08 October 2025

Organic Waste Working Group

Let’s Talk Biogas webinar series

Session 4: How to get it right technically

CLIMATE & CLEAN AIR COALITION
TO REDUCE SHORT-LIVED CLIMATE POLLUTANTS

PREVENT Waste Alliance

Housekeeping rules

This session will be recorded. Your participation automatically means that you grant recording permission. **If you do not want to be recorded, please leave the session.** The recording will be made available after the session.

Please turn off your camera.

Please mute yourself whilst not speaking.

Use the chat for questions you might have during the presentations.

AI chatbots are not allowed and will be removed

Agenda

Let's Talk Biogas joint webinar series Part 4	
Welcome, meeting rules and session outline	5 min
Introduction of PREVENT Waste Alliance and CCAC	10 min
Introduction to Biogas	5 min
Christoph Spurk, *Managing Director @ ÖKOBIT GmbH, and Vice President @ German Biogas Association,* **Biogas made reliable**	15 min
Frank Hofmann, *International Affairs @ German Biogas Association,* **Safe and Climate friendly Biogas**	15 min
Discussion and Q&A	40 min

PREVENT Waste Alliance

PREVENT
Waste Alliance

- International ‘think and do tank’ for circular economy practitioners
- 650+ members from the private sector, academia, civil society and public institutions
- Launched in 2019 by the German Federal Ministry for Economic Cooperation and Development (BMZ)
- Working groups on three material streams:
  - Plastics (incl. sub-topics such as EPR and Plastic Credits)
  - E-Waste and Batteries
  - Organic Waste
- Working groups on cross-cutting issues: Financing Circular Economy; Digitalisation and Circular Economy; Awareness Raising/Behaviour Change
- Pilot projects and innovation programmes

Visit our website and follow us on LinkedIn!

Organic Working Group

Interested to join the Working Group on Organics?
Please contact:: martin.kerres@giz.de & carina.martens@giz.de!

Objectives of our group

- Promote enabling framework conditions for sustainable organic waste management
- Develop solutions for food waste prevention and utilization
- Promote separate collection as well as innovative treatment solutions for organic waste
- Such as the Black Soldier Fly approach, which we support through or CCAC-cofounded **BUGS project in Uganda, Cote D'Ivoire and Ethiopia**

The Climate & Clean Air Coalition

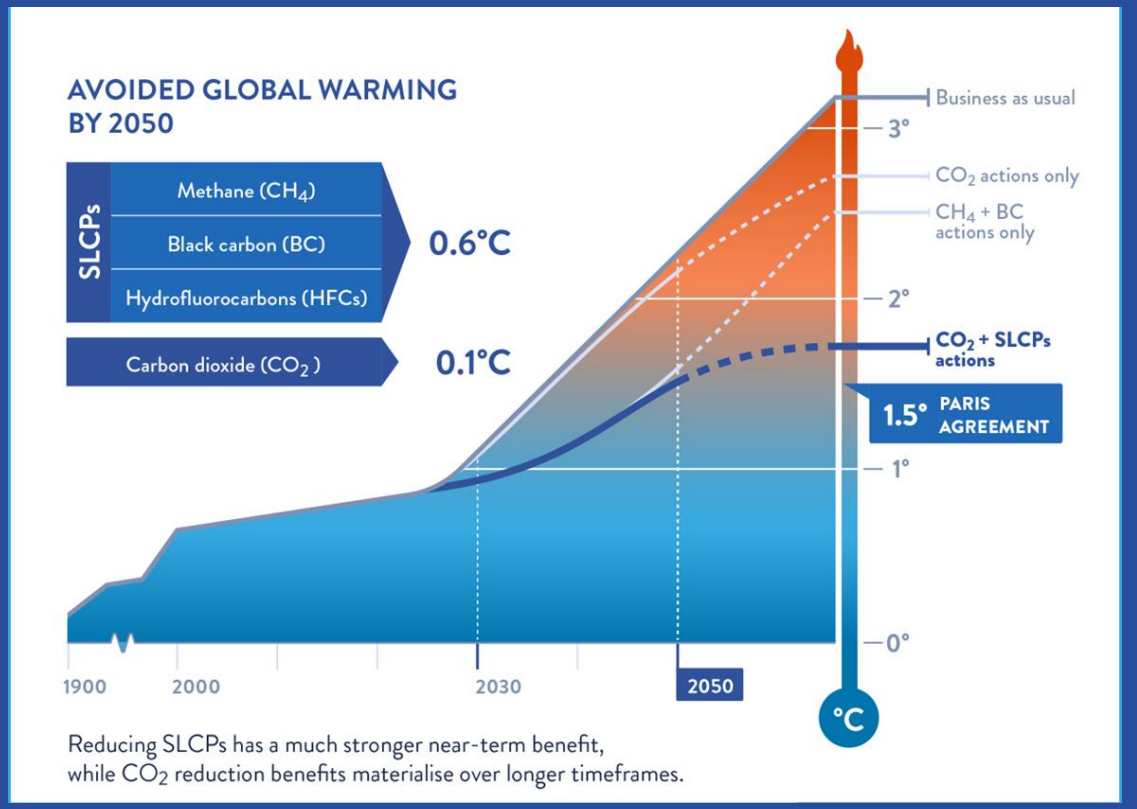
UNEP-convened since 2012

Global, voluntary partnership of committed countries & organisations

Dedicated to addressing short-lived climate pollutants (SLCPs)

88
country partners

93
non-state partners



- Powerful climate forcers responsible for half of global temperature rise
- Air pollutants that are harmful to people, ecosystems and agricultural productivity
- Present in the atmosphere for a few days up to a few years
- Increasingly important target given slow progress on decarbonatisation & increasing concerns over health

PREVENT / CCAC / Let‘s talk biogas, How to get it right technically
08th October 2025

Fachverband BIOGAS
German Biogas Association
Association Allemande du Biogaz
Asociación Alemana de Biogás
www.biogas.org

Biogas: Safe and climate friendly

Frank Hofmann

International Affairs
Fachverband Biogas e.V. - German Biogas Association

Agenda

- The German Biogas Association
- Safety
- Climate friendly
- Conclusions

Fachverband Biogas e.V. – The German Biogas Association

- Operators of biogas plants
- Technology manufacturers
- Research institutions
- Public authorities
- Feedstock providers
- Interested individuals

> 4700 members

40 employees

Member of…

Objective: promotion of biogas for climate protection

- Definition of legal frameworks, guidelines & standards
- Information exchange, knowledge transfer
- Advocating on EU-, national and regional levels

Regional groups

Safety

Importance of safety and health issues

- Any harm of persons must be avoided,
- Interruptions to the operation, damage of the technology and claims for compensation for personal injury cause extremely high costs,
- Responsible persons can face fines (and even imprisonment) for negligent behaviour

Safety

Importance of safety and health issues

- Safety issues at biogas plants can significantly damage the reputation of biogas
- Problems with acceptance regularly lead to difficulties in promoting or supporting biogas, particularly in politics
- Problems lead to a significant tightening of requirements, meaning systems are becoming increasingly expensive to purchase and operate!

Publication: Biogas – Safety first!

Available in English, Spanish, French, Portuguese, Serbian, Indonesian and Dutch!

Potential health hazards on biogas plants

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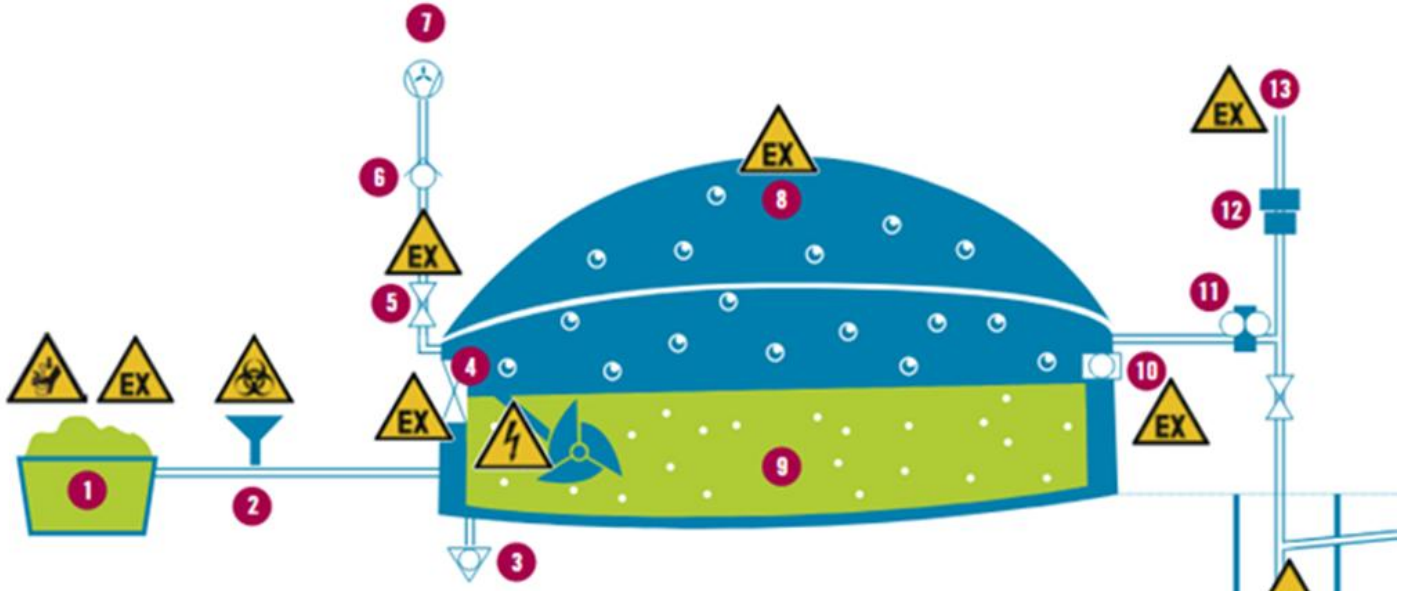
- Noise
- Falling, crashing, etc.
- Hot surfaces
- Electrical hazards
- Hazardous substances
- Explosion Hazards
- Fire hazards
- Mechanical hazards

Source: ISO 7010



1 Feeder
2 Dosing station for processing aids
3 Potential equalisation
4 Access opening
5 Shut off valve
6 Return valve
7 Air injection for the biological desulphurization
8 Gas storage
9 Digester
10 Observation window
11 Low pressure monitor
12 Over- and underpressure protection
13 Blow off pipe
14 Condensate trap

Source: Biogas Safety First! Guidelines for the safe use of Biogas Technology; Fachverband Biogas e.V.

Hierarchy of protective measures

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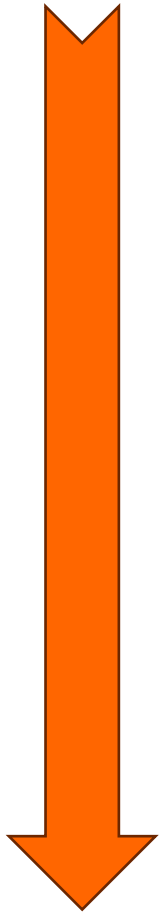
German Biogas Association



C

- **C** = **Constructive** protective measures (gas tightness, fire protection wall, railings,…)

T

- **T** = **Technical** protective measures (gas warning sensor, ventilation, reversing alarm…)

O

- **O** = **Organizational** protective measures (operating instructions, employee instructions, safety data sheets, inspections, maintenance…)

P

- **P** = **Personal** protective measures (non-flammable work clothing, face masks…)


3
12

Biogas, climate friendly

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German Biogas Association

- Biogas is a renewable energy.
- Biogas production can help to **reduce GHG** emissions in several ways:
  - **Avoidance of methane emissions**: during the storage of organic material (like manure or palm oil mill effluents) methane emissions occur. Due to the closed process taking place in the biogas plant and gas utilization, those methane emissions are avoided and the methane converted into carbon dioxide.
  - **Fossil fuel substitution**: energy from biogas can substitute fossil energy carriers and by that CO_2 emissions are mitigated.
  - **Production of fertilizer**: digestate (the effluent of a biogas plant) is a good quality fertilizer. Its use helps to substitute synthetic fertilizers, which require fossil fuels for its production.
- However, methane is a very effective GHG and methane emissions from biogas plants must be limited (e.g. by covering the storage of digestate or installing a flare which burns the produced methane in times the CHP is not in operation).

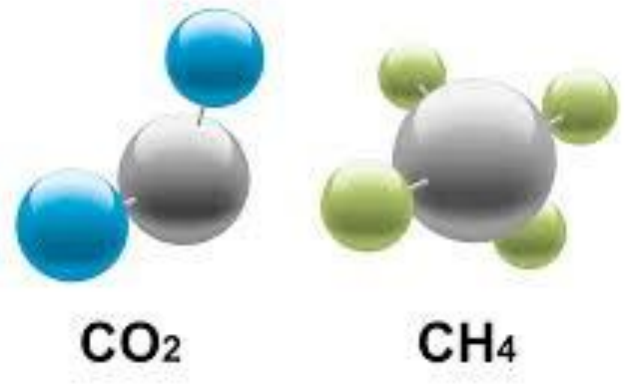
Biogas, climate friendly

- The energy produced in any biogas plant performs better than the fossil comparator (except if the methane leakage is high in biogas plants).
- The more manure (or other open-air stored organic material) is processed, the higher the GHG emission savings.
- The usage of residues and wastes offers the opportunity to convert biomass into energy with very low carbon emissions.
- Energy crop cultivation results in GHG emissions.
- Optimal biogas utilization (electricity, heating or fuel) depends on the particular situation of each country.

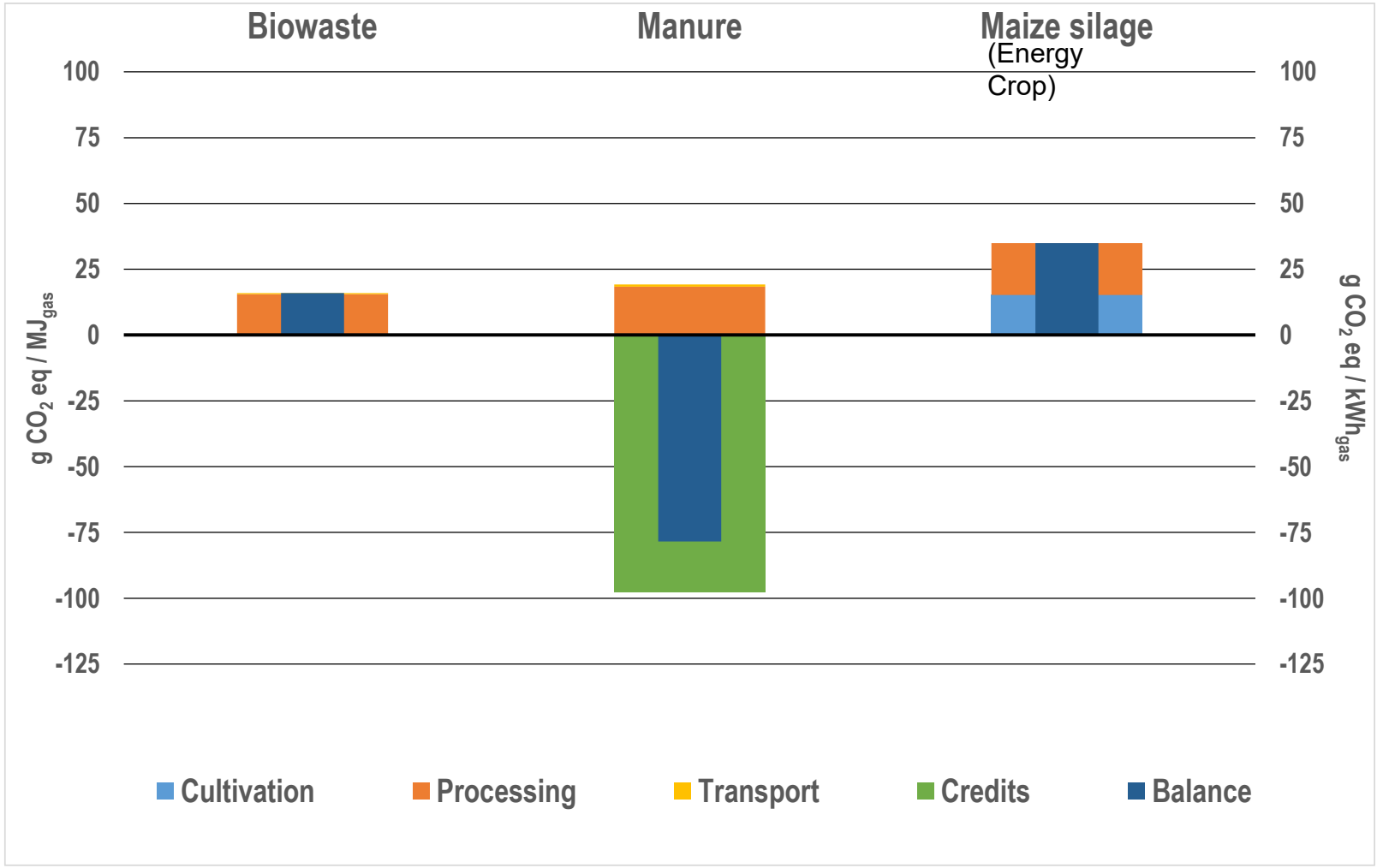
Biogas, climate friendly

Methane leakage should be avoided whenever possible.

- Cover the post-fermentation storage. Most methane emissions in a biogas plant arise there.
- Install an automatic starting flare in the time the CHP is not operating. A CHP operates typically below 8,200 h/a. During CHP standstill times the produced methane must be flared.
- Regular leakage control of the biogas plant
- Check pressure relieve valve’s
- Check all waterlocks, and refill if nescesary
- Walk about around every digestor/gasholder etc



Life Cycle Assessment of a biogas plant



Source: FvB with figures from RED II

Social aspects of biogas

- Rural development. Biogas plants are often located in rural areas
- Job creation
  - 50,000 jobs in Germany
    - Plant operator, technician
    - Maintenance
    - Manufacturers
    - Feedstock suppliers
    - Planner
    - Knowledge, etc.
  - 5000 MW_e capacity
- Typically above 10 Jobs per 1 MW installed el. Power

Conclusions

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- Biogas in an approved state of the art technology - Experience since decades !!!
- Biogas plants must be operated safe and climate friendly
- Safety
  - Constructional
  - Organisational
  - Personal
- Climate friendly
  - No emission to soil or water bodies
  - Low emisions to the air

Meet our Biogas know-how series

Fachverband BIOGAS
German Biogas Association

www.biowaste-to-biogas.com

www.biogas-safety.com

www.biogas-to-biomethane.com

www.digestate-as-fertilizer.com

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Biogas Made in Germany

Scaling Biogas in Partnership: How German Know-how Can Shape a Sustainable Future

Christoph Spurk

Vizepräsident Fachverband Biogas e.V.

Introduction - Christoph Spurk

About OEKOBIT

- Founded in 2000 – originally focused on waste-to-biogas solutions
- Later expanded into agricultural and industrial biogas systems

Today:

- 250 biogas- and 80 biomethane plants across Europe
- A team of 180 experts within the OEKOBIT GROUP

Background:

- Since 2021, Vice President of the German Biogas Association and appointed expert advisor to the German Bundestag

Why Biogas matters:

Every country holds great biogas potential:

- Millions of tons of manure, crop residues, and organic waste are waiting to be used.
- There is a growing demand for clean, reliable, and local energy, especially in rural areas.
- Biogas is more than energy – it's a circular solution for waste, fertilizer, and climate protection.

Scaling up biogas means not just building more plants –
but building them better. Quality is the key to long-term success and public trust.

Biogas made in Germany and technology we offer

German biogas companies bring over two decades of experience in developing and operating biogas plants under demanding technical and regulatory conditions.

What defines our contribution?

- **Reliability:** Systems designed for >90% availability.
  Downtime costs money – uptime generates income.
- **Efficiency:** High electrical efficiency (>40%) and low internal energy consumption.
  Better performance, better economics.
- **Safety:** Advanced safety features, gas-tight components, and rigorous documentation.
  Biogas must not harm people or the environment.
- **Sustainability:** Low methane emissions, covered digestate storage, flare systems, emission monitoring – essential for GHG reduction.

Challenges to Scaling – and How We Can Help

A common obstacle:

- Too much focus on low CAPEX – too little on long-term performance (OPEX).
- Cheap systems may win the tender, but often fail in daily operation.
- Poor performance, high methane losses, and safety issues hurt both the economics and the image of biogas.

How German companies can help:

- Deliver modular, durable solutions adapted to local substrates.
- Provide training and hands-on support for operators and engineers.
- Share know-how and standards to improve safety, efficiency, and sustainability.

From Lagoon to Engineered Performance

Current reality:

- Most low-cost biogas plants use covered lagoons – quick to build, cheap to install, but unsuitable for substrates that contain solids.
- Over time, fibers and sediments settle, active volume reduces, and gas yield drops month by month as the lagoon slowly fills up.

The challenge:

- Without mixing, crusts form on top, sludge builds up below, and temperature and biology become uneven.
- Biogas production becomes **random and uncontrollable.**

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From Lagoon to Engineered Performance

German engineering starts before construction:

We analyze the substrate, calculate viscosity and gas potential,
and design the tank and mixing system to ensure long-term performance.

Engineered solution (Examples):

- Round concrete digesters (CSTRs) provide uniform flow and stable temperature.
- Multi-level, angled agitators prevent crusts and sediment buildup.
- **Fully monitored process:** temperature and **gas output are continuously controlled**.
- Nothing left to chance – **stable gas production and high efficiency for decades.**

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Mixing Excellence – The Heart of Stable Biogas

Why mixing concepts matter:

- Proper mixing prevents crusts, keeps the whole volume active, and ensures even heat and nutrient distribution.

Agitator types:

- Long-shaft mixers: slow, energy-efficient – ideal for fibrous substrates.
- Submersible mixers: directional flow – perfect to prevent floating layers.
- Paddle or low-shear mixers: gentle movement for liquid or sensitive feedstocks.

Efficiency:

- Optimized mixing reduces power use and OPEX, while increasing gas yield and plant uptime.

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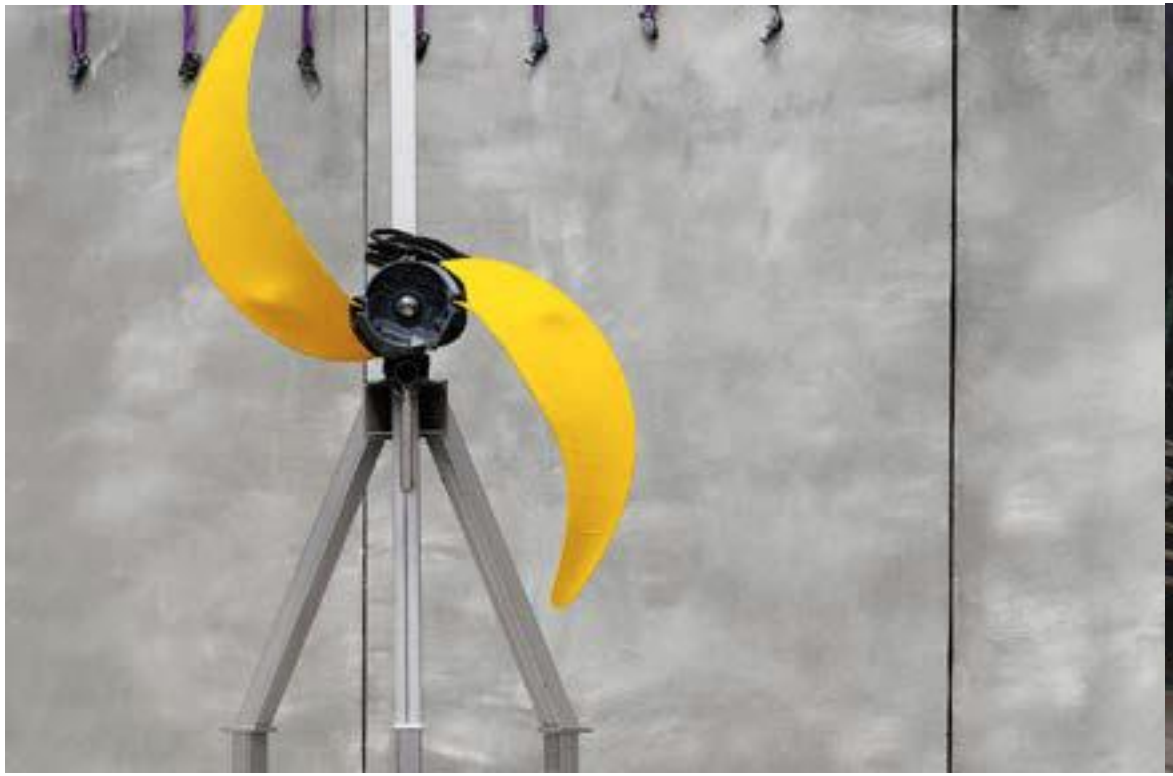
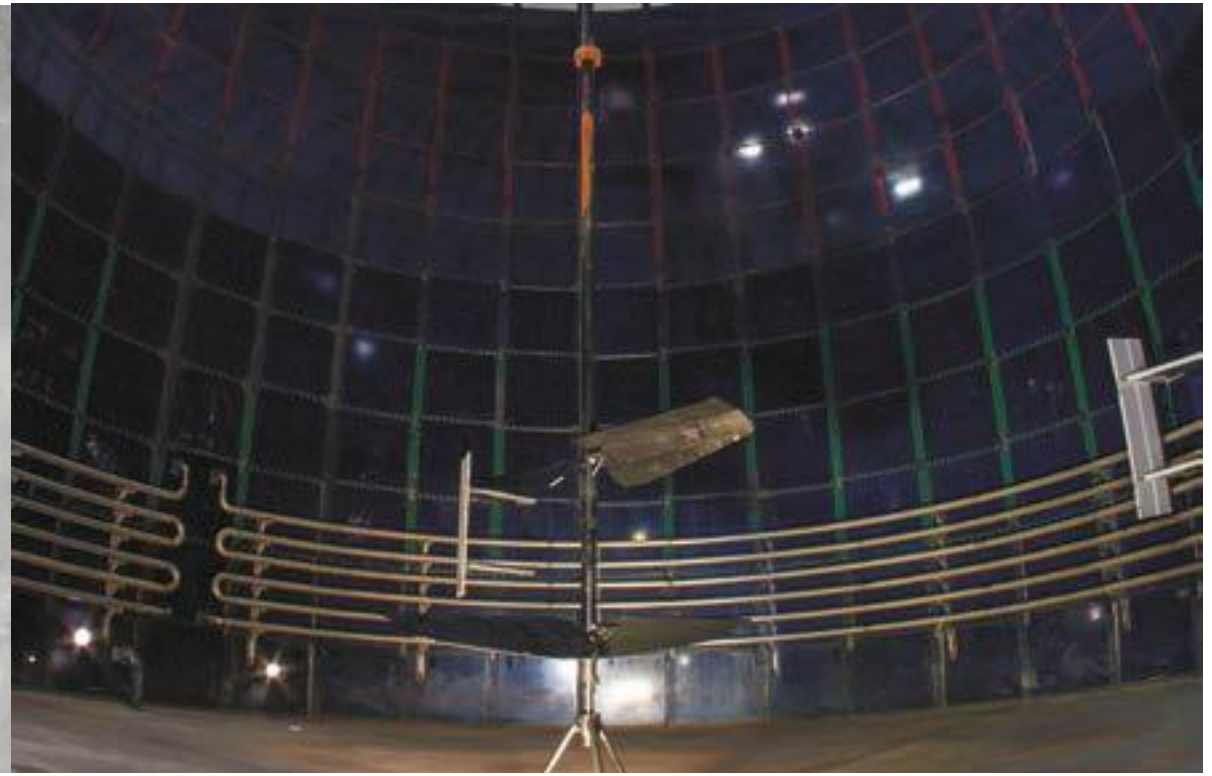
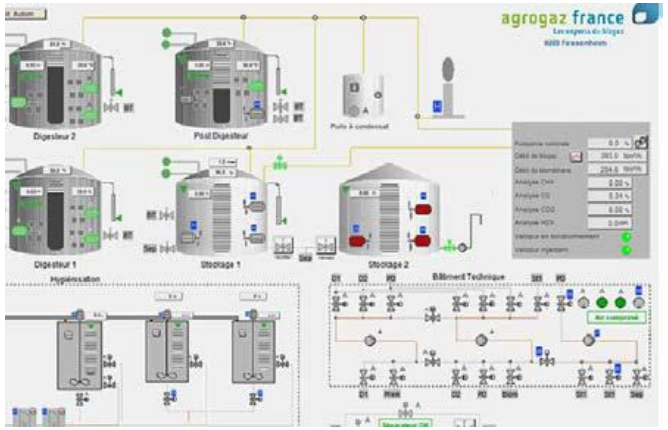




Mixing is just one example
“Made in Germany” solutions go further

- Process control & automation
- Feedstock pretreatment & dosing
- Digestate management & separation
- Heat recovery and energy optimization
- **And many more**



Conclusion

Biogas has the power to transform
but only if it is done right.

German biogas companies bring decades of expertise, high-performing technology, and a deep commitment to sustainability. We are ready to work hand-in-hand not just to scale biogas, but to **make it a long-term success story**

Together, we can unlock the full potential of biogas – for energy security, rural development, and climate protection. Let's **build trust, create value, and shape the future of biogas – together.**

Thank you very much