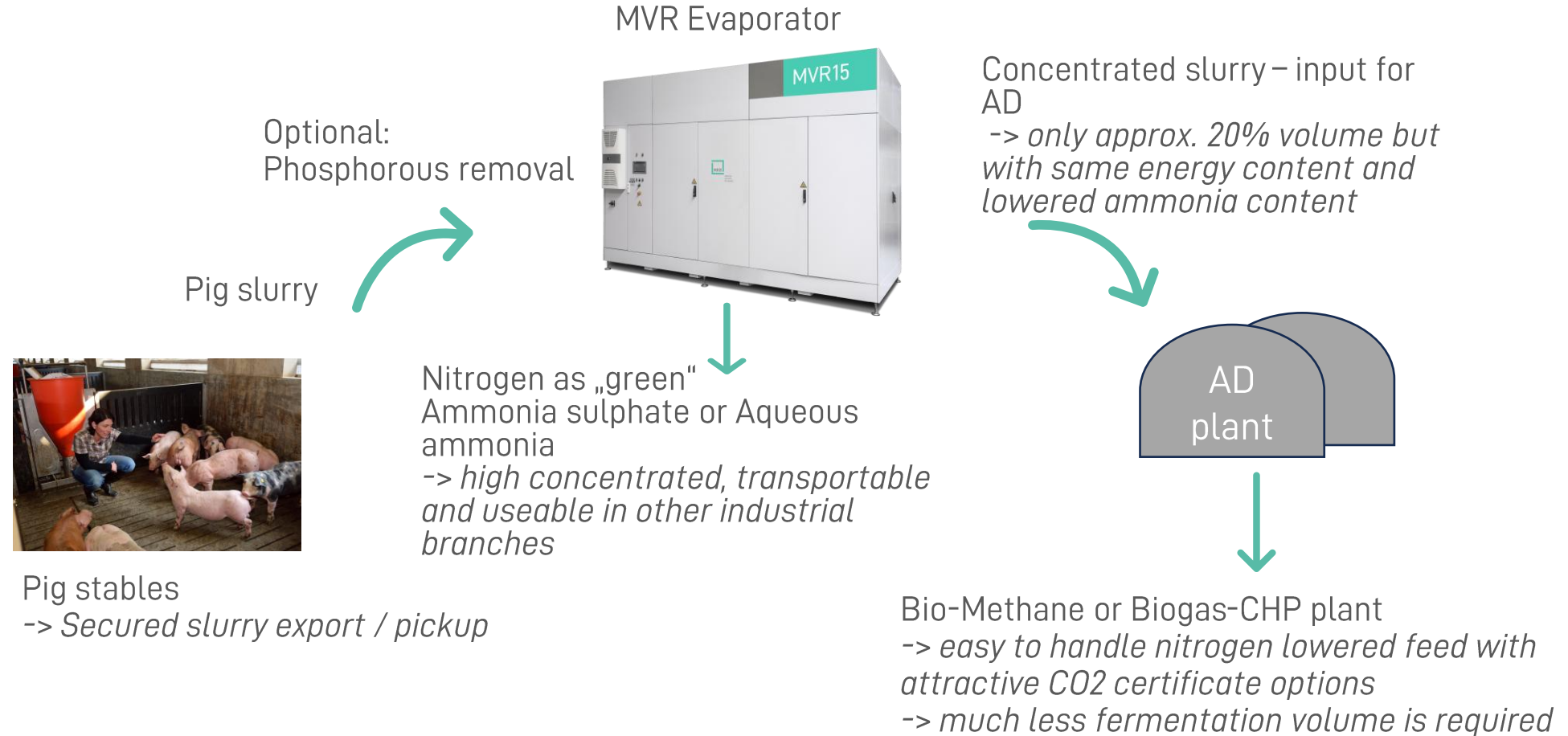


## Additional Advantages:

- **Reduced fermentation volume**
- **Very little ammonia in fermenter**
- **ASL as value product**

# Application Case: Pig Slurry Evaporation

Farm level or decentralised



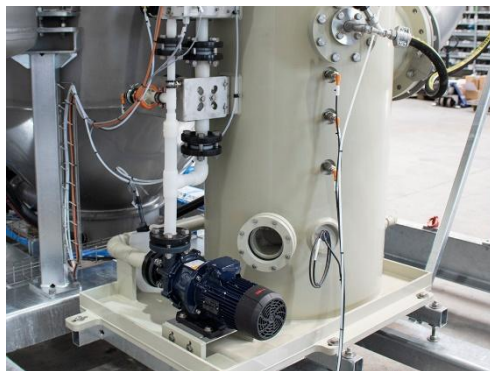
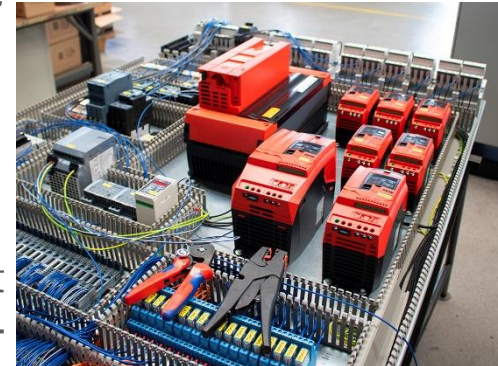
# Advantages



Parts in contact with digestate are made of **stainless steel**.

**No brushes or moving parts** in the media, means low maintenance costs!

PLC programme and control cabinet construction **completely from MKR.**



Components for sulphuric acid and vapour scrubbers made of **stainless steel** as well, thus durable and no corrosion.

Know-how for odourless and dischargeable distillate.

**Find more:**  
[www.mkr-cleanwater.com](http://www.mkr-cleanwater.com)



# Advantages

- Ideal for media with low solid content
- Parts in contact with media in **stainless steel** - higher grades possible for chloride-containing wastewater
- **Modular design**, no up and down scaling of technology just more modules
- No moving parts such as brushes in the digestate - thus significantly **lower maintenance** requirements.
- **Regular automatic acid/alkaline rinsing** removes even the finest organic as well as mineral deposits
- mechanical foam breakers
- **Highest electrical efficiency** (up to 20 - 25 Liters / kwh<sub>el.</sub>)
- **Lowest operating costs** per m<sup>3</sup> distillate
- Only little amount of digestate in the system, approx. 500 litres per module, therefore a **quick heat-up phase / start-up phase** for evaporators

# Why should you choose MKR Evaporation Technology?

- **Robust, durable technology** made of stainless steel
- **Energy-efficient** four-stage heat driven and electrical driven systems.
- **Modular and compact design**
- The technology is based on **25 years of experience** and know-how with evaporation technology and 15 years of experience with digestate.