EUROPEAN BIOGAS CONFERENCE

23 - 24 OCTOBER 2024

EUROPEAN BIOMETHANE WEEK

With the support of

European Commission

BIP Europe
Biomethane Industrial Partnership

OPENING CONFERENCE

Anders Mathiasson

President

European Biogas Association

François Gemenne

Researcher

University of Liège

EUROPEAN BIOMETHANE WEEK

Opening conference

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EUROPEAN BIOMETHANE WEEK

SPOTLIGHT SPEECH

Xavier Passemard

Director of biomethane
Gaz Réseau Distribution France

EUROPEAN BIOMETHANE WEEK

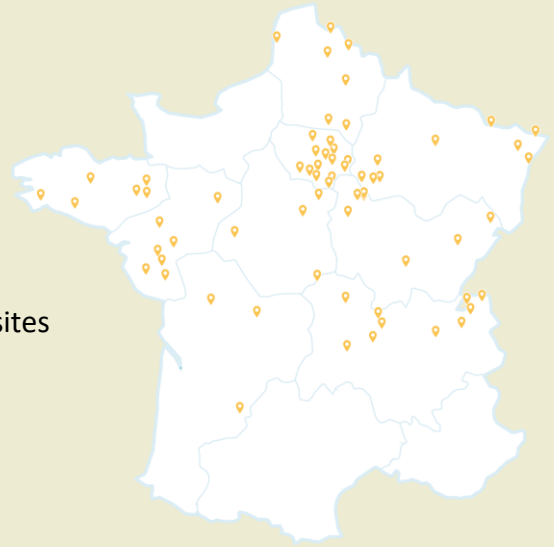
The French agriculture and renewable gas: A symbiotic model

EUROPEAN BIOMETHANE WEEK

23rd of October 2024

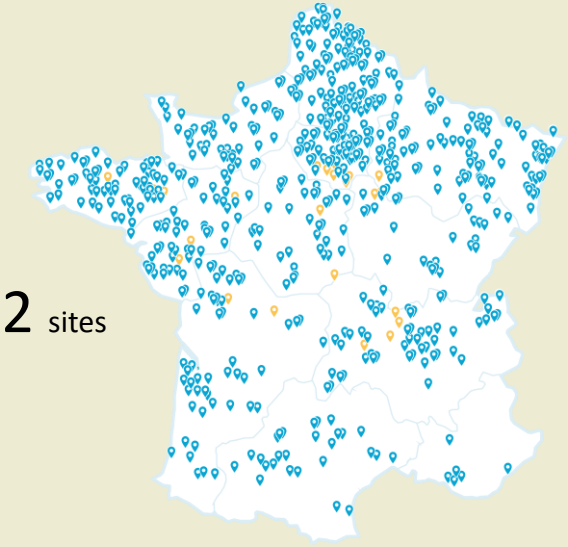
A unique development of AD sites injecting biomethane

DÉCEMBRE 2018



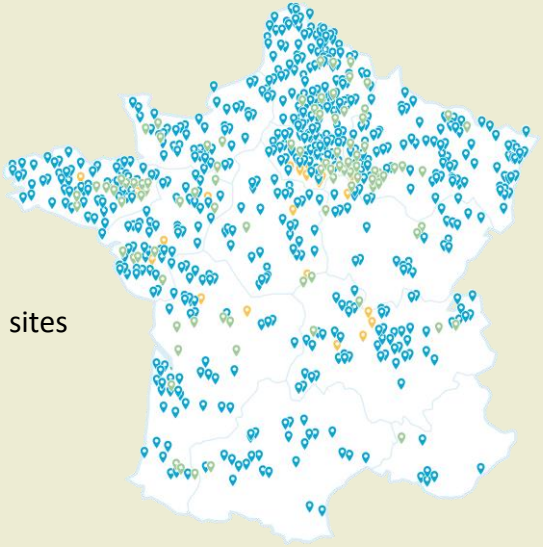
76 sites

DÉCEMBRE 2023



652 sites

PRÉVISIONS 2024



744 sites

By end of 2023, 12 TWh/year capacity of biomethane
the equivalent of 2 nuclear reactor built in 5 years.

EUROPEAN BIOMETHANE WEEK

GRDF

A majority of the production capacity is owned by farmers

BREAKDOWN OF TOTAL INJECTION FACILITIES BY TYPE AT THE END OF 2023

Source: ODRe as at 31 December 2023

- Autonomous agricultural
  423 sites · 65%
- Regional agricultural
  136 sites · 21%
- Sludge from wastewater treatment plants (WWTP)
  47 sites · 7%
- Regional methanisation
  21 sites · 3%
- Non-hazardous waste storage facilities
  18 sites · 3%
- Household waste and biowaste
  7 sites · 1%

EUROPEAN BIOMETHANE WEEK

GRDF

GRDF's network with agricultural stakeholders

Morning plenary

The future of agriculture, today. Resilience, Sustainability and Food Security

Connie Miller

Food and Agriculture Organization

Gaëlle Marion

DG AGRI , European Commission

Diana Lenzi

Farming for Future Foundation

Laurence Molke

Cycle0

Francesca Magnolo

Feedback EU

EUROPEAN BIOMETHANE WEEK

Morning plenary

The future of agriculture, today. Resilience, Sustainability and Food Security

Connie Miller

Deputy Coordinator of the Secretariat of the Global Bioenergy Partnership

Food and Agriculture Organization

EUROPEAN BIOMETHANE WEEK

FAO's Energy-Smart Agrifood Systems: an insight on bioenergy

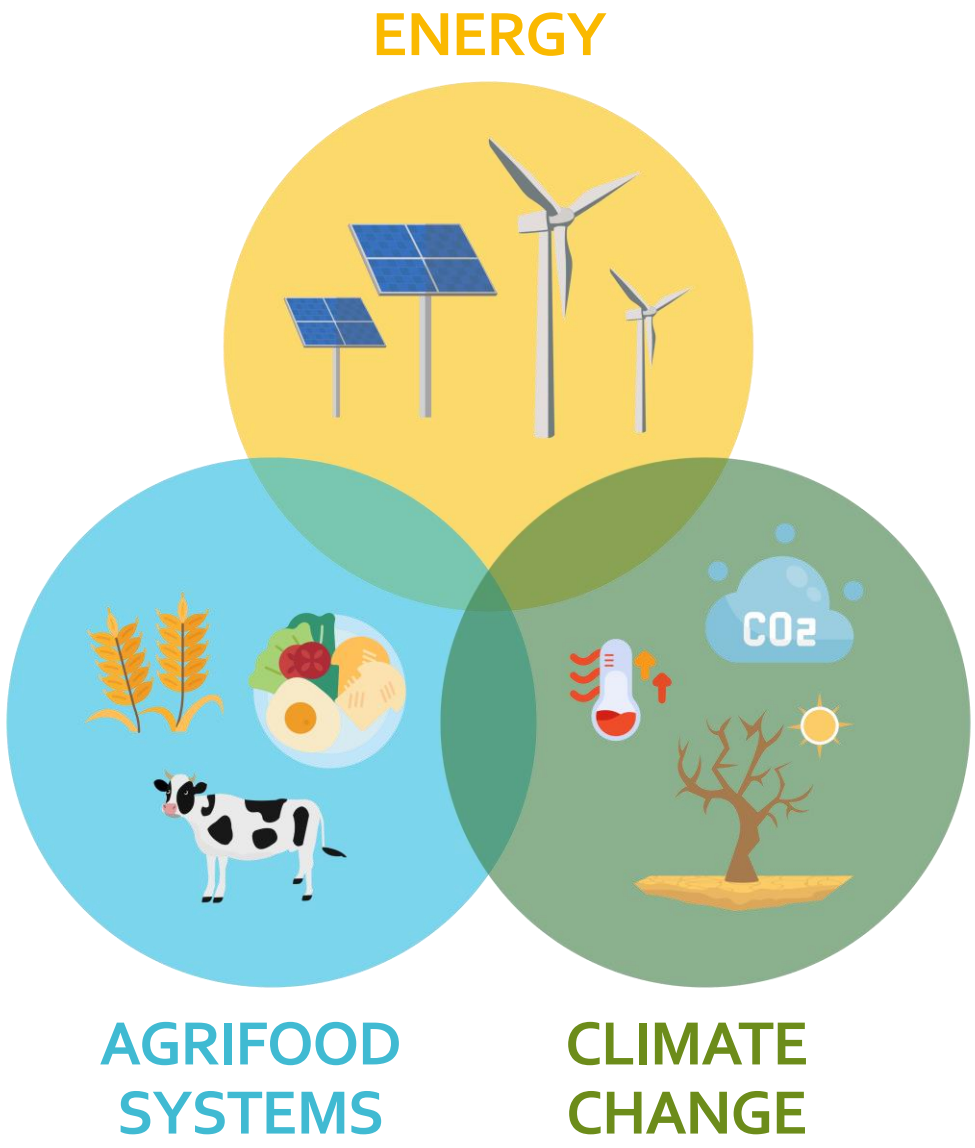
Connie Miller
Deputy Coordinator of the Global Bioenergy Partnership

Climate Change, Biodiversity and Environment (OCB).
Food and Agriculture Organization (FAO) of the United Nations

Biomethane Week 2024
23 October 2024

Agriculture, energy security and climate change are strictly interconnected.

- Agrifood systems need energy at each step of the value chain
- 30% of the world energy is used within agrifood systems
- Energy use in Agrifood systems is responsible for up to 31% of total GHG emissions



Energy-smart solutions are key.

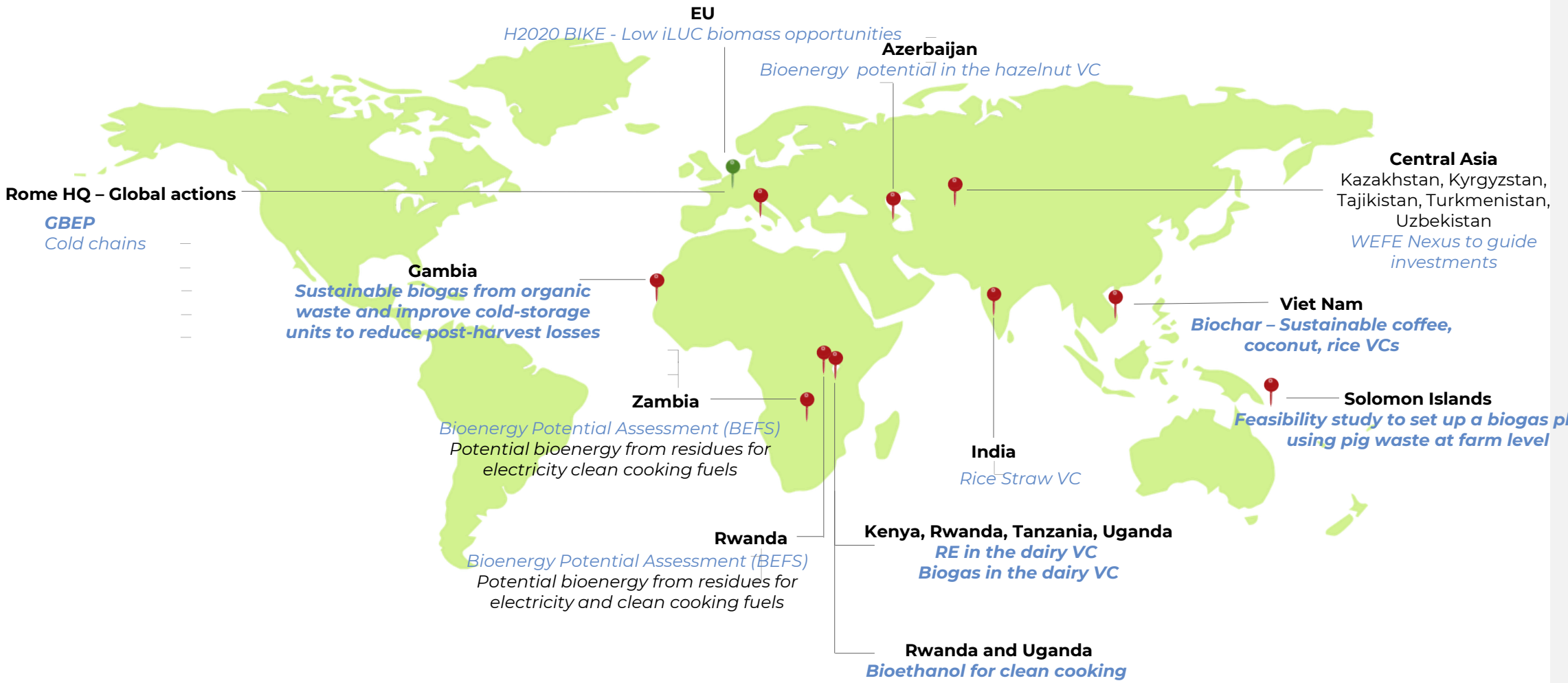
FAO's Energy Smart Agrifood Systems (ESAS) Programme

Provide **energy-smart solutions** at each step of the value chain to help **transform the agrifood systems** (very energy intensive and mostly fossil fuel based) to **sustainably feed a global population** of almost 10 billion by 2050

Agriculture is part of the solution.

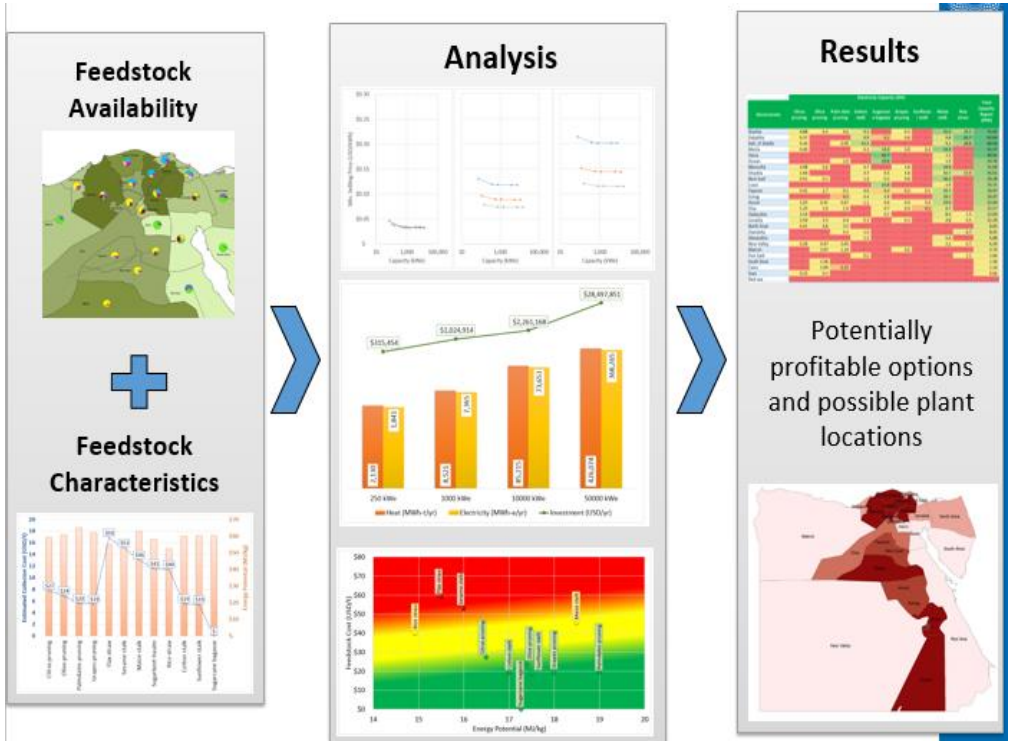
Food and Agriculture Organization of the United Nations

Activities, programmes and projects on bioenergy



FAO long-standing tools on Bioenergy Sustainability

EX-ANTE - BEFS Assessment Approach



Bioenergy and Food Security (BEFS) Approach and Assessment (fao.org)

EX-POST - GBEP Sustainability Indicators

ENVIRONMENTAL

1. Life-cycle GHG emissions
2. Soil quality
3. Harvest levels of wood resources
4. Emissions of non-GHG air pollutants, including air toxics
5. Water use and efficiency
6. Water quality
7. Biological diversity in the landscape
8. Land use and land-use change related to bioenergy feedstock production

SOCIAL

9. Allocation and tenure of land for new bioenergy production
10. Price and supply of a national food basket
11. Change in income
12. Jobs in the bioenergy sector
13. Change in unpaid time spent by women and children collecting biomass
14. Bioenergy used to expand access to modern energy services
15. Change in mortality and burden of disease attributable to indoor smoke
16. Incidence of occupational injury, illness and fatalities

ECONOMIC

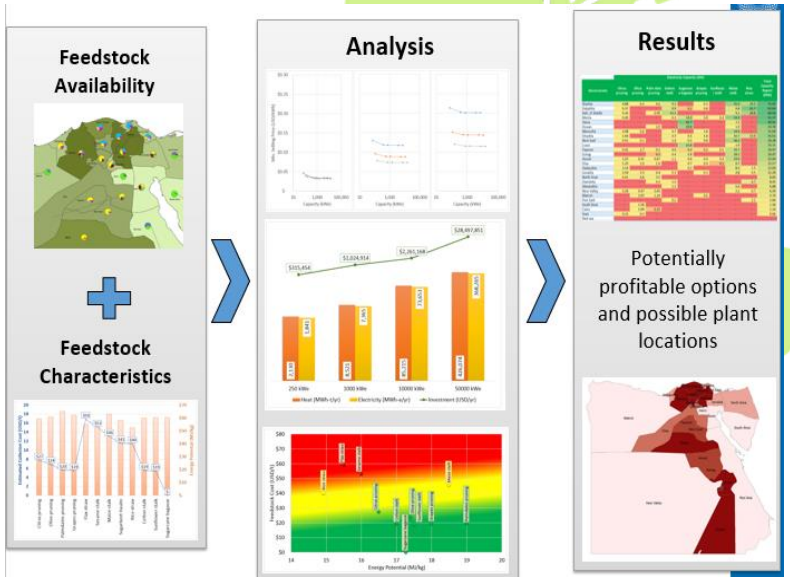
17. Productivity
18. Net energy balance
19. Gross value added
20. Change in consumption of fossil fuels and traditional use of biomass
21. Training and re-qualification of the workforce
22. Energy diversity
23. Infrastructure and logistics for distribution of bioenergy
24. Capacity and flexibility of use of bioenergy

GBEP Sustainability Indicators (fao.org)

Food and Agriculture Organization of the United Nations

Bioenergy potential assessment in Rwanda

Ex ante evaluation of biomass-based pathways for production of cooking fuels and electricity – biomass needs, uses and energy characteristics



Bioenergy Potential Assessment (BEFS)
Potential bioenergy from residues for electricity and clean cooking fuels

Detailed assessment of biogas for clean cooking:
The analysis shows that a detailed understanding of the manure production rates, water access rates, livestock numbers and management practices, and household cooking energy demand is required to further strengthen the biogas programme in the country.

Bottlenecks for biogas – number and spread of livestock (should be complemented with other feedstocks); and lack of integration of household energy needs into planning and programming.

Food and Agriculture Organization of the United Nations

FAO

GBEP assessment of biogas in Viet Nam

Multiple benefits of biogas at household level:

- Reduced household expenditures on energy (ind. 11)
- Increased access to modern energy services (ind. 14)
- Reduced time spent collecting fuelwood (ind. 13)
- Reduced exposure to indoor air pollution and to the related health risks (ind. 15)

Bottlenecks for biogas – lack of capacity leads to poor management and inefficiency; and lack of capital limits power generation from biogas.

Ex post evaluation of biogas systems in households and livestock farms

GBEP Capacity Building Group on Biogas in 2024…

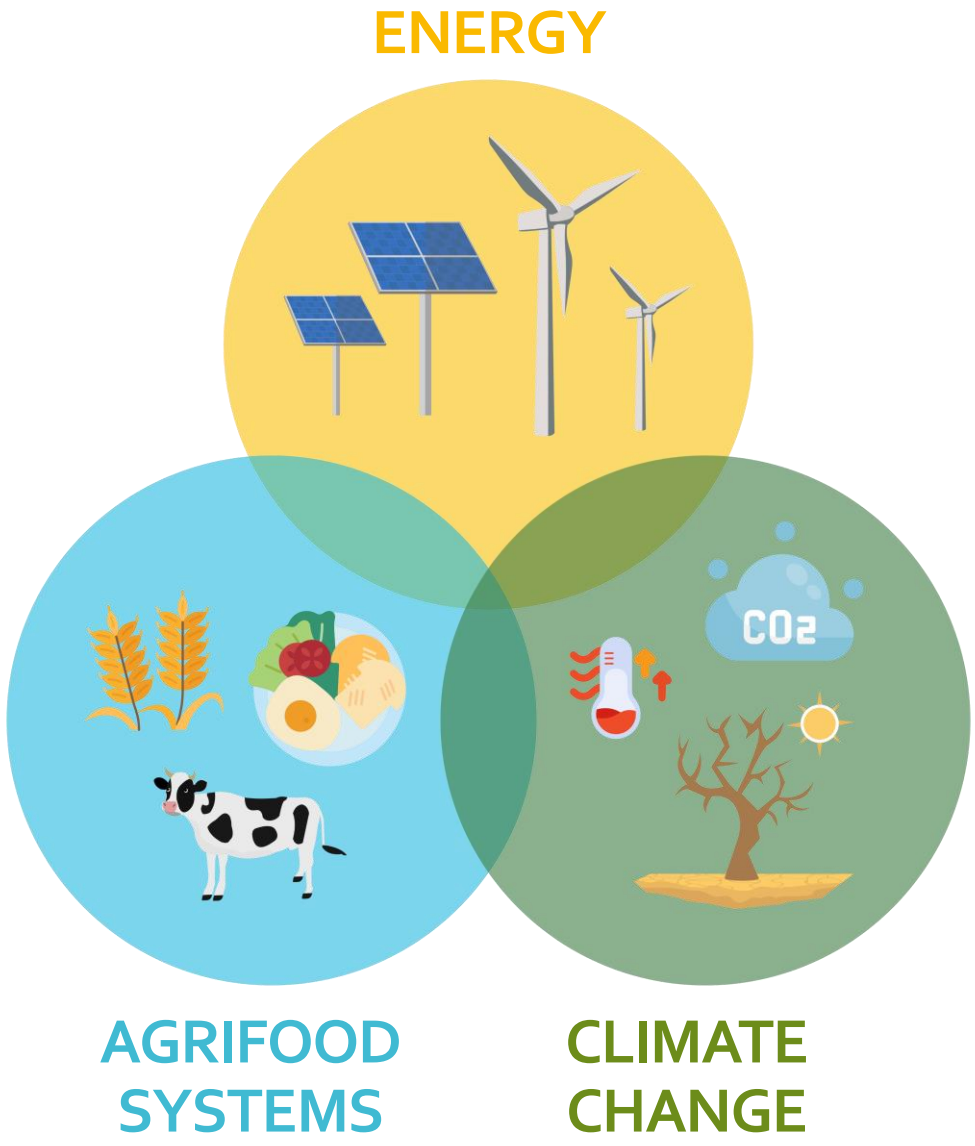
- White paper on Policies and Strategies for biogenic CCU in biogas systems
- Training on biogenic CCUS in biogas systems
- Webinars

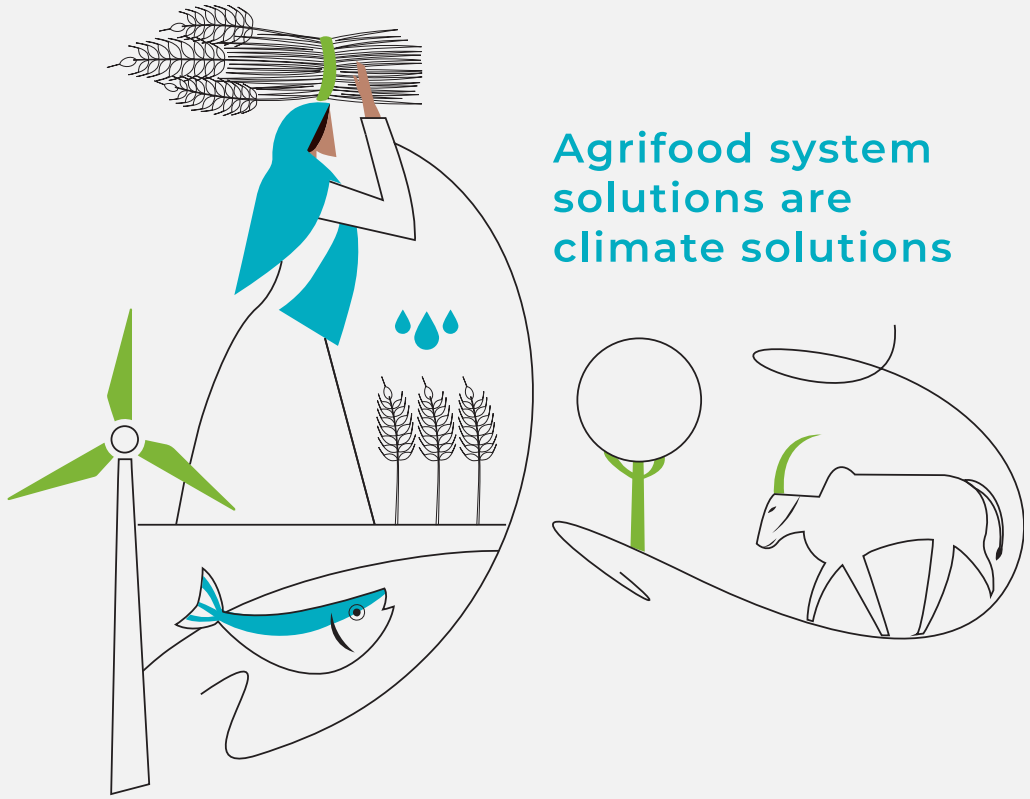
What has experience showed us?

- Biogas systems can have many benefits beyond energy production – contribute to circular economy and sustainable development

BUT

- Biogas is not a one-size-fits-all solution
- Scientific assessments that produce accurate data are key for effective planning and policy
- In turn, appropriate enabling environments are essential for stimulating investments





Agrifood system solutions are climate solutions

THANKYOU

OFFICE OF CLIMATE CHANGE, BIODIVERSITY AND ENVIRONMENT (OCBD)

www.fao.org/climatechange

FAO

Morning plenary

The future of agriculture, today. Resilience, Sustainability and Food Security

Gaëlle Marion

Head of Unit for Environmental Sustainability, DG AGRI

European Commission

EUROPEAN BIOMETHANE WEEK

European Biogas Conference 2024
“The future of agriculture, today. Resilience, Sustainability and Food Security”

Gaëlle Marion – Head of Unit AGRI B.2
Environmental sustainability

23/10/2024

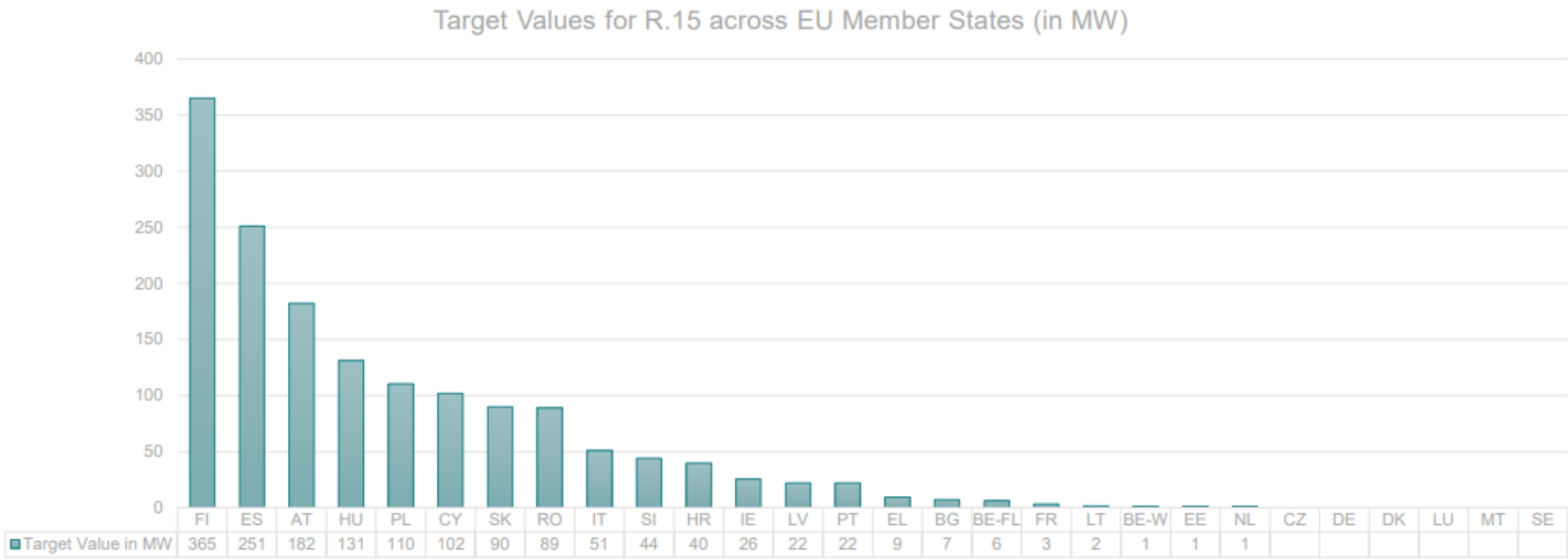
Current and future events

- Strategic dialogue on the Future of Agriculture
- Mission letter Commissioner designate
  - **Vision for Agriculture and Food** → first 100 days
  - **New approach to deliver on sustainability** to support farmers in **decarbonisation** and preserving biodiversity.
  - Strengthen farmers' position in the value chain
- Future CAP (post 2027)
- Update bioeconomy strategy (by the end of 2025)

Decarbonisation agriculture & role biogas in CAP

- Biomethane – 35 bcm annually by 2030
- Bioenergy makes up 60% of the renewable energy in the EU
- Strategic objectives CAP → bioeconomy/bioenergy + sustainable prod. RE
- Scale up RE without undermining food production and avoid impacts on land-use → focus on organic waste and forest-agricultural residues

Biogas projections in CSPs



EU target of all CAP-Plans 2023 - 2027: production capacity of almost **1.560 MW**

European Commission

Conclusions – further reflections

- CAP is not the only support instrument to push forward renewable energy production.
- The potential of rural areas to contribute to the energy transition remains.
- Renewable energy production and agricultural activities have the potential for a mutually beneficial relationship.
- Competition/trade-offs with other land-uses/food production -> scale up the production of renewable energy without undermining food production.

Thank you

European Commission

Morning plenary

The future of agriculture, today. Resilience, Sustainability and Food Security

Diana Lenzi

President

Farming for Future Foundation

EUROPEAN BIOMETHANE WEEK

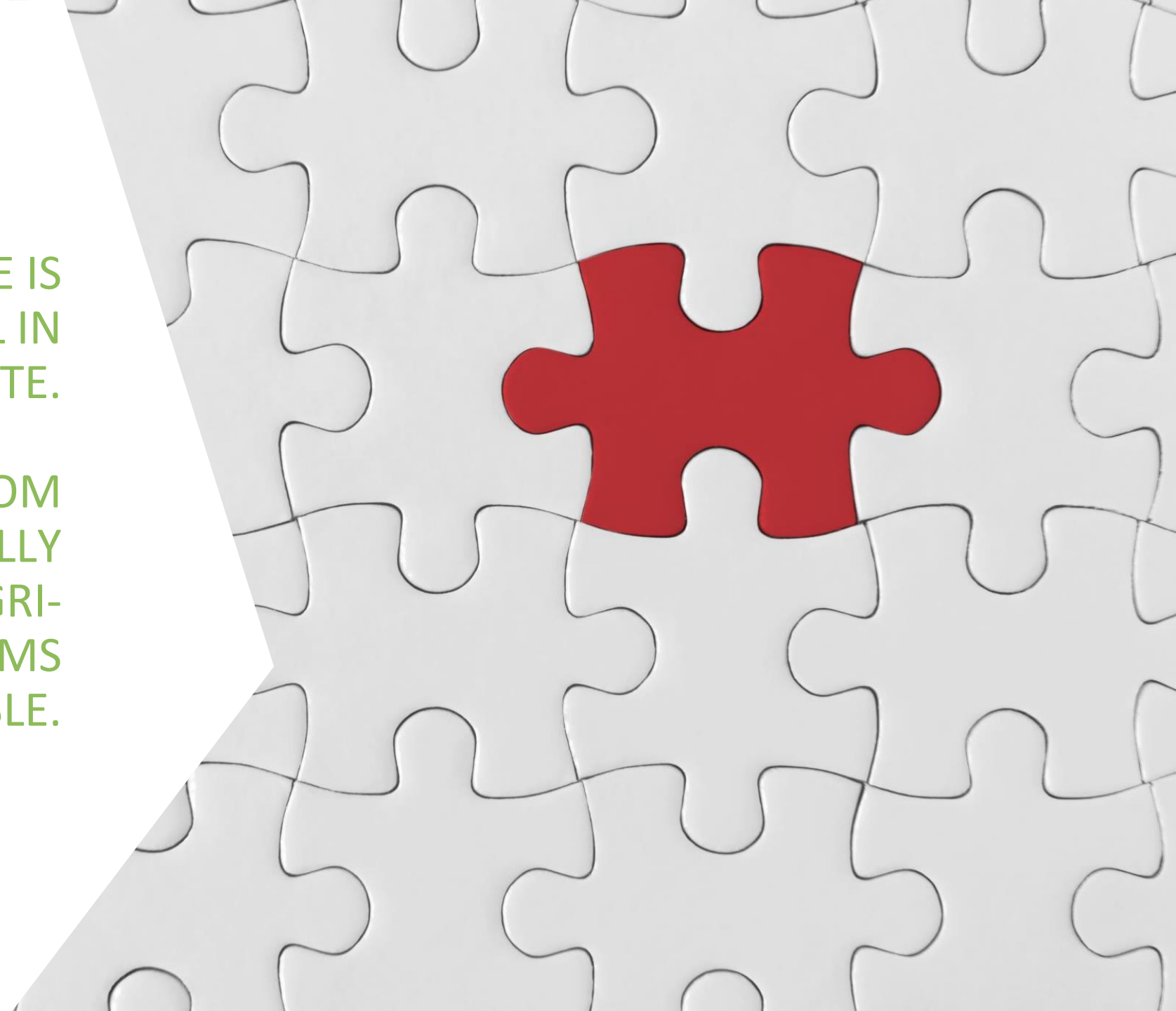
FARMING FOR FUTURE FOUNDATION

FILLING THE MISSING PIECE BETWEEN FARMING SYSTEMS, CIVIL SOCIETY AND POLICY MAKERS

President Diana Lenzi
23rd October 2024

AGRICULTURE IS EVERMORE CENTRAL IN THE EU POLITCAL DEBATE.

STILL WE SEEM FAR FROM NAILING WHAT IS REALLY NEEDED TO MAKE AGRI-FOOD SYSTEMS SUSTAINABLE.



FARMING FOR FUTURE FOUNDATION

FARMING FOR FUTURE: 10 ACTIONS to ensure Sustainable food, feed and energy

1. ENERGIE RINNOVABILI IN AGRICOLTURA

SOSTITUIRE I COMBUSTIBILI FOSSILI CON FONTI DI ENERGIA RINNOVABILE PER RIDURRE L'INQUINAMENTO E LE EMISSIONI

2. AZIENDA AGRICOLA 4.0

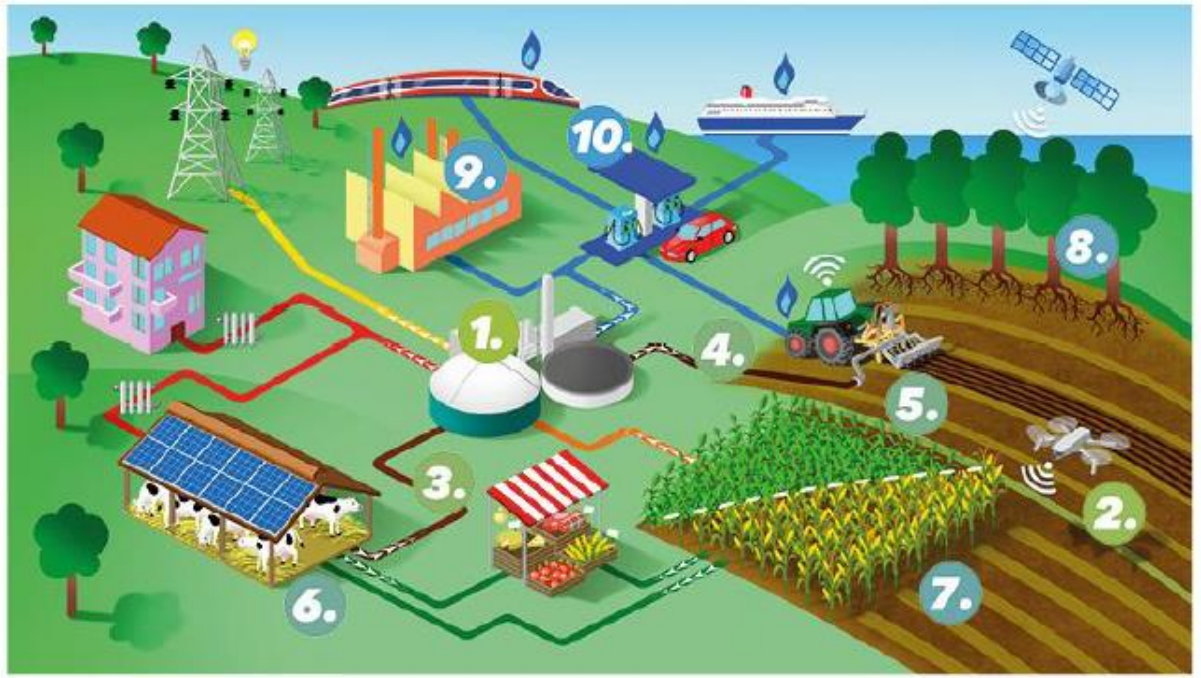
ADOTTARE TECNICHE DI AGRICOLTURA E ZOOTECNIA AVANZATE PER CALIBRARE LE RISORSE NECESSARIE ALLE COLTURE E ALLEVAMENTI

3. GESTIONE DEGLI EFFLUENTI D'ALLEVAMENTO

IMPIEGARE EFFLUENTI ZOOTECNICI E SCARTI AGRICOLI NELLA DIGESTIONE ANAEROBICA PER RIDURRE LE EMISSIONI E PRODURRE BIOENERGIE RINNOVABILI

4. FERTILIZZAZIONE ORGANICA

UTILIZZARE FERTILIZZANTE ORGANICO (DIGESTATO) PER RESTITUIRE NUTRIENTI AL SUOLO E RIDURRE L'USO DI FERTILIZZANTI CHIMICI



5. LAVORAZIONI AGRICOLE INNOVATIVE

ADOTTARE TECNICHE AVANZATE DI LAVORAZIONE DEL SUOLO E FERTILIZZAZIONE ORGANICA PER RIDURRE LE EMISSIONI DAI SUOLI

6. QUALITÀ E BENESSERE ANIMALE

IMPLEMENTARE TECNICHE AGRICOLE E ZOOTECNICHE DI ECCELLENZA PER MIGLIORARE LA QUALITÀ E IL BENESSERE DEGLI ALLEVAMENTI

10 BIOGAS E ALTRI GAS RINNOVABILI

PRODURRE METANO E IDROGENO RINNOVABILI DAL BIOGAS AGRICOLO

9. PRODUZIONE E USO DI BIOMATERIALI

SVILUPPARE E UTILIZZARE MATERIALI DI ORIGINE BIOLOGICA, NATURALI E RINNOVABILI

8. AGROFORESTAZIONE

INTEGRARE COLTIVAZIONI LEGNOSE NEI CAMPI COLTIVATI PER AUMENTARE LA FOTOSINTESI E LA SOSTANZA ORGANICA NEI SUOLI

7. INCREMENTO FERTILITÀ DEI SUOLI

ADOTTARE LE DOPPIE COLTURE PER INCREMENTARE LA CATTURA DELLA CO_2 E LA FERTILITÀ DEI SUOLI

FARMING FOR FUTURE FOUNDATION

THE FOUNDATION WANTS TO BE AN INNOVATIVE AND INCLUSIVE SPACE WHERE ALL ACTORS OF THE AGRIBUSINESS VALUE CHAIN CAN CO-CREATE, PROMOTE AND SCALE FARMING SYSTEMS THAT DELIVER SUSTAINABLE FOOD, FEED AND ENERGY

- Farmers
- Farms
- Agro-industry
- Agri-food value chain actors
- Researchers

OUR VALUES

- Scientific research and scientific evidence are crucial to properly address the challenges and opportunities embedded in the transition to more sustainable food systems.

- There is a perception gap between civil society/consumers, farmers/farms and policy makers/Institution. This needs to be breached if we want to build a more sustainable future for EU Agriculture.

- The key role of innovation and technological progress can only be fully appreciated if we manage to upskill and professionalize the agri-sector, in all its facets.

- Engagement with policy makers and stakeholders needs to be propositional, solution based and data supported.

FARMING FOR FUTURE FOUNDATION

OUR ACTIONS

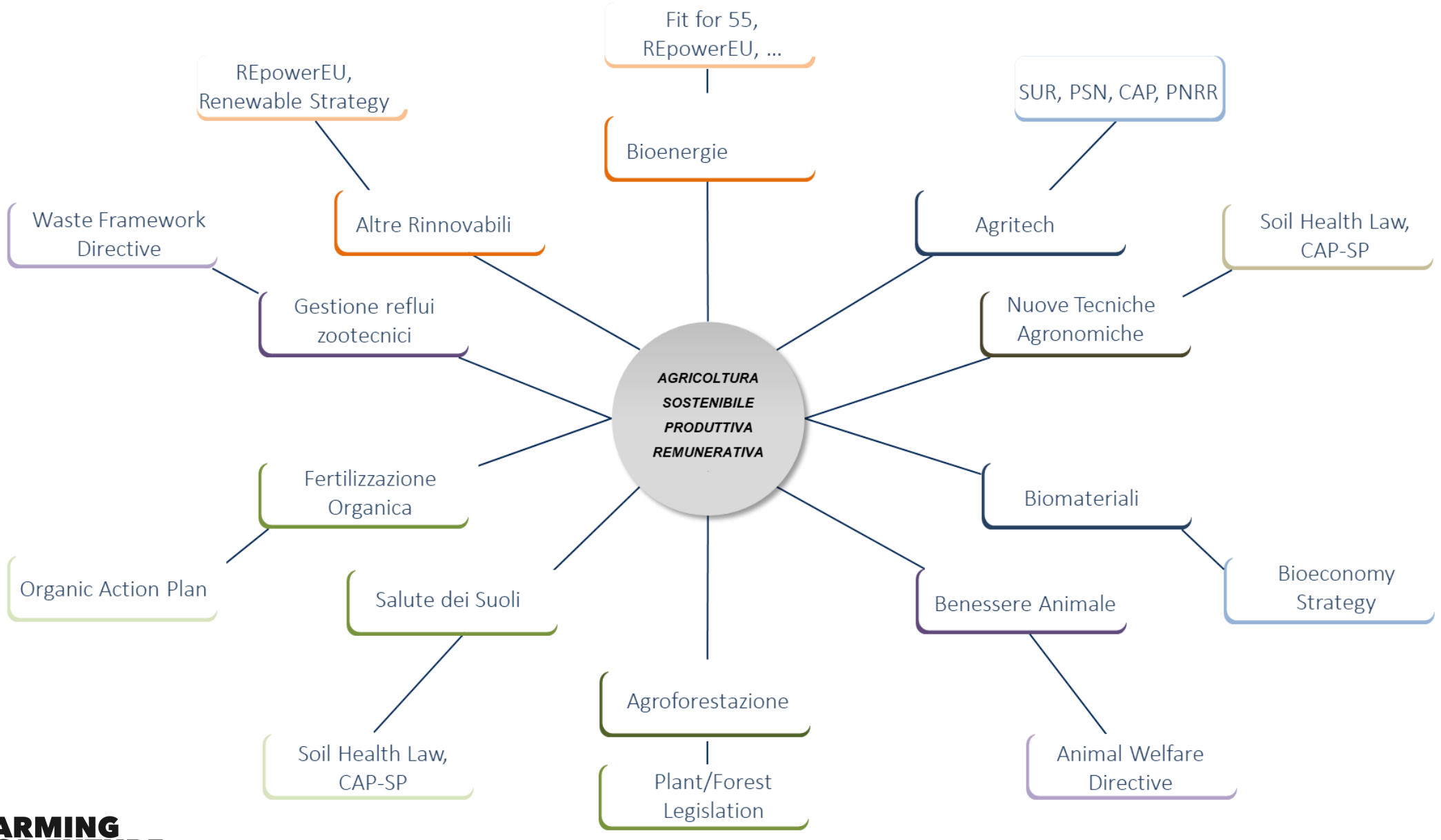
- Promote and finance research that is meaningful, applicable and helps investigate all the dimensions of sustainability.

- Promote strategic partnerships with all actors of the agri value-chain, upstream or downstream the primary production step.

- Breach the gap between farmers and civil society to regain a proper recognition of the societal role of farming and farmers, through a hands-on communication strategies.

- Advocate at all levels and all times for the values and actions of Farming for Future model, backing our proposals with science-based evidence, data and socio-economic relevance.

FARMING FOR FUTURE FOUNDATION



FARMING FOR FUTURE FOUNDATION

SDA Bocconi
SCHOOL OF MANAGEMENT

AGRI LAB
ROMEO ED ENRICA INVERNIZZI
AGRIBUSINESS RESEARCH
INITIATIVE

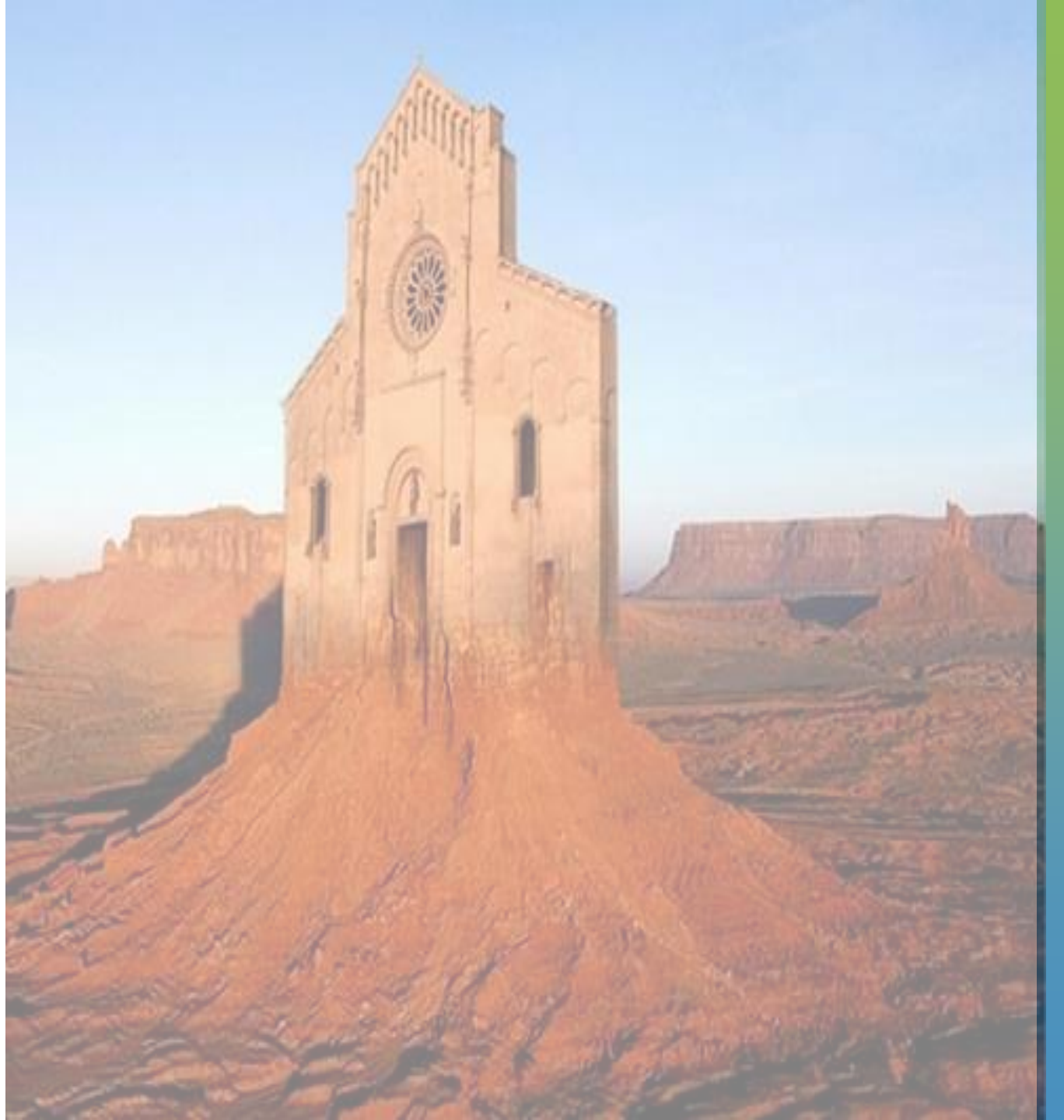
A horizontal research to investigate the VALUE of COMPLIANCE

Analyze the status quo in the use of DIGESTATE

Determine the policy limits or incentives

Evaluate the economic impact of regulation

Promote the adoption of better practices supported by better policies



FARMING FOR FUTURE FOUNDATION

Morning plenary

The future of agriculture, today. Resilience, Sustainability and Food Security

Laurence Molke

CEO

Cycle0

EUROPEAN BIOMETHANE WEEK

CycleØ

CycleØ Introduction

Laurence Molke, CEO.

Long-term value through **short-cycle** carbon – for farmers and their communities

CycleO

Our Story

2013

FNX is founded. Designs liquefaction plants.

2019

FNX moves exclusively into renewable natural gas, focusing on biomethane.

2021

Ara Partners, a leading PE firm focused on industrial decarbonisation, supports FNX's transformation as an owner operator of biomethane plants.

2022

Ara Partners supports CycleØ to develop a pan-European biomethane production platform. FNX acquired by CycleØ, to bring tech & engineering expertise.

2023

CycleØ inaugurates its first integrated, greenfield biomethane project in Catalonia.

2024

CycleØ acquires Biogasclean, a leading global supplier of desulphurisation and biological methanation technology.

2025+

CycleØ rolls out ~50 plants across key target markets in Europe and LATAM providing renewable energy.

CycleØ

Creating value for farmers & rural communities.

A clean-ride on the carbon short cycle.

- Fossil fuels are long cycle carbon, a one-hit wonder
- Renewable energies such as renewable gas (biomethane) deliver an endless cycle of re-use.
- Comparable to the water used in hydro electric power – the source is not exhausted by use

Renewable molecule farming.

- Carbon based compounds derived from sustainable sources rather than fossil fuels
- These molecules are crucial for the energy transition and can be used as fuels, materials, and chemicals
- Supporting transport decarbonisation – e.g. data barns and marine fuel

Transforming waste into opportunity.

- New, long-term revenue by valorising waste feedstocks (livestock slurry and crop residues)
- Reduced fertilizer costs by replacement with digestate – rich, organic substitute
- Meeting environmental obligations by managing nitrate use

Cycle0

Cycle0

Morning plenary

The future of agriculture, today. Resilience, Sustainability and Food Security

Francesca Magnolo

Researcher

Feedback EU

EUROPEAN BIOMETHANE WEEK

Challenging dominant assumptions on scaling-up biomethane from manure

FEED BACK EU

Francesca Magnolo

23rd October 2024

European Biogas Conference

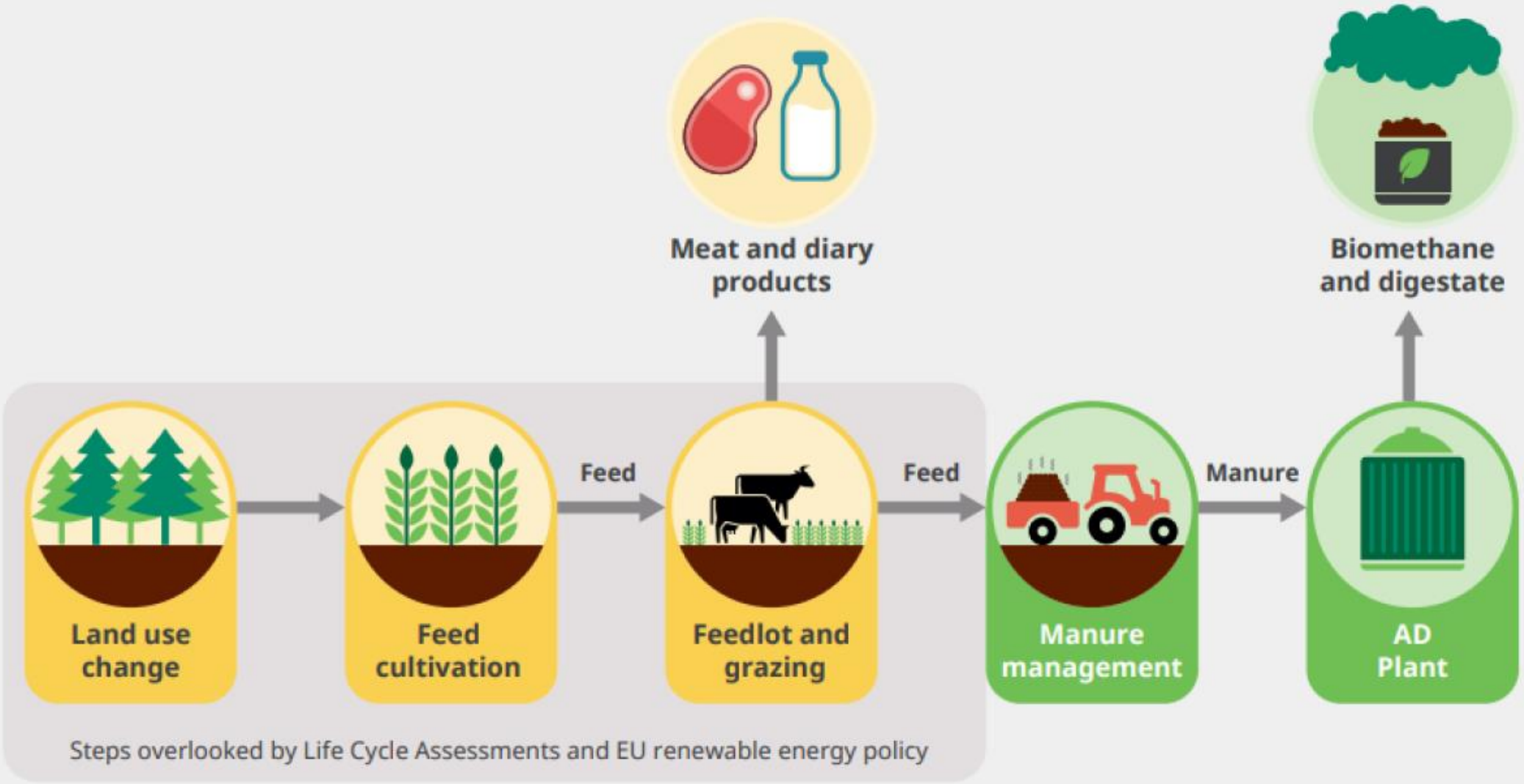
Do you consider manure
as a **waste**
or
as a **by-product** of animal farming
operations?

Waste: *"any substance or object which the holder discards or intends or is required to discard"*

<u>unless:</u>

- the further use of the substance is certain
- capable of being used without any further processing
- is produced as an integral part of a production process
- its reuse must comply with regulations, ensuring no harmful effects

Credit: Schauhi, Pixabay



in the RED, manure is a **waste** with 0 **environmental burden until its collection** (Annex V,VI,IX)

Emissions reductions?

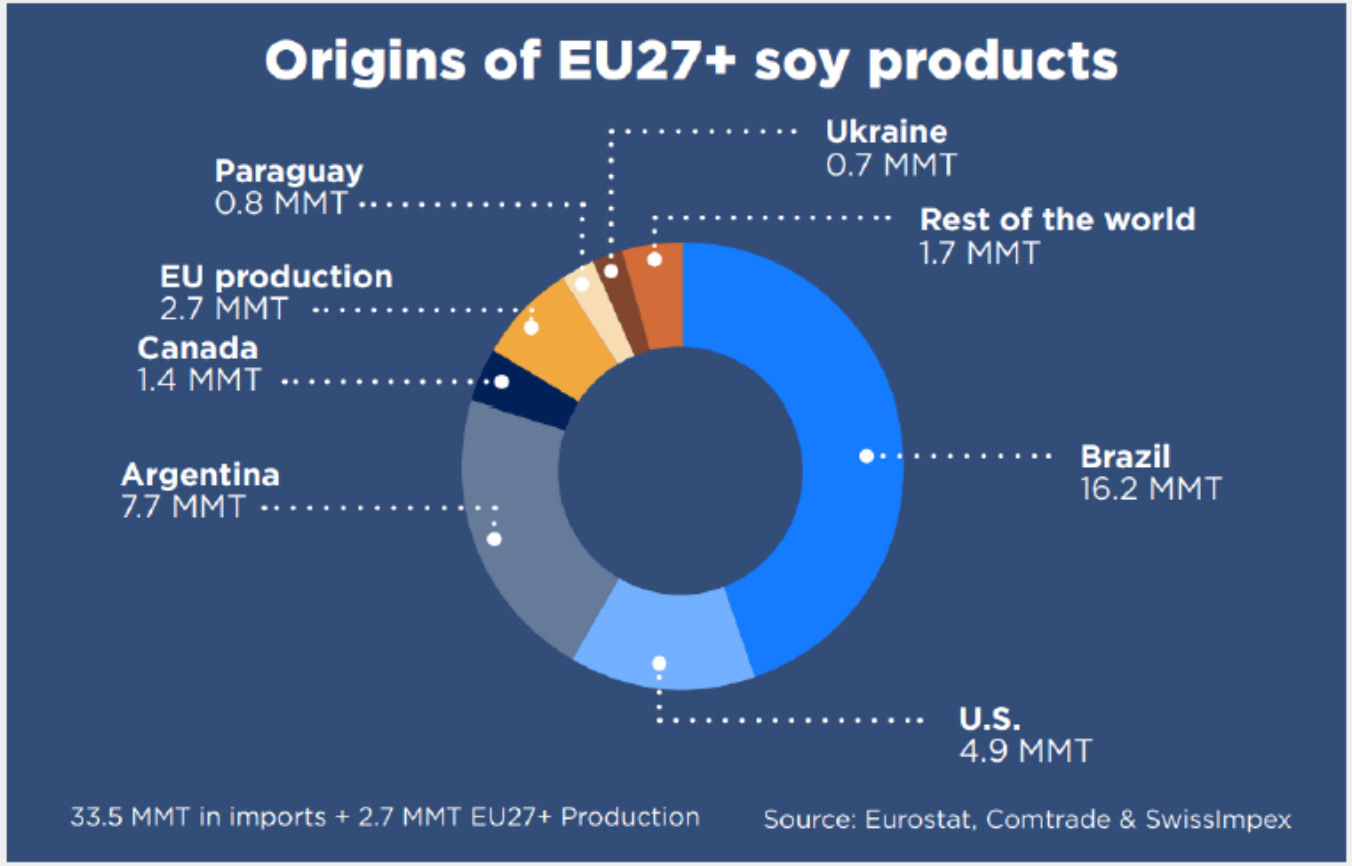
- EU emissions from agriculture (EEA, 2023): 17% manure management and 48% enteric fermentation
- Highest environmental impacts associated to manure production is feed cultivation (Cherubini et al. 2015)
- A survey of LCA experts shows that 65% would consider manure as a by-product (Kyttä et al., 2022)

- IEA is giving the dangerous message that biogas can allow the expansion of industrial livestock farming without additional impacts (IEA Bioenergy, 2020)
- Current figures used for manure potential (2023-2035): - 0,6% beef and pigmeat, +0,4% poultry
- **Herd size increases** the U.S. - case studies with 3.7% growth year-on-year: biogas upscale as strategy for methane reduction by the Biden Administration (FoE 2024)

! Emission reductions of the livestock sector in line with the Paris Agreement:
- **50%** in 2030 and - **61%** in 2036 (Harwatt et al., 2024)

FEED BACK EU

EU strategic autonomy and food security?



(IDH European Soy Monitor 2024)

- 72 % import of protein-rich animal feed (FEFAC, 2023)
- 36% of agricultural imports from Russia are protein-rich animal feed (DG AGRI 2023)
- Major contributors for imports of primary crops: Brazil, Ivory Coast, Ukraine, Australia, Canada, and US (JRC, 2024)
- 67% of crops in EU used as livestock feed

Upscaling biomethane from manure

1) Not reducing emissions and ILUC, just hiding them

2) Animal feeds become the new energy crops

3) Replacing a natural gas dependency with an animal feed dependency

Major policy inconsistencies

- EU nature restoration law
- Regulation on Deforestation-free Products
- EU protein strategy
- Corporate Sustainability Reporting Directive
- Corporate Sustainability Due Diligence

Recommendations

- **End incentives** to manure as biomethane feedstock: remove animal manure from RED Annex IX and emission bonus -54CO2eq/ton manure
- **Reclassify manure as by-product** and revise RED emissions accounting methodology
- **Moratorium on new or expanded factory farms**, including those with biogas and biomethane plants

Thank you for your attention!

Bibliography

(for more email me! fc.magnolo@hotmail.it)

EEA 2023: Greenhouse gas emissions from agriculture in Europe

IEA Bioenergy 2020: Potential and utilization of manure to generate biogas in seven countries

FEFAC 2023: Feed and food

DG AGRI 2023: Agri-food statistical factsheet EU-Russia

JRC 2024: EU land use footprint: modelling the land needed for EU consumption

EU Commission 2024: Protein supply and demand

FoE & SRAP 2024: Biogas or Bull****

Q&A Session

The future of agriculture, today. Resilience, Sustainability and Food Security

Connie Miller

Food and Agriculture Organization

Gaëlle Marion

DG AGRI , European Commission

Diana Lenzi

Farming for Future Foundation

Laurence Molke

Cycle0

Francesca Magnolo

Feedback EU

EUROPEAN BIOMETHANE WEEK

Visual summary of the plenary

EUROPEAN BIOMETHANE WEEK

EBA AWARDS

FINALISTS ANNOUNCEMENT

EUROPEAN BIOMETHANE WEEK

EBA AWARDS
FINALISTS ANNOUNCEMENT

Green Horizon Narrator Award

Safety First Award

Biogas Problem Solver Award

Women Trailblazer Award

EUROPEAN BIOMETHANE WEEK

Green Horizon Narrator Award

Finalists

Consorzio Italiano Biogas

Renera

EUROPEAN BIOMETHANE WEEK

Safety First Award

Finalists

Schulungsverbund BIOGAS

German Biogas Training Network

PRODEVAL
RNG PROCESS TECHNOLOGIES

Prodeval

EUROPEAN BIOMETHANE WEEK

Biogas Problem-Solver Award

Finalists

CPL/Puragen Activated Carbons

Agriportance

Women Trailblazer Award

Finalists

Miriam Weissroth

Anita Bednarek

EUROPEAN BIOMETHANE WEEK

EBA AWARDS
FINALISTS ANNOUNCEMENT

Green Horizon Narrator Award

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Women Trailblazer Award

EUROPEAN BIOMETHANE WEEK

EUROPEAN BIOGAS CONFERENCE

23 - 24 OCTOBER 2024

EUROPEAN BIOMETHANE WEEK

With the support of

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BIP Europe
Biomethane Industrial Partnership

Parallel breakout

Inclusive biogas: with the communities for the communities

Moderated by Sasha Twining

Frank Siebern-Thomas

European Commission

Roozbeh Feiz

Biogas Research Centre, University of Linköping

Sabine Täuber

European Federation of Agencies and Regions for Energy and Environment

Jeroen Callewaert

Desotec

Serena Vanzetti

Cooperativa Speranza

Denis Bonvillain

Veolia

EUROPEAN BIOMETHANE WEEK

Parallel breakout

Inclusive biogas: with the communities for the communities

Frank Siebern-Thomas

Head of Unit of Fair, Green, and Digital Transitions
DG Employment, European Commission

EUROPEAN BIOMETHANE WEEK

European Biomethane Week

European Biogas Conference 2024: Breakout session 1
– EU Just Transition policy framework & whole-of-society approach –

Brussels, 23 October 2024

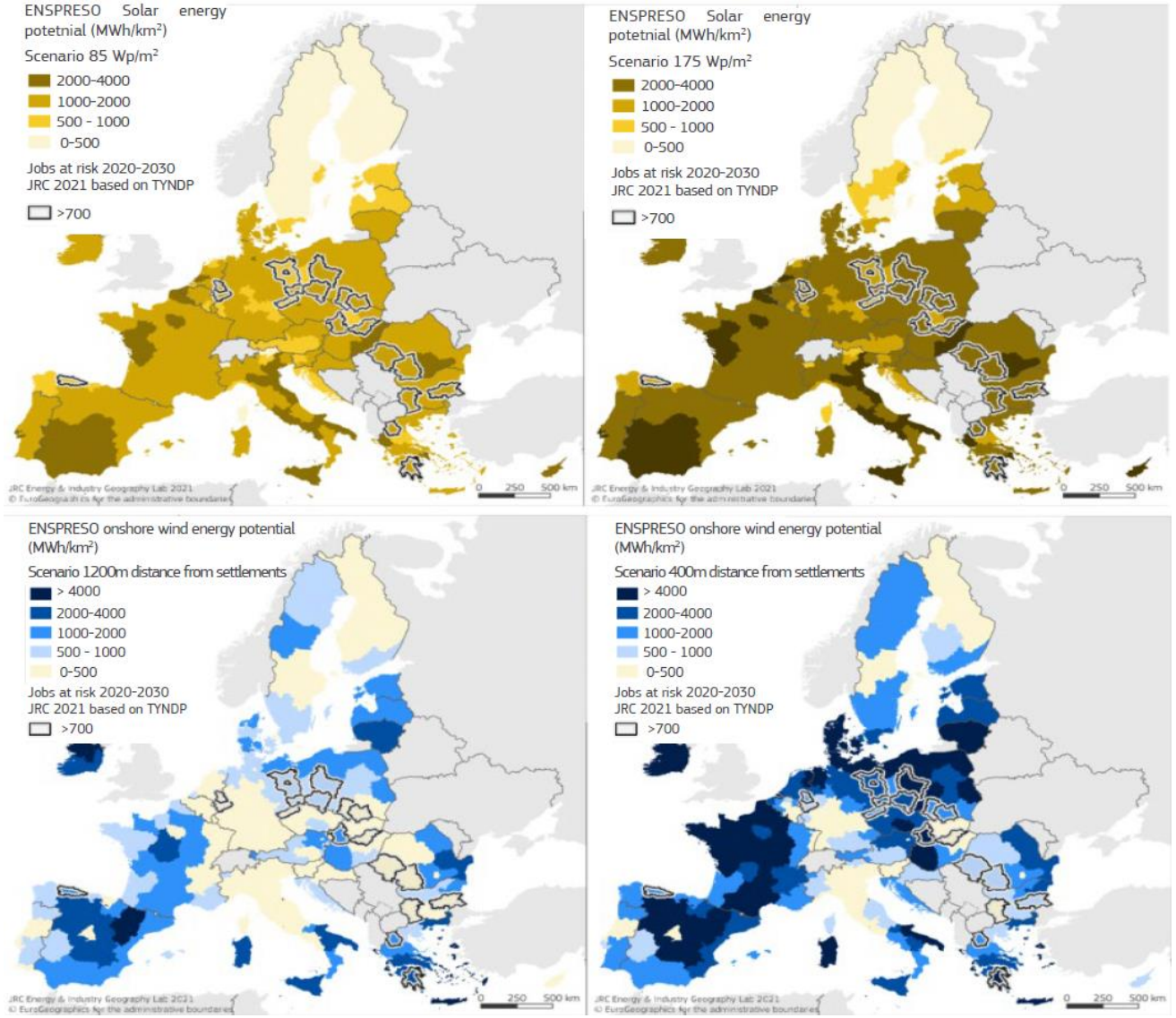
Frank Siebern-Thomas
Fair Green and Digital Transitions, Research
DG Employment, Social Affairs and Inclusion

Job creation opportunities and labour market transitions

uneven impacts - territorial and sectoral dimensions

Jobs at risk vs. potential of renewable energy production

Jobs in renewable energy sectors



Source: JRC(2021), The future of jobs is green

European Commission

How do Europeans see the green transition?

Expectations, opportunities and concerns vs. signs of backlash

The green transition **should not leave anyone behind**

93% think the **current level of energy prices** for people in their country is a **serious problem**

Feel a **personal responsibility to act** to limit climate change

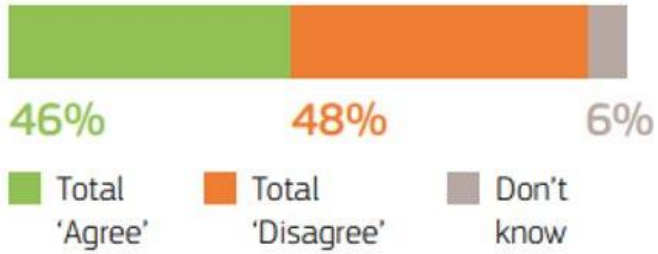
61% think that policies to tackle climate change will **create good quality jobs** (in terms of earnings, job security and quality of the working environment)

57% think that policies to fight climate change will **create more new jobs than they will remove**

Total 'Agree' Total 'Disagree' Don't know

Should **personally do more than what they are doing** to contribute regardless of what others do

46% agree to consider they are confident that by 2050 sustainable energy, products and services **will be affordable** for everyone, including poorer people

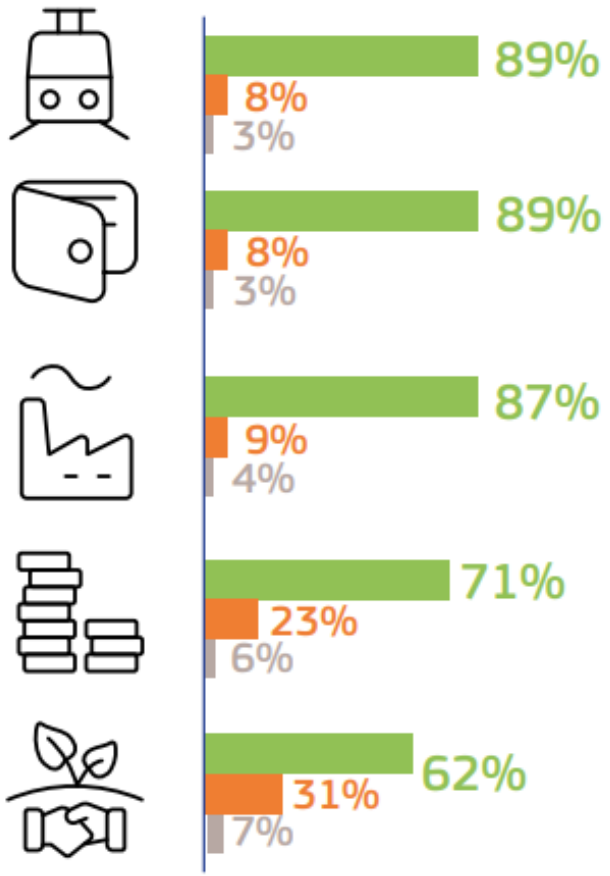


How do Europeans see the green transition?

Support for political action

Support for policy actions to advance a fair green transition

Total 'In favour'
Total 'Opposed'
Don't know



European Commission

EU Just Transition policy framework - where do we stand?

EU just transition policy framework

Strategies, policies and targets

- ✓ European Green Deal (European Climate Law, 2040 Climate Target Plan)
- ✓ European Pillar of Social Rights and Pillar Action Plan
- ✓ European Skills Agenda and Skills Pact; Action Plan for tackling skill and labour shortages
- ✓ EU industrial policy, incl. Net-Zero Industry Act

Guidance and Monitoring

- ✓ **Council Recommendations on ensuring fair transition towards climate neutrality** and on strengthening social dialogue in the EU; sec(toral social dialogue; green collective bargaining
- ✓ Policy mainstreaming and fair transition analysis in **European Semester**
- ✓ Updated **National Energy and Climate Plans** and
- ✓ Commission Recommendation on energy poverty

Financial support

- ✓ Just Transition Mechanism/Fund
- ✓ Social Climate Fund
- ✓ Recovery and Resilience Fund
- ✓ European Social Fund +
- ✓ …

European Commission

EU just transition policy framework

Council Recommendation on a fair transition towards climate neutrality

1. Policy packages for a fair green transition

a. Active support to quality employment
- Employment, job creation
- Working conditions
- Involvement, restructuring

b. Education, training, lifelong learning
- Strategies, partnerships
- Intelligence, cooperation
- VET, adult training

c. Fair tax-benefit systems, social protection
- Tax shift away from labour
- Social protection, well-designed income support
- Insurance solutions

d. Access to essential services, housing
- Energy investments, renovations, social housing
- Mobility and transport
- Consumption (nutrition)

2. Cross-cutting elements

a. Inclusive whole-of-society approach
- Coordinated policy-making, social partners, civil society, regional and local authorities, public services

b. Evidence-based approach
- Definitions, concepts and methodologies; ex-ante & ex-post impact assessments; R&I; public exchanges

3. Funding

Optimal use of public and private funding
- EU-level instruments and funding options (e.g. Recovery and Resilience Facility, Cohesion Policy funds, Just Transition Mechanism, InvestEU, ERASMUS+, EGF, LIFE, etc.)
- Commit and deploy adequate national resources; share best practices among Member States

Implementation by the Member States and monitoring in the context of the **European Semester**

1st progress review in October 2023 in EMCO and SPC; **key messages adopted by EPSCO** in November 2023

Dialogues with social partners and civil society organisations**; 2nd progress review** in 2025

- Fully **exploit benefits** and opportunities associated with the green transition
- **Fairly spread the costs** of tackling and adapting to climate change.

European Commission

Monitoring the implementation by Member States

EPSCO key messages (November 2023)

Most Member States make **use of existing structures** to address the transition challenges, without comprehensive implementation strategy.

Scope for a **more systematic, coherent and targeted approach**

Need for more **systematic involvement of social partners** and civil society actors

Need for better evidence base and a **common understanding** of fair transition concepts and policies, incl. green jobs, employment in the green economy, transport poverty, ...

Need to accelerate **re- and up-skilling** in the transition, incl. through adult education & training**.**

Country-specific **examples & best practices**: Strategy (Spain), transition councils (AT, DE), systematic distributional impact assessment (NL) , dedicated labour inspections (PL), …

European Fair Transition Observatory - Quality Jobs Framework - …

European Commission

Discussion

Frank.Siebern@ec.europa.eu
EMPL-Green-Deal@ec.europa.eu

https://ec.europa.eu/commission/presscorner/detail/en/ip_21_6795
https://www.consilium.europa.eu/en/press/press-releases/2022/06/16/council-takes-action-to-ensure-green-transition-is-fair-and-inclusive

European Commission

Parallel breakout

Inclusive biogas: with the communities for the communities

Roozbeh Feiz

Associate professor

Biogas Research Centre, University of Linköping, Sweden

EUROPEAN BIOMETHANE WEEK

European Biomethane Week: European Biogas Conference 2024
Breakout Session 1 – Inclusive biogas: with the communities for the communities

What kind of biogas system do we want? A multi-valorisation perspective

Roozbeh Feiz

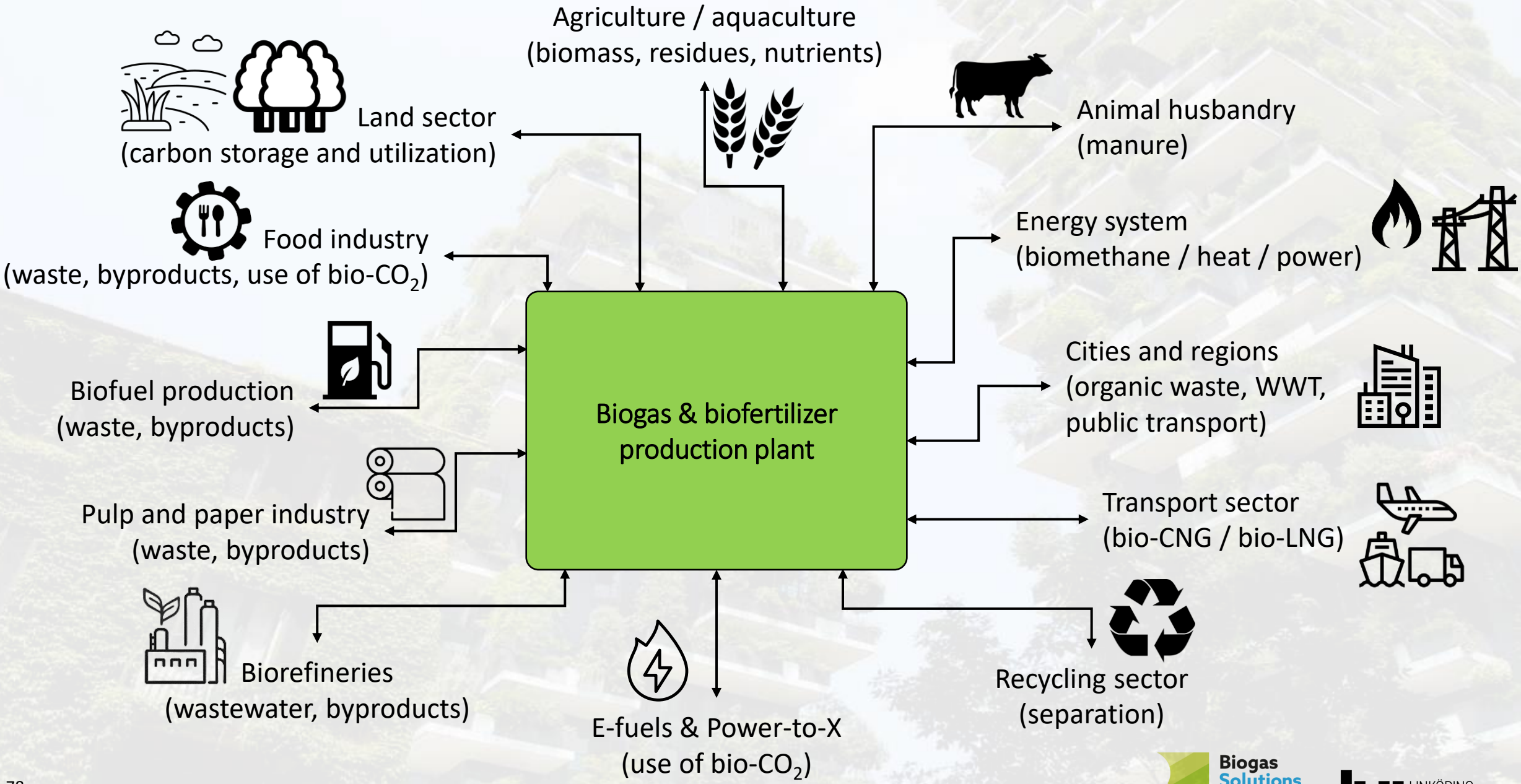
Associate professor (docent)

October 23th, 2024

Biogas Solutions Research Center

LINKÖPING UNIVERSITY

AD supports system building through synergies



Biogas Solutions Research Center

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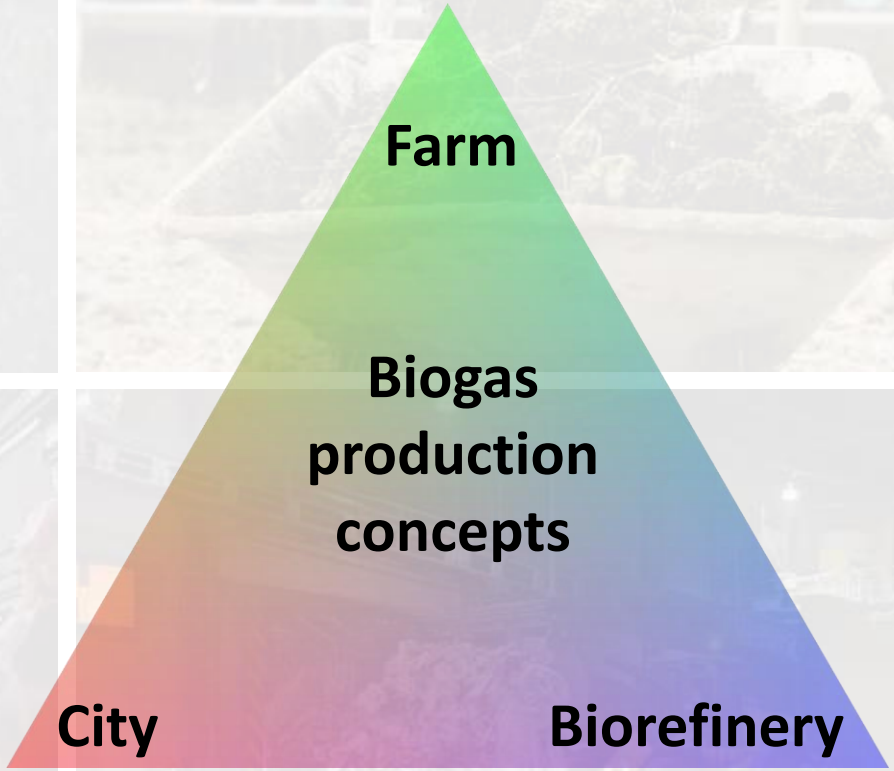
More biomass, strengthen soil health and fertility through intermediate crops, use biofertilizer, reduce imbalances in nutrient distribution:
Biogas done right, carbon farming, …



Wastewater treatment, waste management, transport and nutrient recycling:
Nordic Biogas Model

Increased valorisation and diversity of products, increase the competitive advantage of industries, remove bottlenecks for sustainable growth:
biorefineries, anaerobic biorefinery

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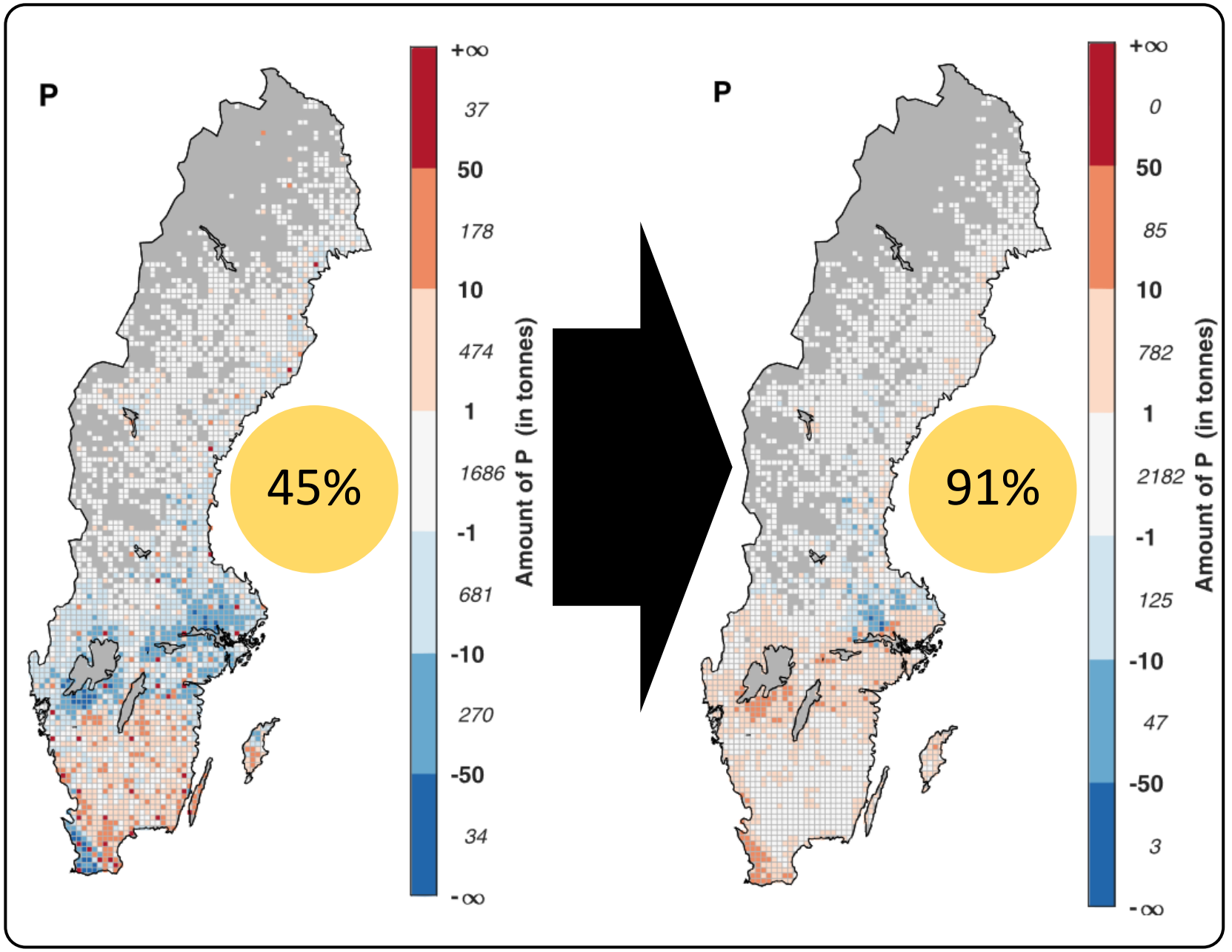
Biogas enables using nutrients efficiently

Biogas plants can serve as nodes for more efficient redistribution of the nutrients (example P).

Considering, local (5x5 km^2) fertilization with P, we could theoretically cover almost all of the P demand and 40 % of the N demand in Sweden.



Metson, G.S., Feiz, R., Quttineh, N.-H., Tonderski, K., 2021. Optimizing transport to maximize nutrient recycling and green energy recovery. Resources, Conservation & Recycling: X 100049. https://doi.org/10.1016/j.rcrx.2021.100049

Biogas Solutions Research Center

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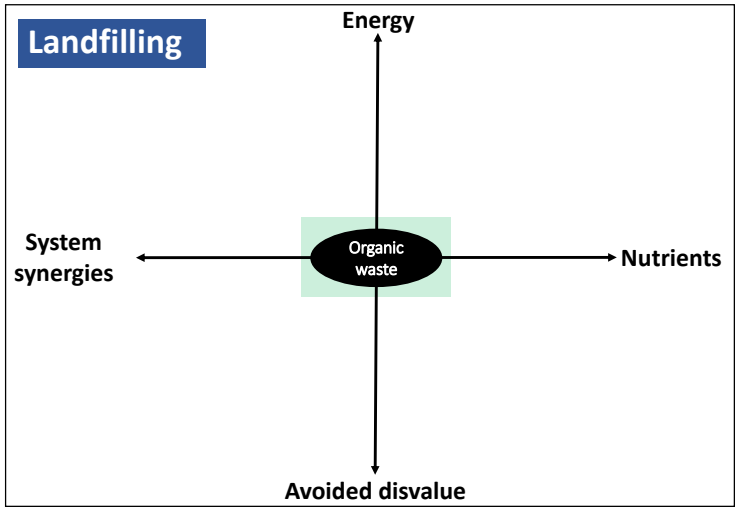

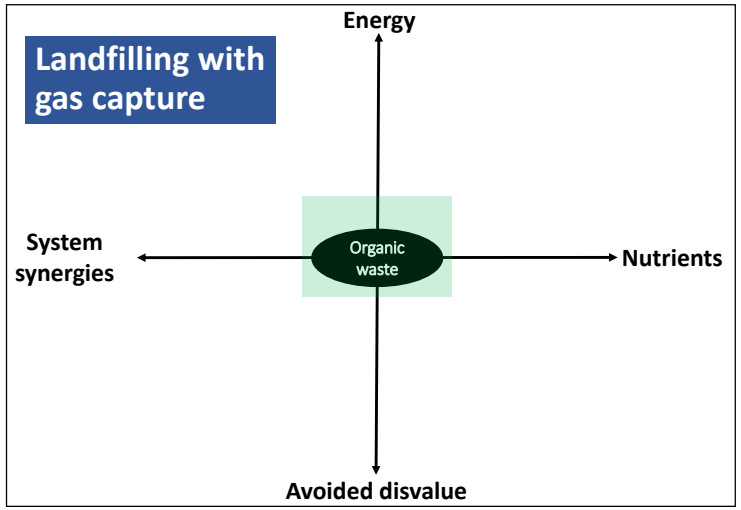

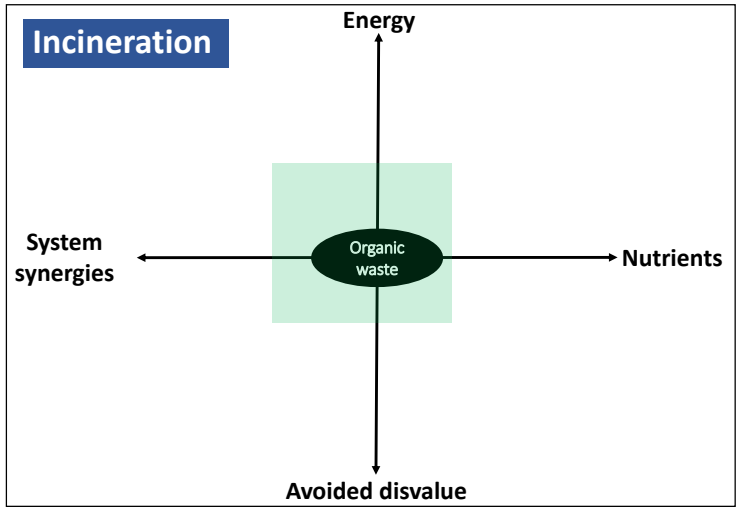

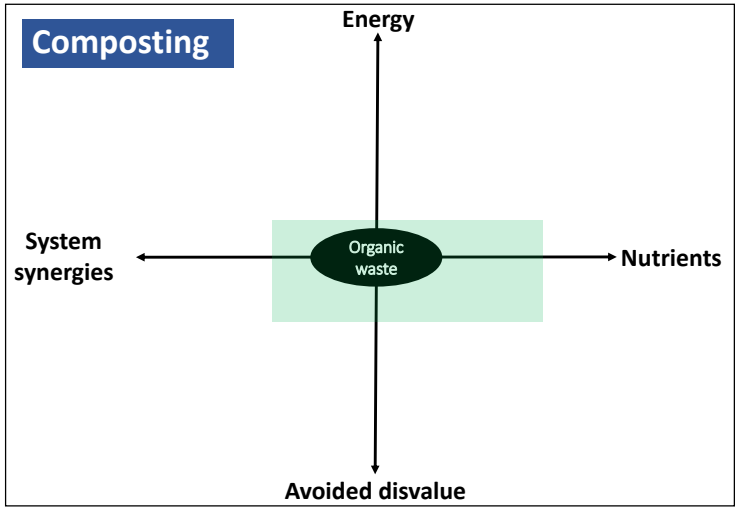

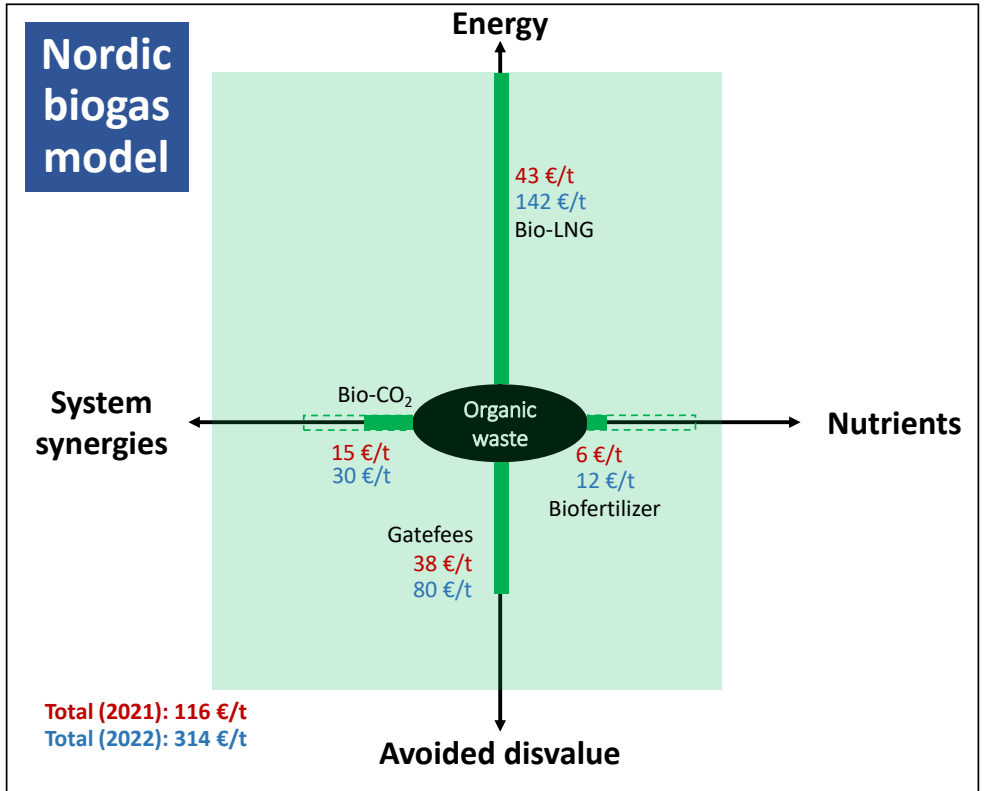

Biogas production can come with positive externalities for surrounding community!

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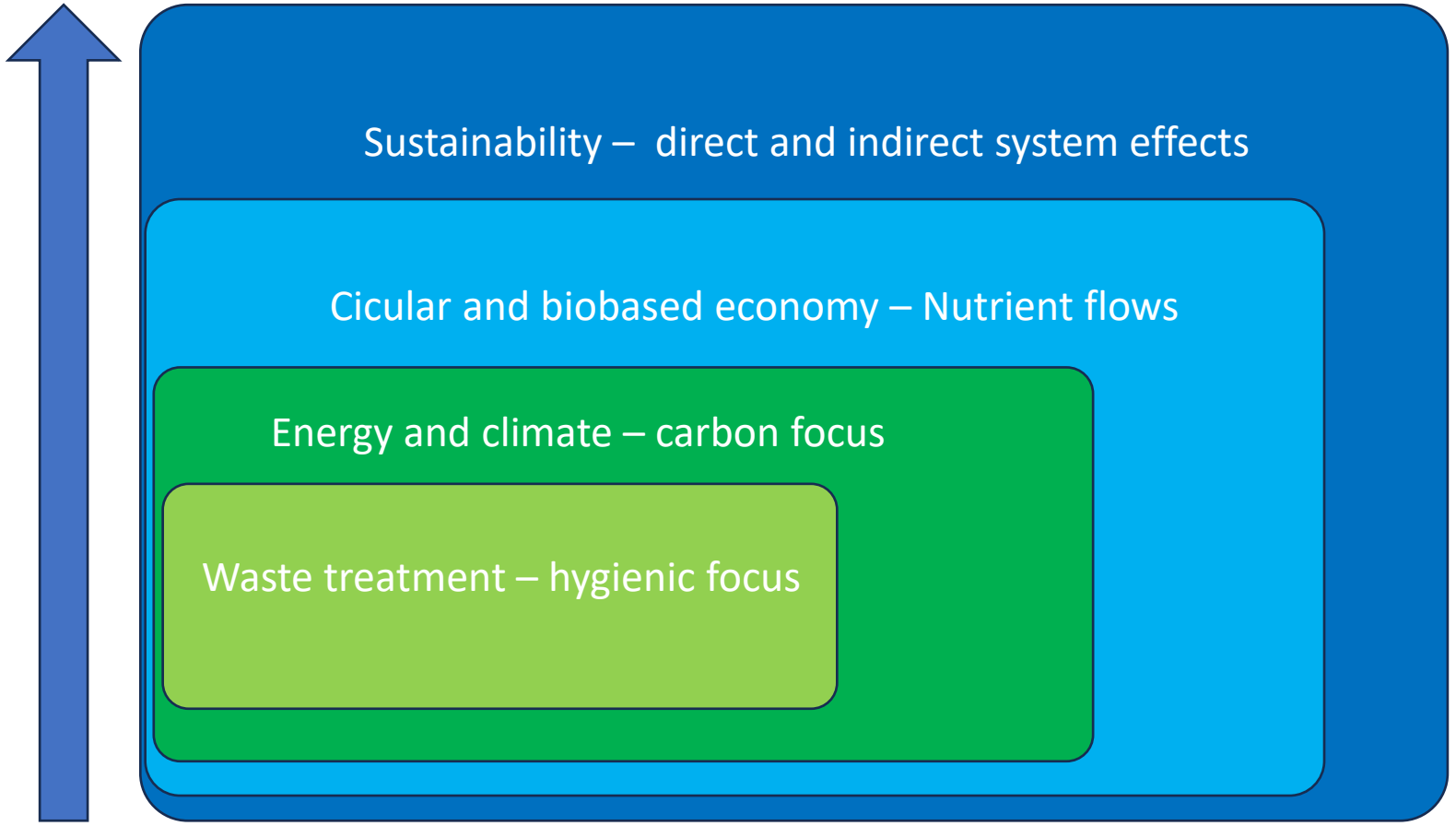
The changing framing and identity of biogas solutions



Here & Now!

Multi-valorization

Avoiding disvalue

System synergies

Positive externalities

Dynamic opportunities

Biogas Solutions Research Center

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Thank you for your attention!

roozbeh.feiz@liu.se

LINKÖPING UNIVERSITY

Biogas Solutions Research Center

Parallel breakout

Inclusive biogas: with the communities for the communities

Sabine Täuber

Project Leader

European Federation of Agencies and Regions for Energy and Environment (FEDARENE)

EUROPEAN BIOMETHANE WEEK

ENERGIKONTOR SYD

FEDARENE

Energy Agencies

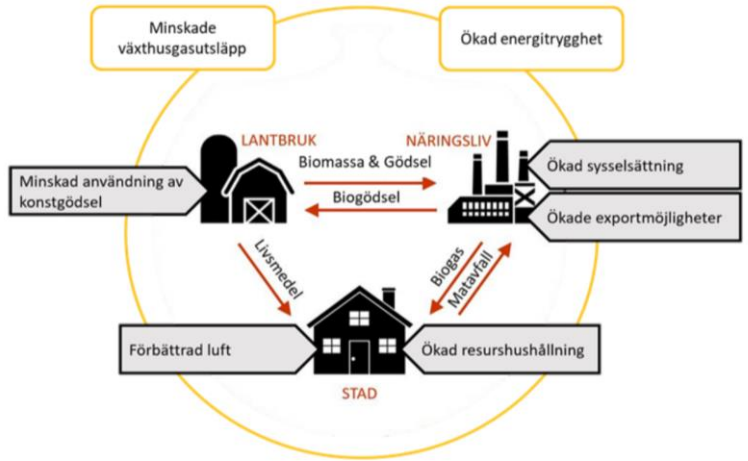
+ Biogas = 

ENERGIKONTOR SYD

FEDARENE

Socio-economic and environmental externalities of biogas are rather well studied (in Sweden)…

…on a general level



Figur 1: Illustrativ bild av nyttorna som värderas i rapporten.

Nimby for Biogas plants?

Experiences **Auvergne Rhone-Alpes** study ”Inclusive Biogas: With the Communities, for the Communities”

YES: in project phase for agricultural of local methanisations on non-isolated sites. 10-15% of projects have acceptability problems, fears: odours, traffic, property prices, risk of explosion

No/very low: for community units using sewage sludge, industrial units on their own site

No, one the biogas plats of whatever type is running

Experiences from **southern Sweden**

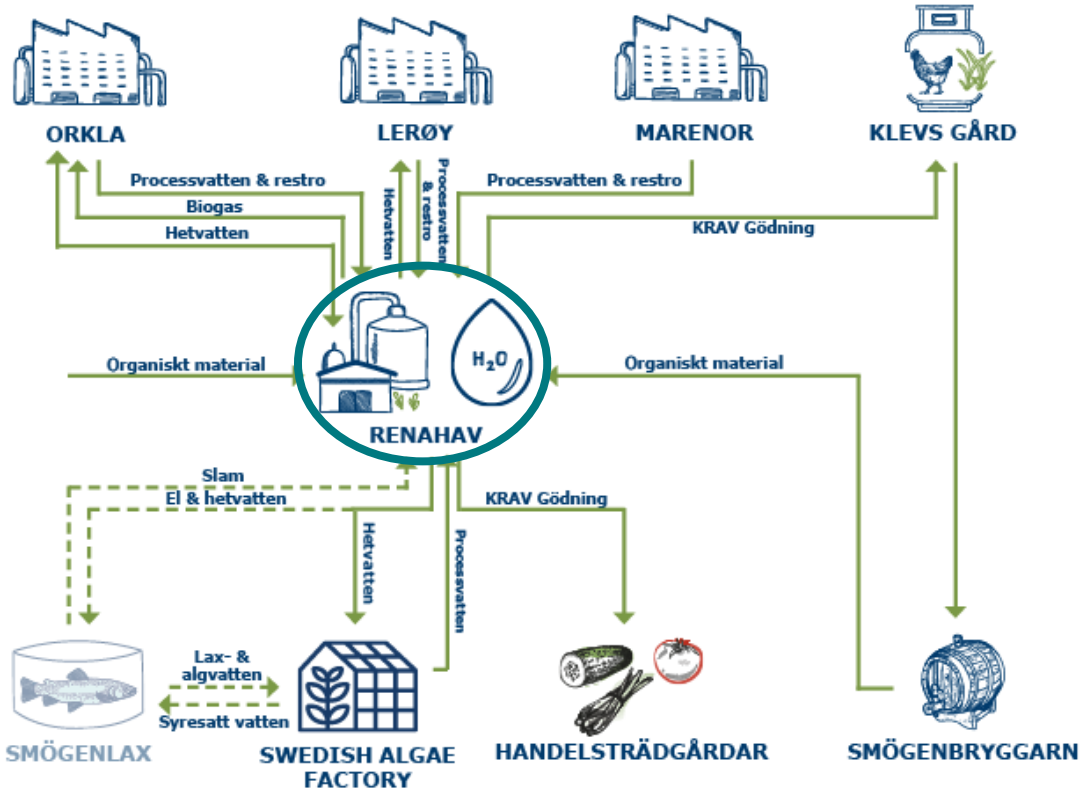
- Size
- Location
- interconnected locally
- Type of biomass
- Ownership/Business model

For inspiration, some positive cases from Sweden

ENERGIKONTOR SYD

FEDARENE

Renahav part of Sotenäs Symbios-center



Before

- Fears from neighbours: odour & landscape
- many appeals in permit process

After

- No complaints afterwards
- Local benefits: more jobs, greener food industry & farming

Sotenäs kommun

Helsingborg / NSR

Biogas part of local climat action plan

- Biogas from food waste, sewage
- Busses, heavy duty vehicles
- Innovative biogas-projects, focus on circularity

Gasum Nymölla
Industrial Symbios

- Paper mill important industri for the area
- 2020 Stora Enso together with Gasum build biogas production facility
- Biogas-process takes care of wastewater from paper mill
- Bio LNG for 170 heavy duty vehicles

Key messages

- Promising biogas-cases in many European regions
- Biogas is pinpointed as a key for energy transition
- Local and regional challenges need to be addressed on national and EU-level

ENERGIKONTOR SYD

Thank you

For more information and contact

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@EnergyAgencySwe

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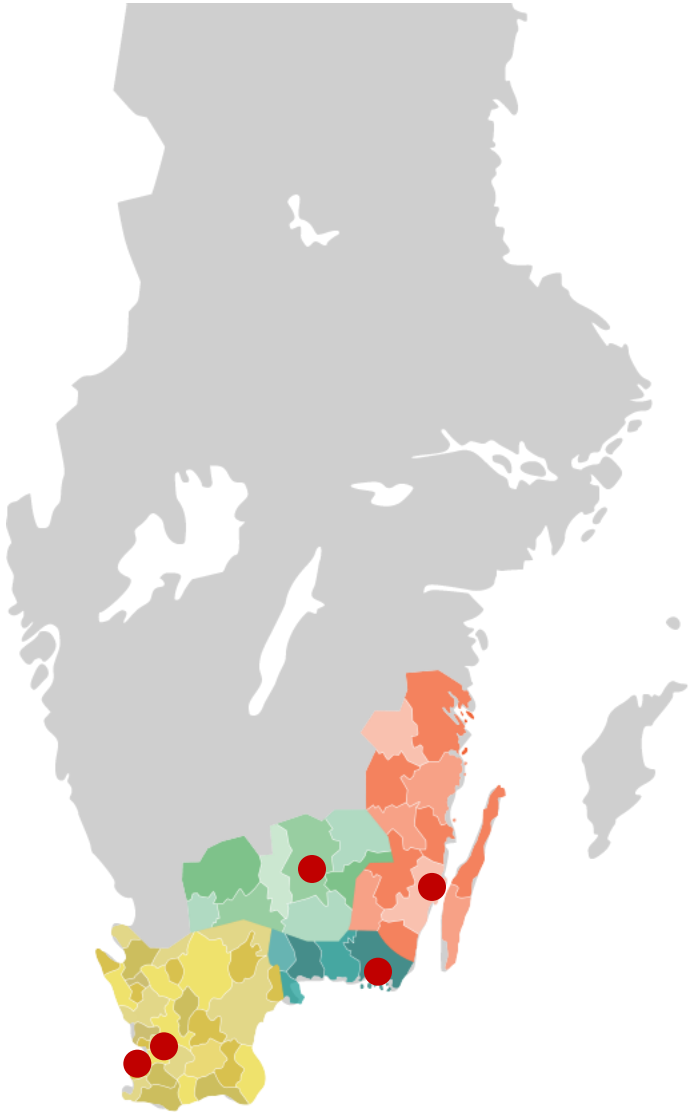
ENERGIKONTOR SYD

Energy Agency Southern Sweden

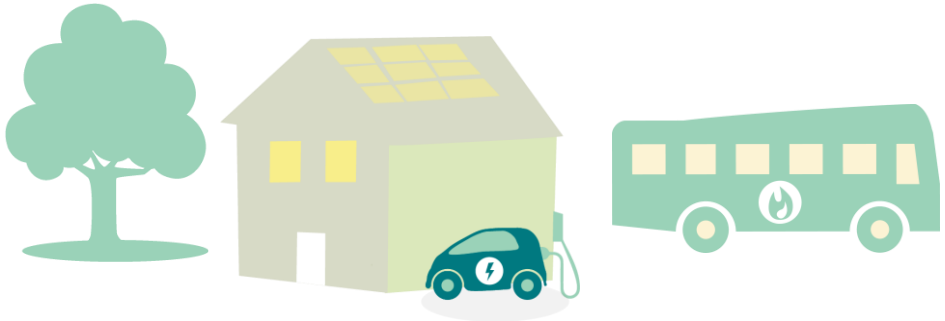
- 58 municipalities
- Four regions (with regional councils)
- Four counties (with county administrative boards)
- 2 million inhabitants (20% of total population)
- 9% of Sweden’s total area

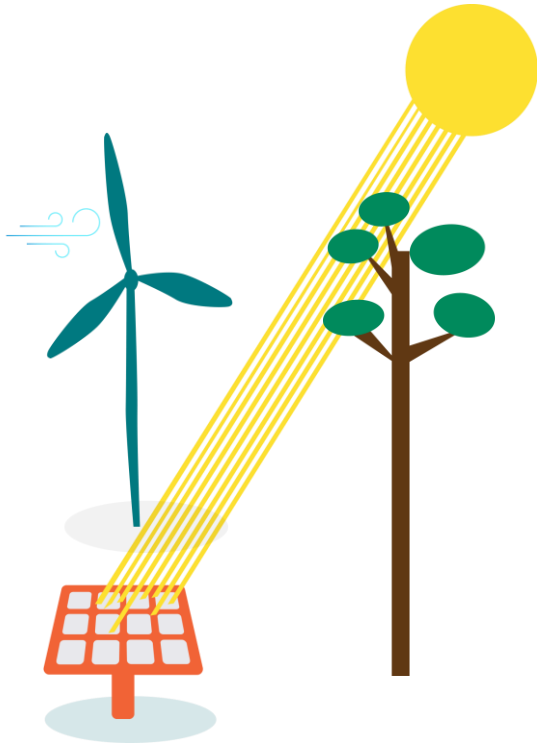


ENERGIKONTOR SYD

Our mission

- Reduce the demand for energy
- Increase energy efficiency
- Increase the share of renewable energy

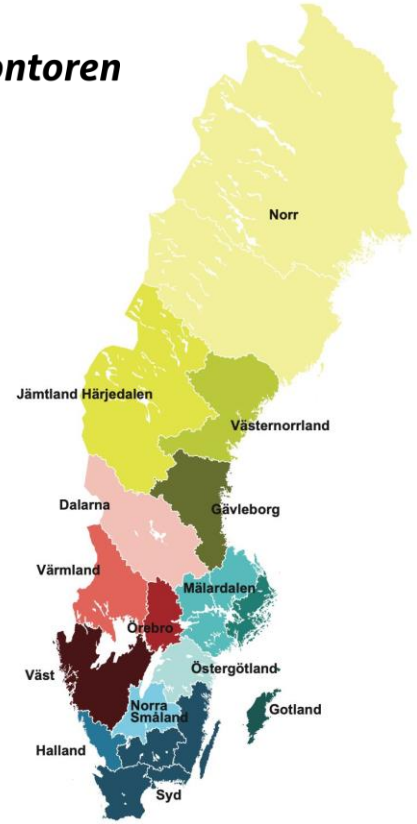




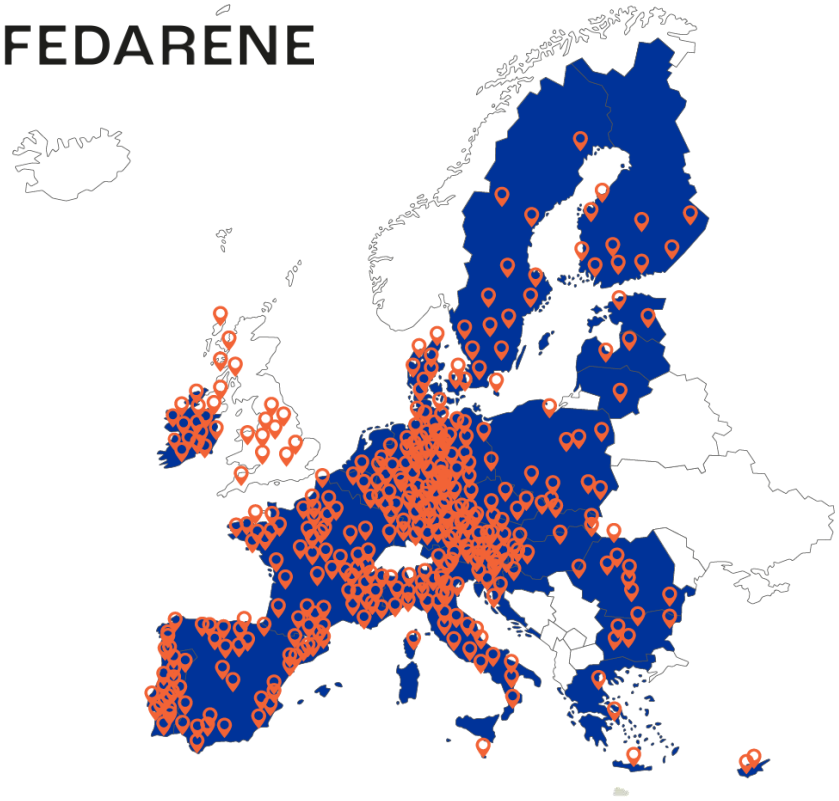
Regional Energy Agencies

ENERGIKONTOR SYD

Energikontoren SVERIGE



FEDARENE



Inclusive Biogas : With the Communities, For the Communities.

Auvergne Rhône-Alpes
Énergie Environnement

Septembre 2024

Avec le soutien de : La Région Auvergne-Rhône-Alpes · RÉPUBLIQUE FRANÇAISE · ADEME

Actions to engage communities directly in biogaz project

Raise awareness of methanisation among local authorities and of their potential roles in projects.

Support local authorities

ENERGIKONTOR SYD

FEDARENE

Public perception varies

Skåne

”Vi har inte flyttat hit för att få en djurfabrik framför oss”

2 oktober 2020 07:00

Lukten. Transporterna. Storleken. På Söderslätt växer oron för jättesatsningen Jordberga Resurshub, där gödsel från nya grisanläggningar ska skapa stor produktion av biogas. Där aktörerna ser en satsning på cirkulär ekonomi fruktar andra att deras landsbygd förvandlas till industriområde.

Jonas Nyrén
Text

Niklas Wihlborg
Text

Sjöbo >

Ja till [illegible]s anläggning för biogas – ”Det känns som en mardröm”

Kommunen och länsstyrelsen sa nej men mark- och miljödomstolen ger Gasum tillstånd för den planerade biogasanläggningen vid Röddinge. Efter kritiken som riktats mot projektet kommer beslutet nästan som en chock för de boende i Röddinge.

Biogasanläggning ska hjälpa Perstorp AB att bli fossilfria

20 juni 2024 12:09

Biokrafts planer på att bygga en stor anläggning för biogasproduktion i Perstorp går in i nästa fas. Nu har ett avtal slutits med Perstorp AB om placering i industriparken. Anläggningen blir en del av kemikoncernens gröna omställning.

Annsofie Wieland
Text

Tillgången på biogas till konkurrenskraftiga priser är avgörande för omställningen av kemiindustrin, anser företrädare för Perstorp AB, som nu slutit avtal med Biokraft om en biogasanläggning i industriparken.
Bild: Johan Persson

Parallel breakout

Inclusive biogas: with the communities for the communities

Jeroen Callewaert

Chief Commercial Officer

DESOTEC

EUROPEAN BIOMETHANE WEEK

DESOTEC

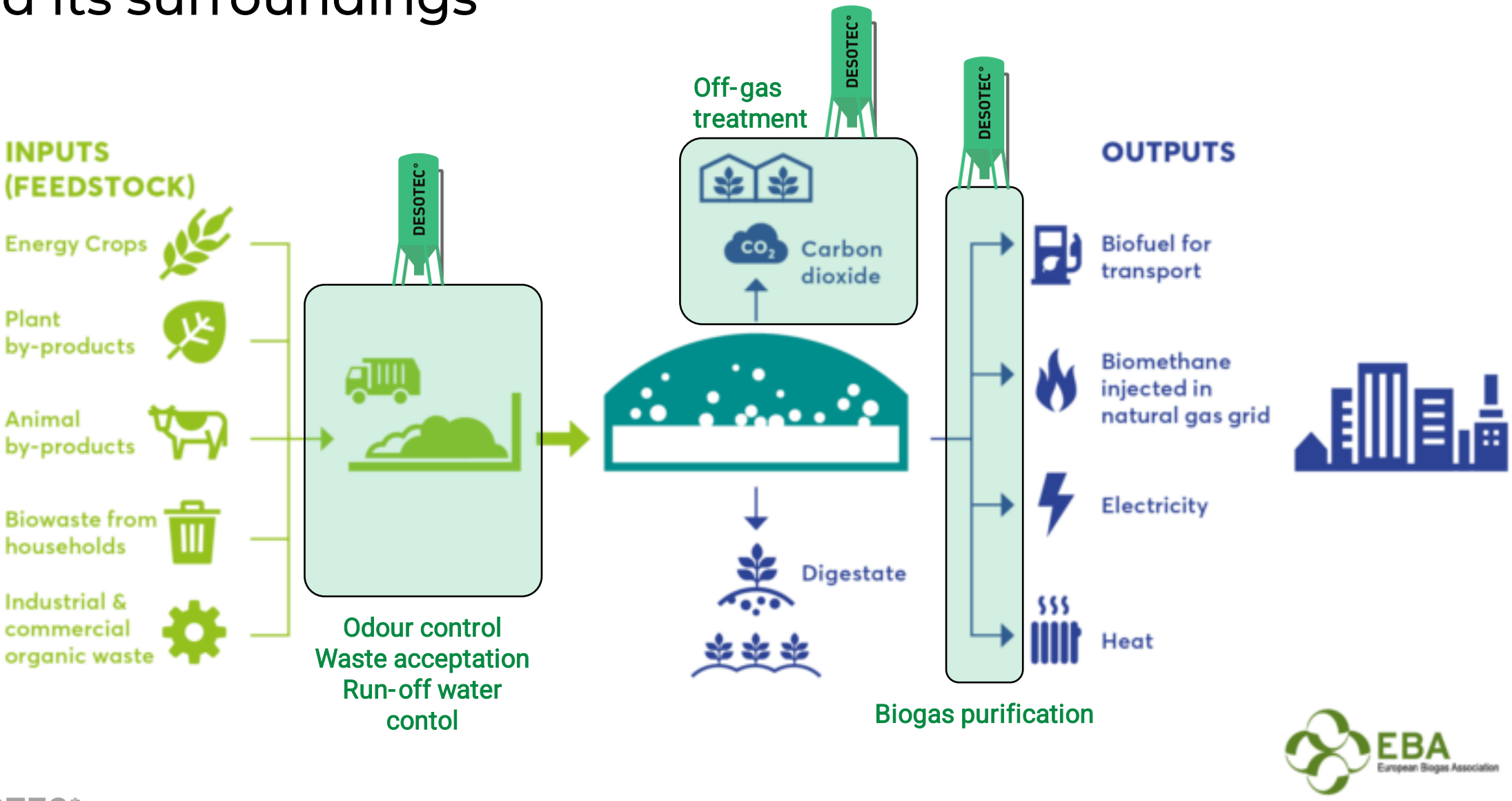
Sustainable mobile filtration solutions

EUROPEAN BIOMETHANE WEEK

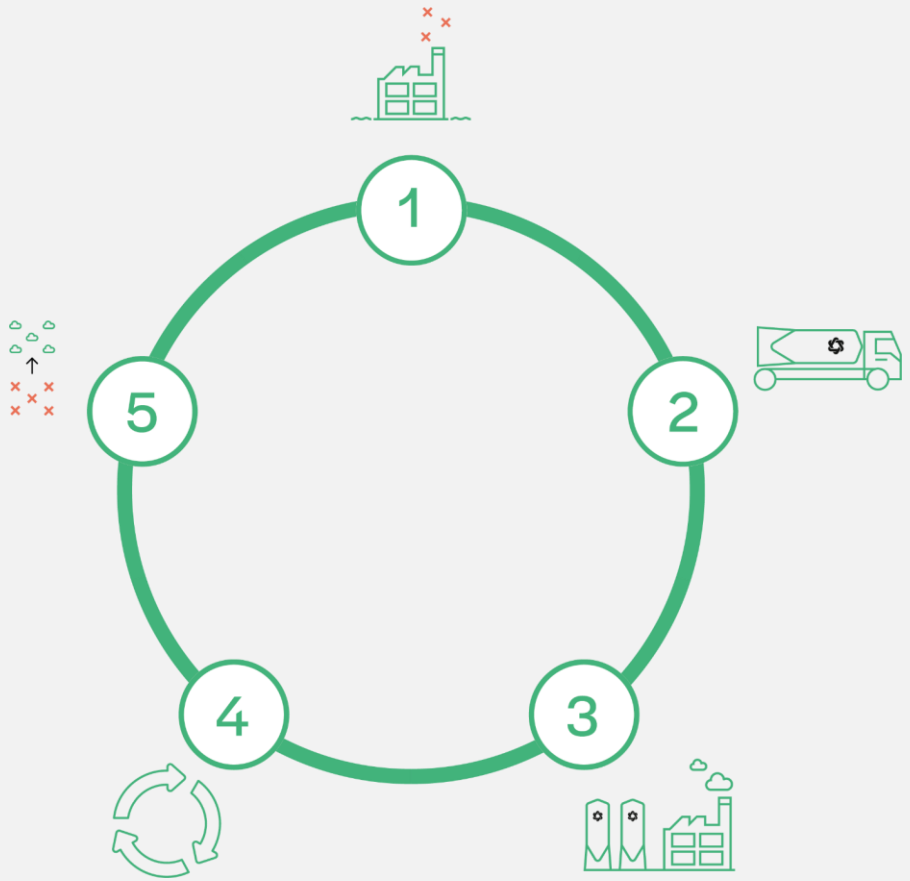
Mobile filtration solutions strengthen the biogas sector's sustainability and community acceptance

European Biomethane Week – 23rd October 2024 - Brussels

Bringing more sustainability on anaerobic plants, landfill sites and its surroundings



What can a mobile filtration solution bring for the biogas community?

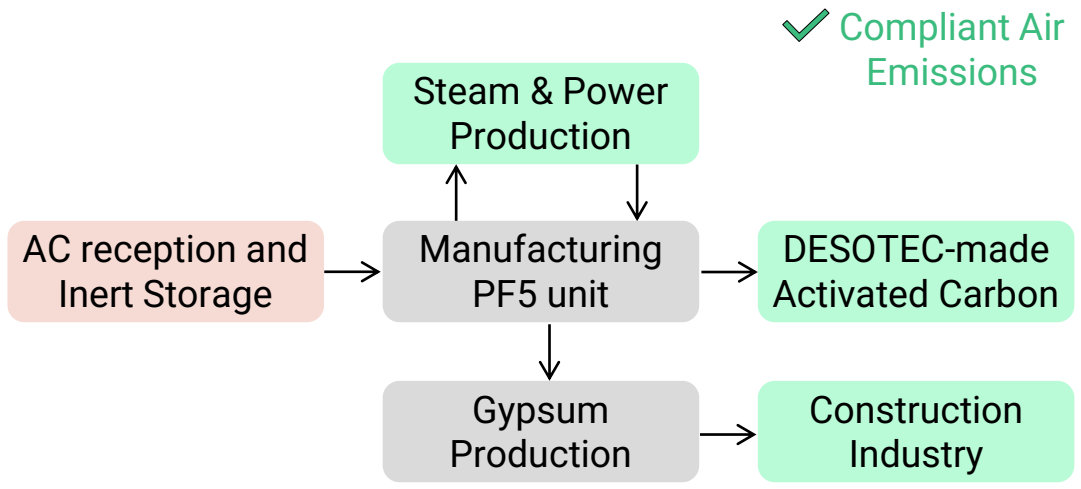


1. Analysis of the purification need
2. Delivery and installation of the mobile filter
3. Filtration and adsorption of impurities
4. Recycling and reactivation or production of activated carbon
5. Full neutralisation of all components and creation of valuable by-products from components

Our **innovative** solution for landfilled and incinerated spent carbons from H_2S removal

Challenge
Avoid disposal of **high-sulphur loaded activated carbon**

Solution
Upcycle of high-sulphur carbon waste in a sustainable way



Why our solution is the **sole circular and most sustainable choice** for you and your community

R&D Team investigated two processes before industrial selection:

☑ **Thermal process**

- Effective and efficient separation of sulphur from activated carbon
- Complete removal and destruction of adsorbed pollutants (VOC, PFAS, siloxanes and H_2S) due to high temperature
- No cross-contamination of pollutants between clients, safeguarding product integrity
- Production of saleable by-products

☐ ~~**Caustic washing**~~

- Production of a wastewater stream rich in S, VOCs and Persistent Organic Pollutants (POP, PFAS)
- Insufficient removal and destruction of hazardous pollutants
- Loading/ blocking the activated carbon pores, impacting the quality

DESOTEC

Sustainable mobile
filtration solutions

Thank you for your kind attention

Jeroen CALLEWAERT
Global Chief Commercial Officier
Jeroen.callewaert@desotec.com
+32 51 246 057

www.desotec.com

Parallel breakout

Inclusive biogas: with the communities for the communities

Serena Vanzetti

Cooperativa Agricola Speranza-Candiolo

EUROPEAN BIOMETHANE WEEK

Inclusive biogas: with the communities for the communities

Cooperativa Agricola Speranza

European Biogas Conference 2024
23rd October 2024
Bruxelles

Cooperativa Speranza's Stages/Steps

- 1974: the birth. The first step was to create a «meat shop»
- 1974-2008: buy machinery togheter to sostaine the cost and improve farming technique
- 2008: first biogas plant
- 2010: second biogas plant, district heating to IRCC
- 2019: third biogas plant: BIOLNG and CO2
- 2024-20…: conversion the two plants to produce biomethane and CO2

Cooperativa Agricola Speranza

Biogas Circularity

Cooperativa Agricola Speranza

Biomethane's keys

- SUSTAINABILITY ENVIRONMENTAL
- SUSTAINABILITY SOCIAL
- SUSTAINABILITY ECONOMIC
- SINERGY

Cooperativa Agricola Speranza

Thank you for your attention

Parallel breakout

Inclusive biogas: with the communities for the communities

Denis Bonvillain

Head of EU Affairs

Veolia

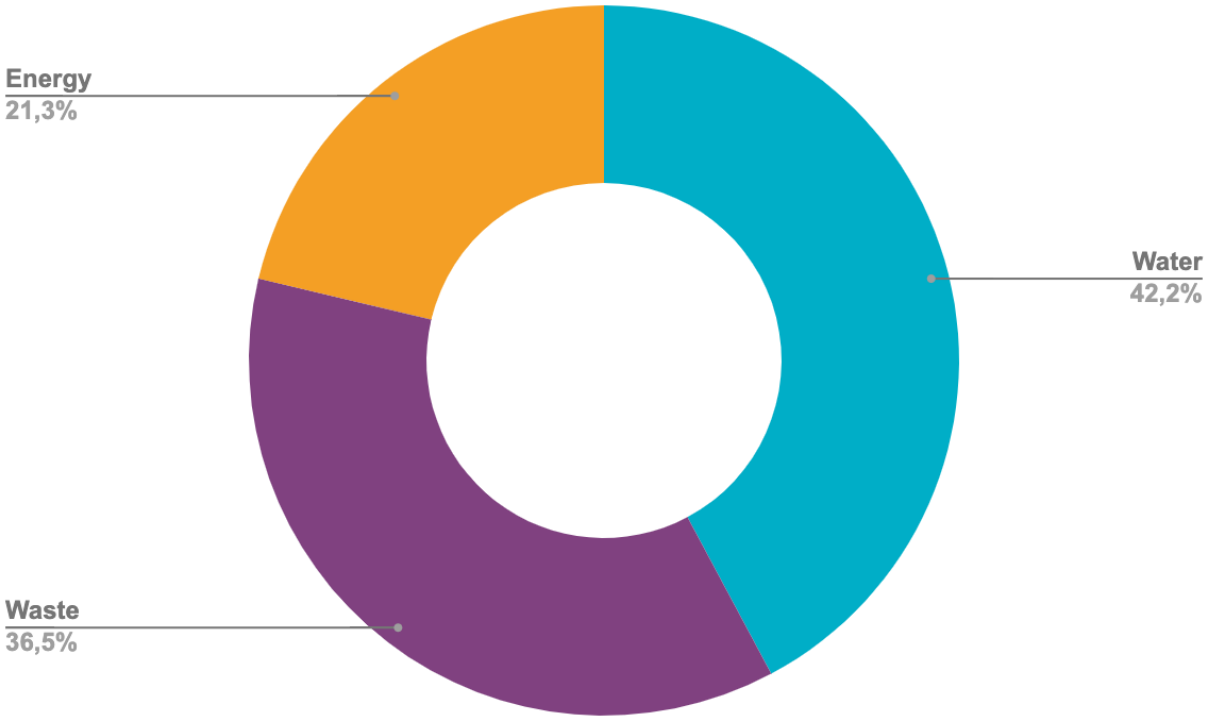
EUROPEAN BIOMETHANE WEEK

Producing biomethane based on the feedstock of a community / territory

Brussels, 23 October 2024

OUR 3 MAIN BUSINESSES

GLOBAL OVERVIEW BY ACTIVITY*



breakdown of revenue by business line

1

WATER

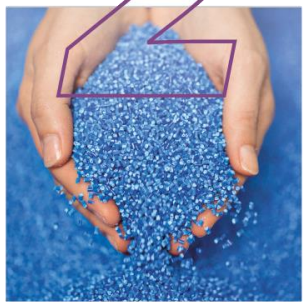
111
million people supplied with drinking water

97
million people connected to wastewater systems

4,130
drinking water production plants managed

3,506
wastewater treatment plants managed

2



WASTE

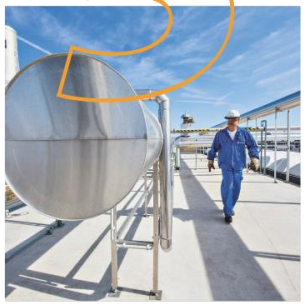
46
million people provided with collection services on behalf of municipalities

61
million metric tons of treated waste

533,759
business clients

823
waste processing facilities operated

3



ENERGY

44
million MWh produced

46,922
thermal installations managed

680
heating and cooling networks managed

2,716
industrial sites managed

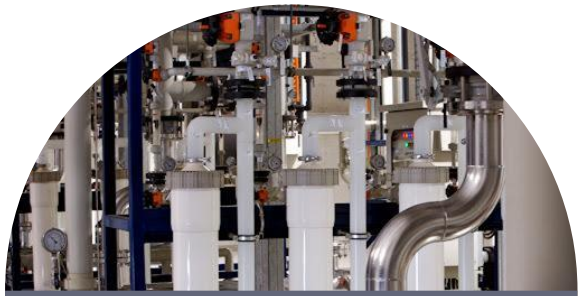
SOLUTIONS TO ADDRESS 3 MAIN CHALLENGES

DECARBONIZATION

- Local energy
- Energy autonomy

ECONOMY & REGENERATION OF RESOURCES

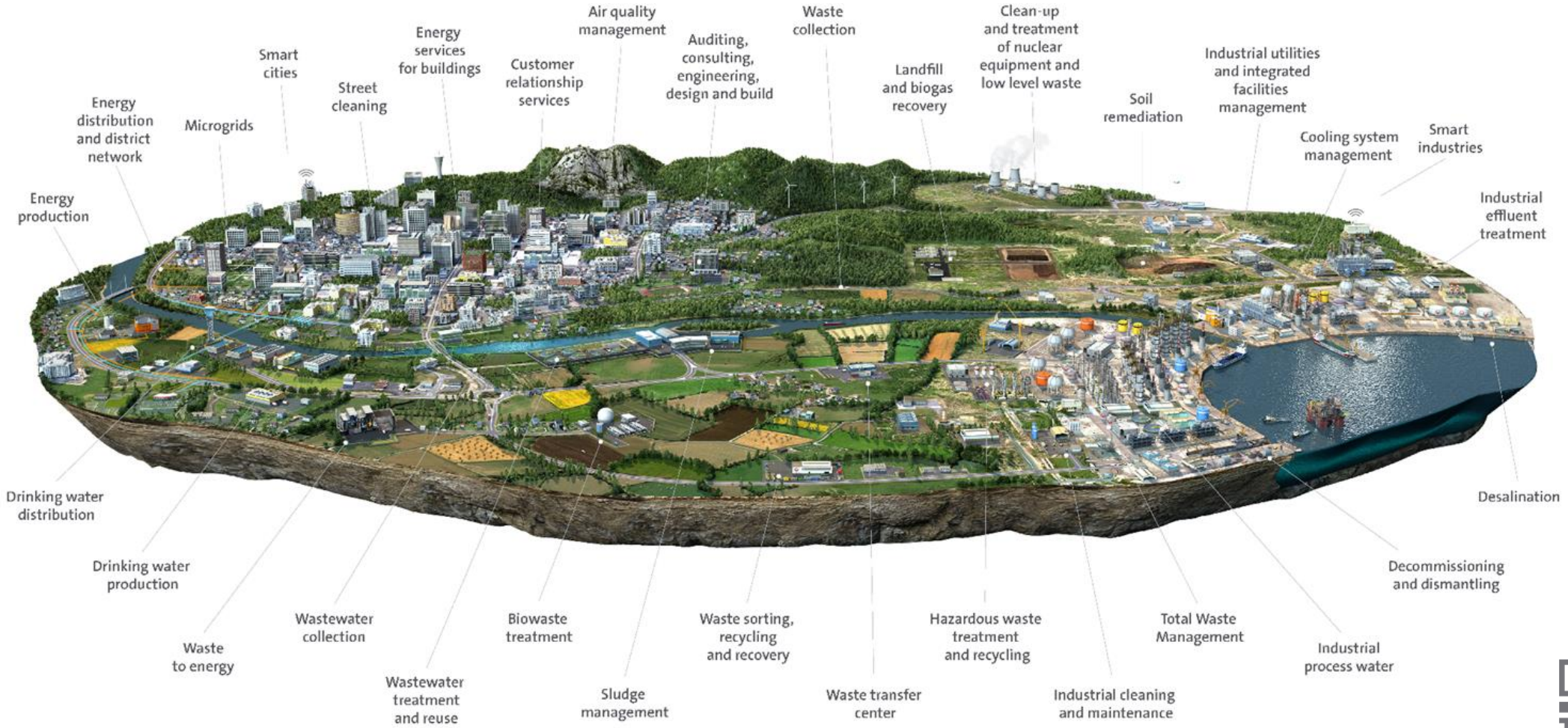
- Recycling of plastics and critical materials
- Water neutrality
- Reuse of wastewater



DEPOLLUTION

- Treatment of hazardous waste
- Treatment of micropollutants
- Soil remediation
- IAQ

VEOLIA, WORLD
OF SOLUTIONS FOR
LOCAL AUTHORITIES & INDUSTRIES



Discover our solutions on our Website:
activities.veolia.com

Biomethane from agri waste feedstock - Soudan (FR)

Multipurpose platform

Methanization process - 17,000 tons/year of mainly agri feedstock (manure, liquid manure, crop residues, intermediate crops) + by-products of agri-food industry

Compost process - 30,000 tons/year from sewage sludge and green waste

Injection to the grid since 2019 - 22GWh/year

Biomethane from landfill gas - Claye Souilly (FR)

Lorem ipsum dolor

Industrial complex

One of the biggest biomethane plant in France, operational since May 2024 with **an annual production capacity of 120GWh**

Veolia operates the landfill site - Val Pôle - which provides the biogas

Waga Energy transforms the biogas into biomethane thanks to their technology - WagaBox

ENGIE buys the biomethane based on a 13-year BPA

Biomethane from sewage sludge - Sofia (BG)

BIOFACTORY

Thank you for your attention

Q&A Session

Inclusive biogas: with the communities for the communities

Moderated by Sasha Twining

Frank Siebern-Thomas

European Commission

Roozbeh Feiz

Biogas Research Centre, University of Linköping

Sabine Täuber

European Federation of Agencies and Regions for Energy and Environment

Jeroen Callewaert

Desotec

Serena Vanzetti

Cooperativa Speranza

Denis Bonvillain

Veolia

EUROPEAN BIOMETHANE WEEK

Parallel breakout

Biogas 4.0: boosting efficiency with tech wizardry

Moderated by Dirk Bonse

Maja Rosiak

Xylem

Philippe Breuils

Green Data Science

Jhuma Sadhukhan

University of Surrey, UK

Anna Schnürer

Swedish University of Agricultural Sciences

Peter Schley

SmartSim GmbH

Parallel breakout

Biogas 4.0: boosting efficiency with tech wizardry

Maja Rosiak

Lead Biogas Center of Excellence

Xylem

EUROPEAN BIOMETHANE WEEK

Efficient Biogas production through optimized mixing, CFD and other technological solutions

Maja Rosiak

Head of Biogas Center of Excellence

23.10.2024

Xylem in biogas segment

25 years of experience

> 7 000 installation references

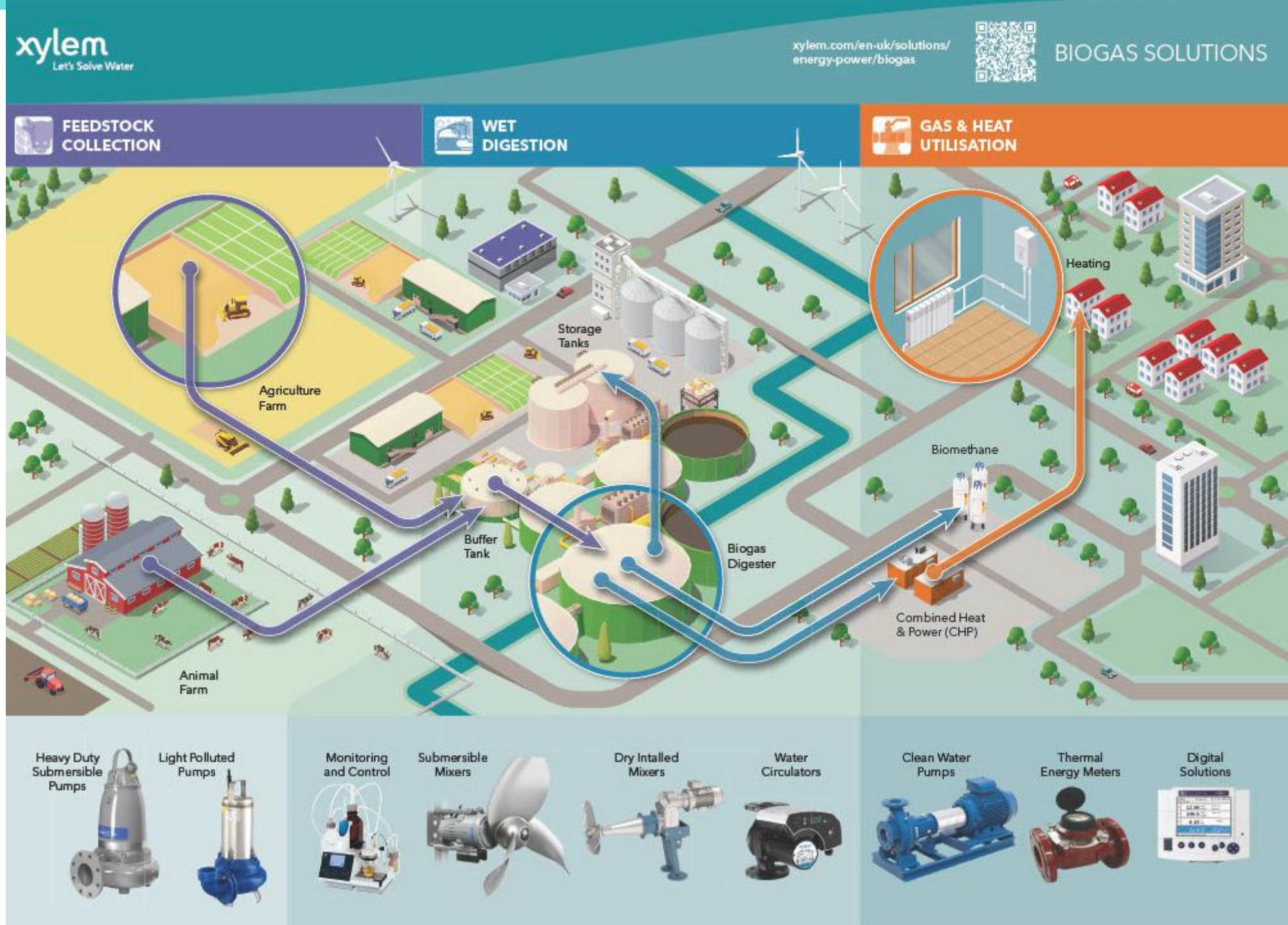
2 000 mixers delivered annually

EnviTec Biogas
PlanET
HN Nesemeier
SKINNER AgSolutions
Manure Handling | Biogas | Nutrient Recovery
PROEKO BIOGAS
NovaTech Biogas · Solar · Fotovoltaik
DYNAMIC BIOGAS
AGRIVAL
Biolectric
VEOLIA

BIOGAS CoE

xylem

Solutions for biogas and biomethane production



BIOGAS CoE

CFD Analysis

Digital solution for process optimization and troubleshooting

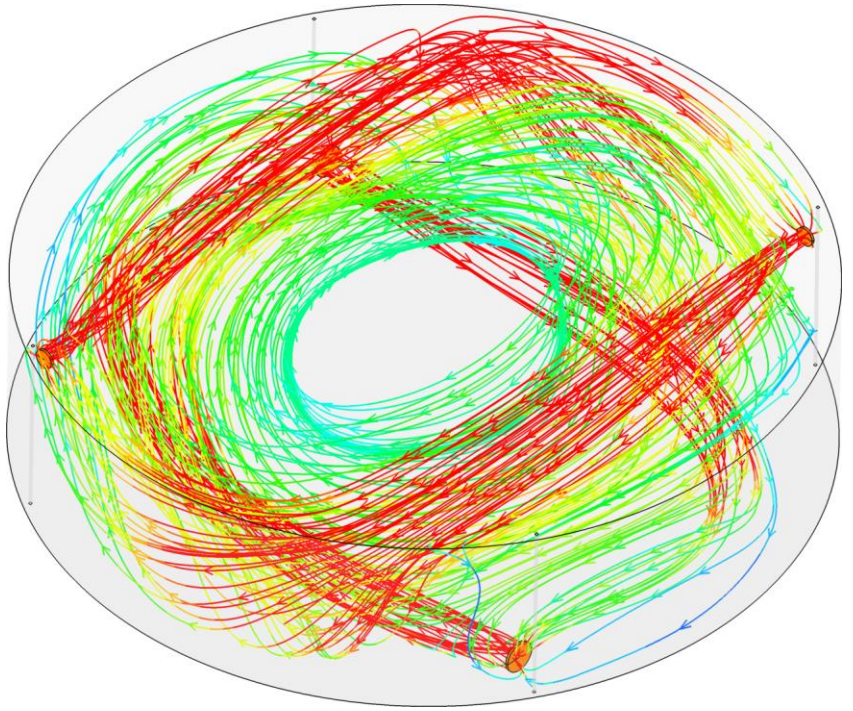
Mixing System Solution:

- Sizing, position and orientation
- Visualization

Analysis

- Process optimization
- Sedimentation and crust risk
- Short-circuiting and stagnancy
- Troubleshooting

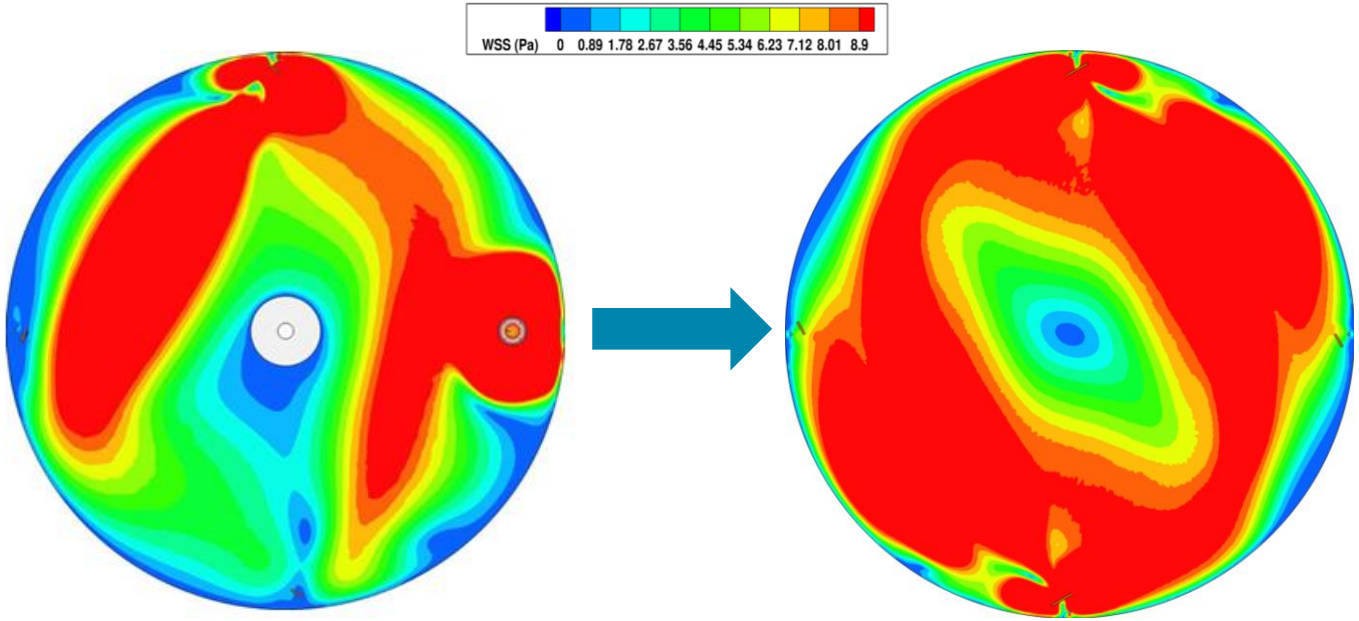
Iso View



CFD Analysis

Process optimization – biogas digester

Wall Shear Stress (WSS) at tank bottom



Biogas production optimization

- Increased biogas yield
- Increased profit
- Savings in maintenance

BIOGAS CoE

xylem

Complete optimization solution

Digital solution for transformative results

Sense:

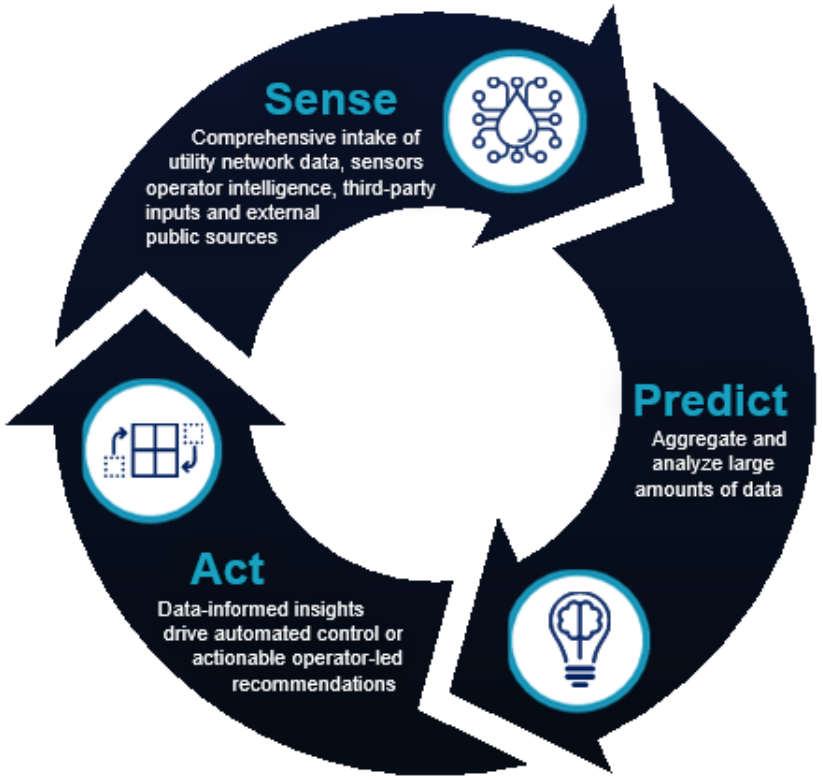
- Continuous data collection of system data (PLS), energy consumption data, weather data, laboratory data and warnings
- Potential identification

Predict

- Integration of the digital model of the system based on real-time data
- Simulation of thousands of scenarios to determine optimal target values
- Providing insights into asset performance based on data analytics

Act

- In order to achieve optimal results, suggested measures are implemented manually or (semi-)automatically



BIOGAS CoE

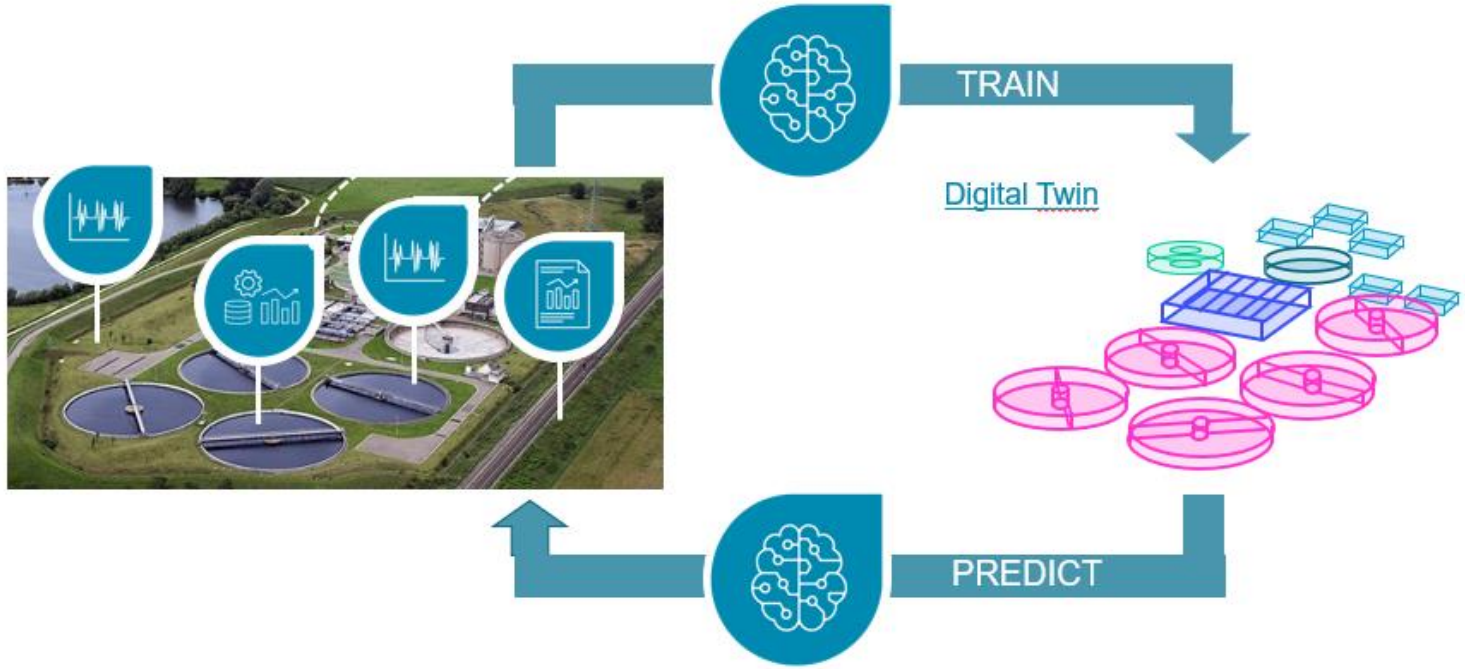
xylem

Digital Solutions to reduce energy consumption in Treatment Plant

Cuxhaven, Germany

Energy Reduction of
26.3%

Saving **1.1 Million kWh per year**
equivalent to
330 000€/a



BIOGAS CoE

xylem

Maja Rosiak
Head of Biogas Center of Excellence (CoE)

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Parallel breakout

Biogas 4.0: boosting efficiency with tech wizardry

Philippe Breuils

Founding Partner

Green Data Science

EUROPEAN BIOMETHANE WEEK

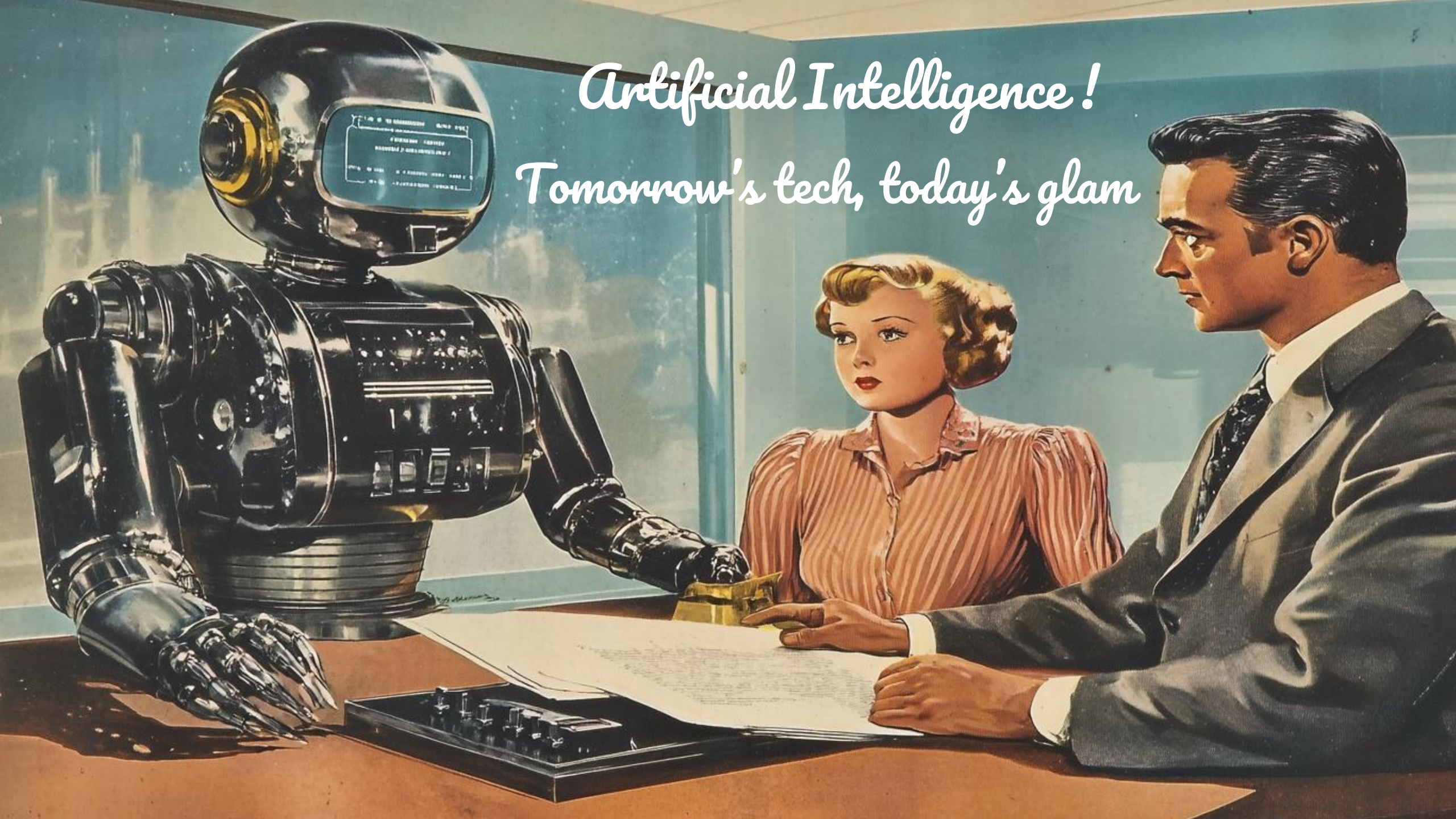
Biogas 4.0
Boosting efficiency with tech wizardry

Philippe Breuils – Green Data Science

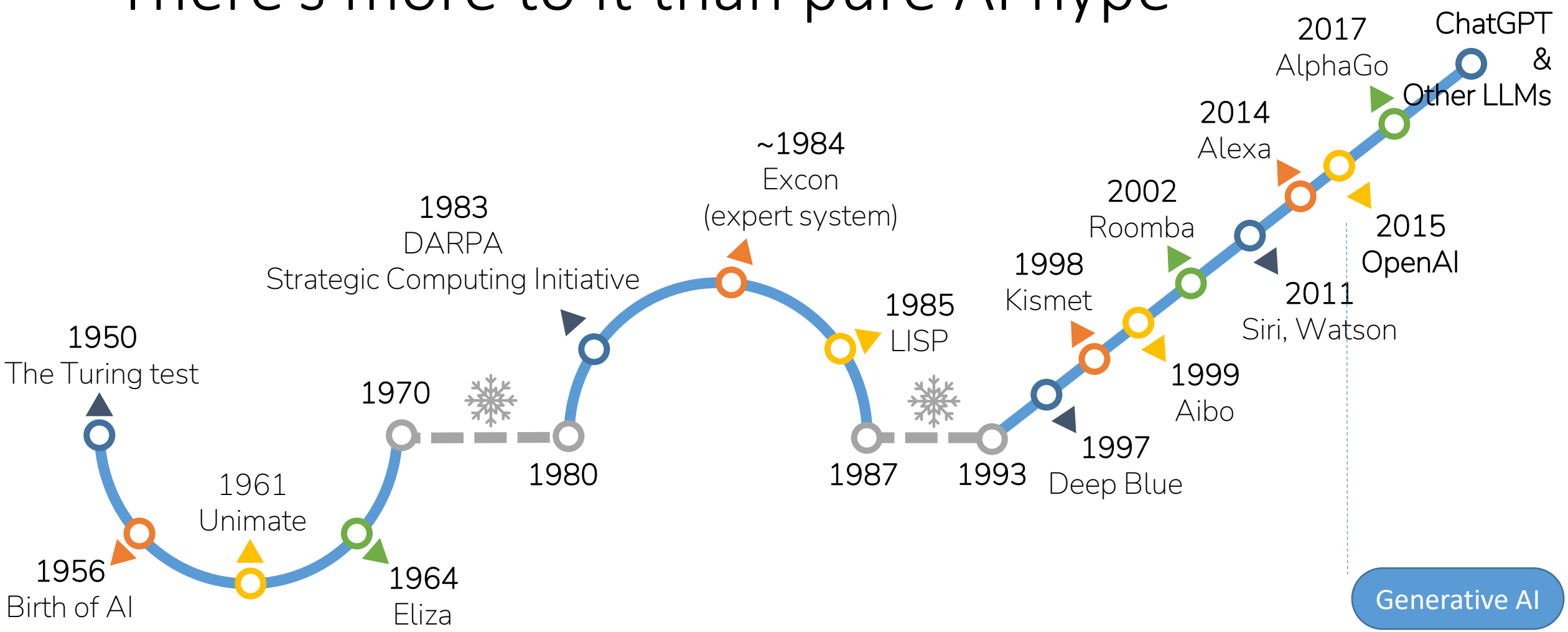
p.breuils@greendatascience.ai

European Biogas Conference

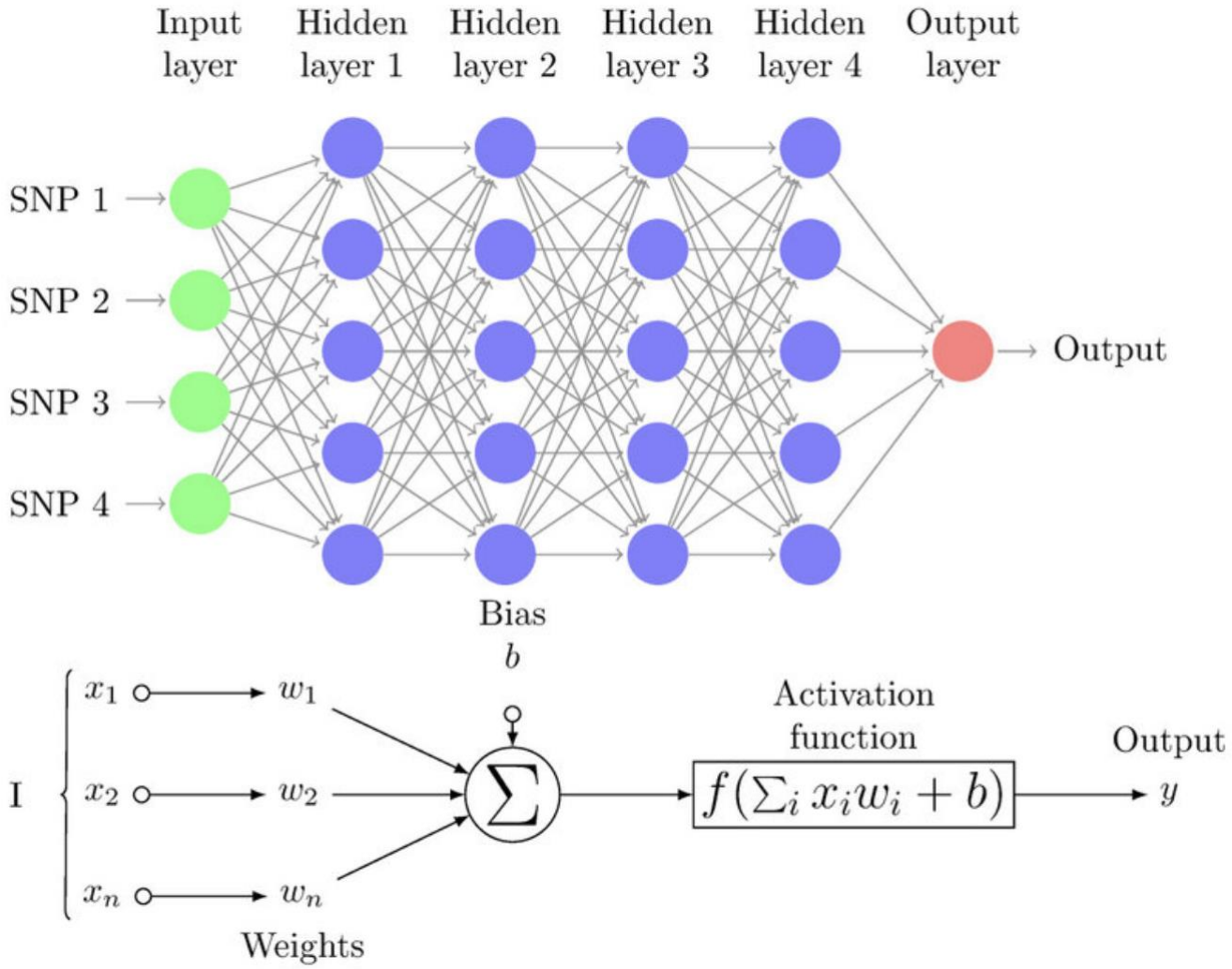
Brussels, October 23rd 2024


Artificial Intelligence !
Tomorrow's tech, today's glam

Machine Learning
There's more to it than pure AI hype



Artificial neural networks are math functions…

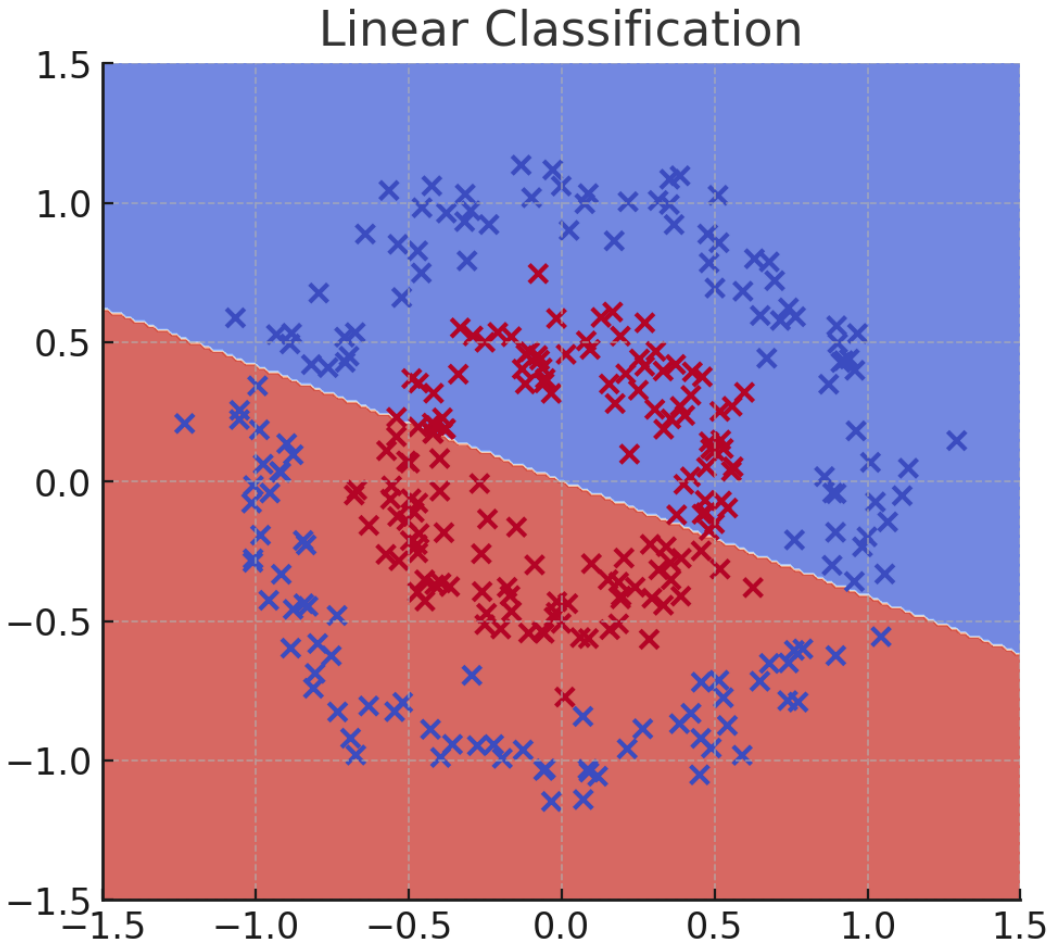


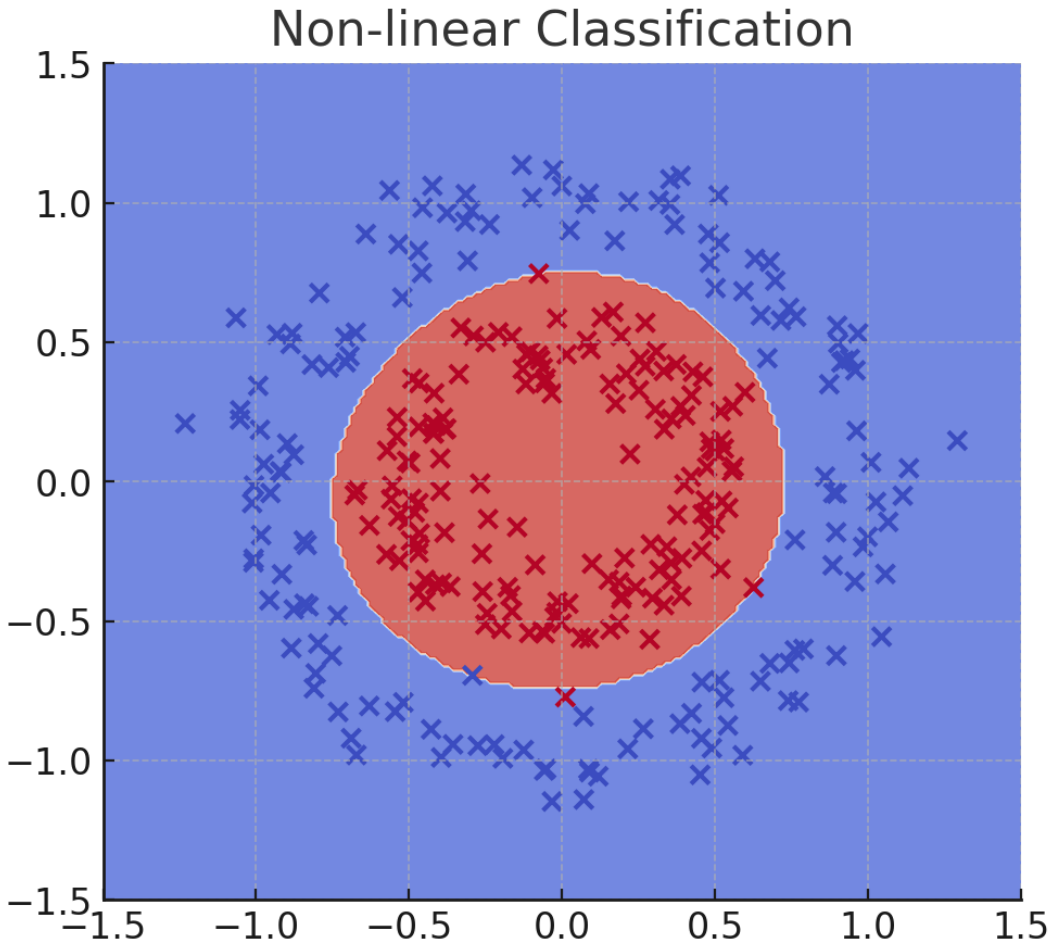
Inspired by **biological networks** which are heavily interconnected cells often organized in layers in the neural cortex

Weights : Each connection between neurons has a weight which modifies the influence that a given input has on the output. Weights are adjusted during the training process to optimize the network's performance

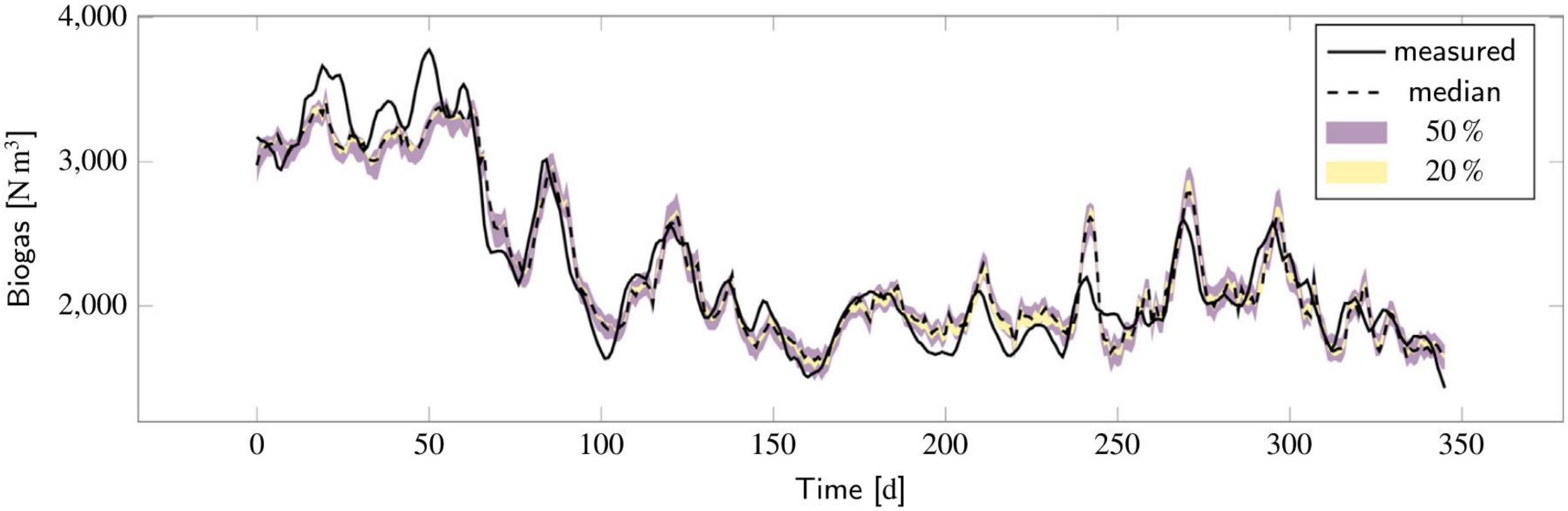
Activation function : Each neuron applies an activation function to the weighted sum of its inputs. This function introduces non linearities in the model, allowing the network to capture complex relationships between variables

… with interesting capabilities…





… well suited to achieve complex predictions



*Daily prediction of global biogas volume**

(*) Sappl, Johannes, Matthias Harders, and Wolfgang Rauch. “Machine Learning for Quantile Regression of Biogas Production Rates in Anaerobic Digesters.” Science of The Total Environment 872 (May 2023): 161923.

AI: a proven efficiency for biogas

- Academic research in the field of applying machine learning to biogas production started more than 20 years ago

- ML algorithms, in particular neural networks, have always proven efficient at modeling the reactions involved in anaerobic digestion

- Applications for biogas efficiency are endless:
  - Predict the biogas yield with less than 8% error
  - Detect foam formation with 24 hours of anticipation
  - Optimize virtual pipeline operations
  - Determine the best VFA ratios to maximize biogas output

The « Yes we KAN » initiative

- A novel approach has emerged in physics: applying Kolmlogorov-Arnold Networks[(1)] to scientific problems
- KANs offer better model accuracy and **interpretability** than traditional neural networks

Offered to all EBA members for a limited time

- Green Data Science will forward all costs of training a KAN algorithm on any biogas plant and share the results with the plant's stakeholders
- Visit greendatascience.ai/yes-we-kan

(1): Liu, Ziming, Pingchuan Ma, Yixuan Wang, Wojciech Matusik, and Max Tegmark. "KAN 2.0: Kolmogorov-Arnold Networks Meet Science." arXiv, August 19, 2024. http://arxiv.org/abs/2408.10205.

Thank you

https://greendatascience.ai

hello@greendatascience.ai

Parallel breakout

Biogas 4.0: boosting efficiency with tech wizardry

Jhuma Sadhukhan

Director of Research & Innovation

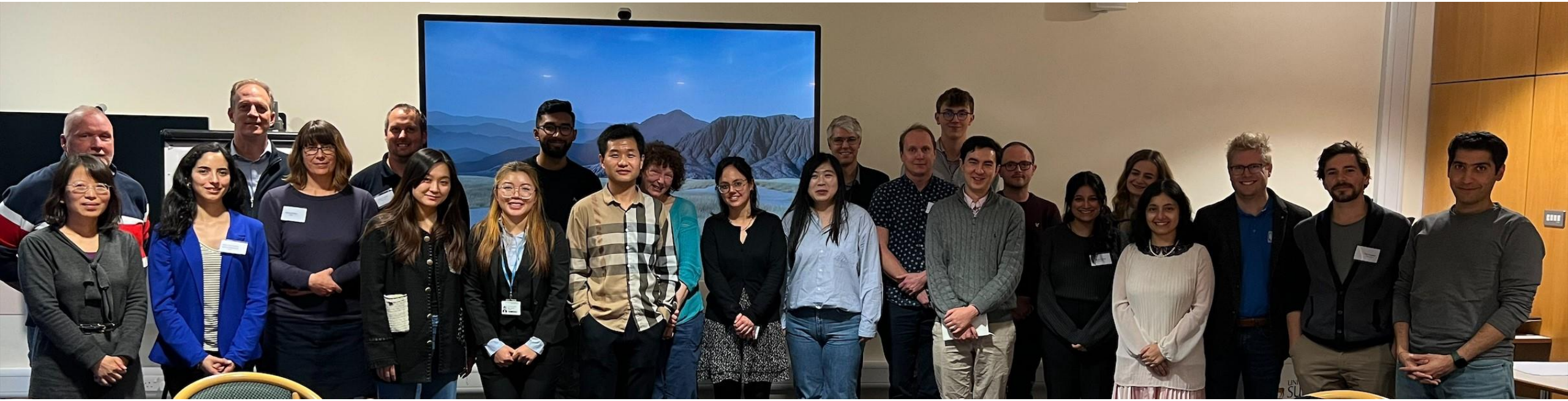
University of Surrey, UK

EUROPEAN BIOMETHANE WEEK

AI4AD

UNIVERSITY OF SURREY

EBNet
Environmental Biotechnology



University of Southampton

MANCHESTER 1824
The University of Manchester

The University of Nottingham

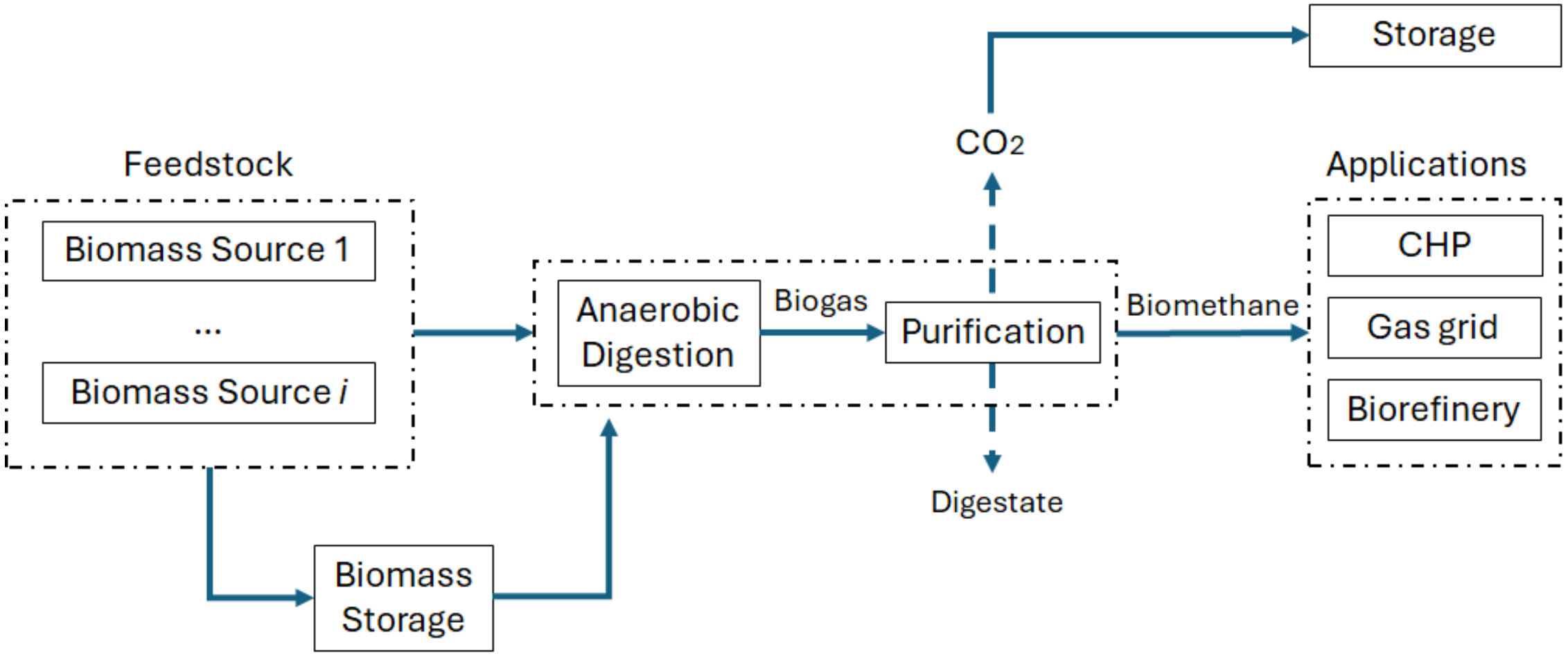
UKRI UK Research and Innovation

Challenges

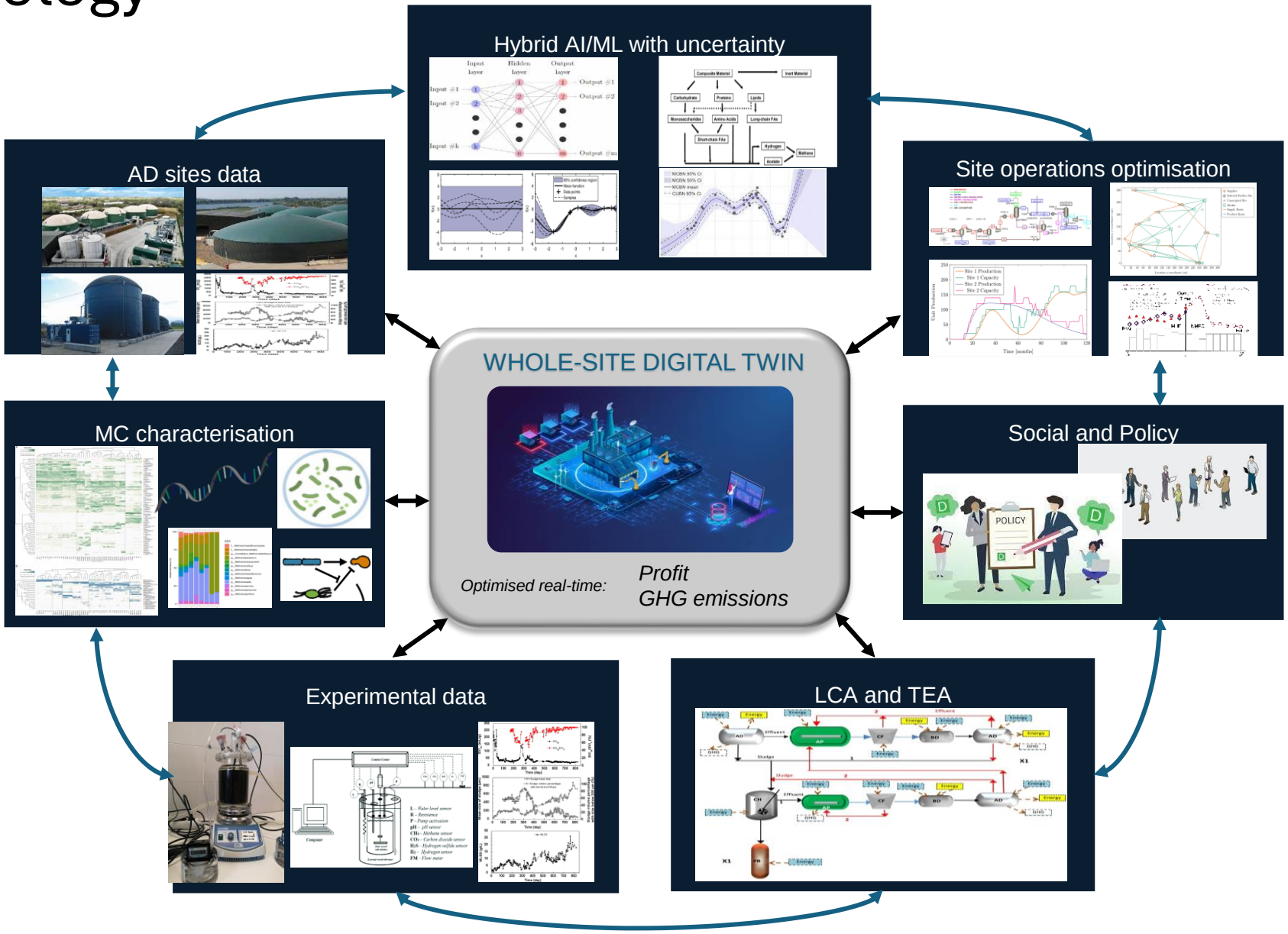
A core challenge is the ability to reach stable and enhanced biomethane production across a variety of operating conditions and feedstocks

The central problem is the prediction of how the complex microorganism population reacts to different operational parameters

System Boundary



Methodology



Solutions

LCA and TEA implemented

Incorporated into scheduling problem – an optimisation problem that can be run to maximise biomethane that also led to the greatest GWP reduction and profitability

Professor Jhuma Sadhukhan
j.sadhukhan@surrey.ac.uk

Parallel breakout

Biogas 4.0: boosting efficiency with tech wizardry

Anna Schnürer

Professor

Swedish University of Agricultural Sciences

EUROPEAN BIOMETHANE WEEK

Microbial surveillance of biogas plants using AI

Anna Schnürer

Swedish University of Agricultural Sciences

anna.schnurer@slu.se

WHAT DRIVES A BIOGAS PROCESS?

A complicated network of many microbes with different functions

Many influencing parameters

Temperature

Organic Load

Retention time

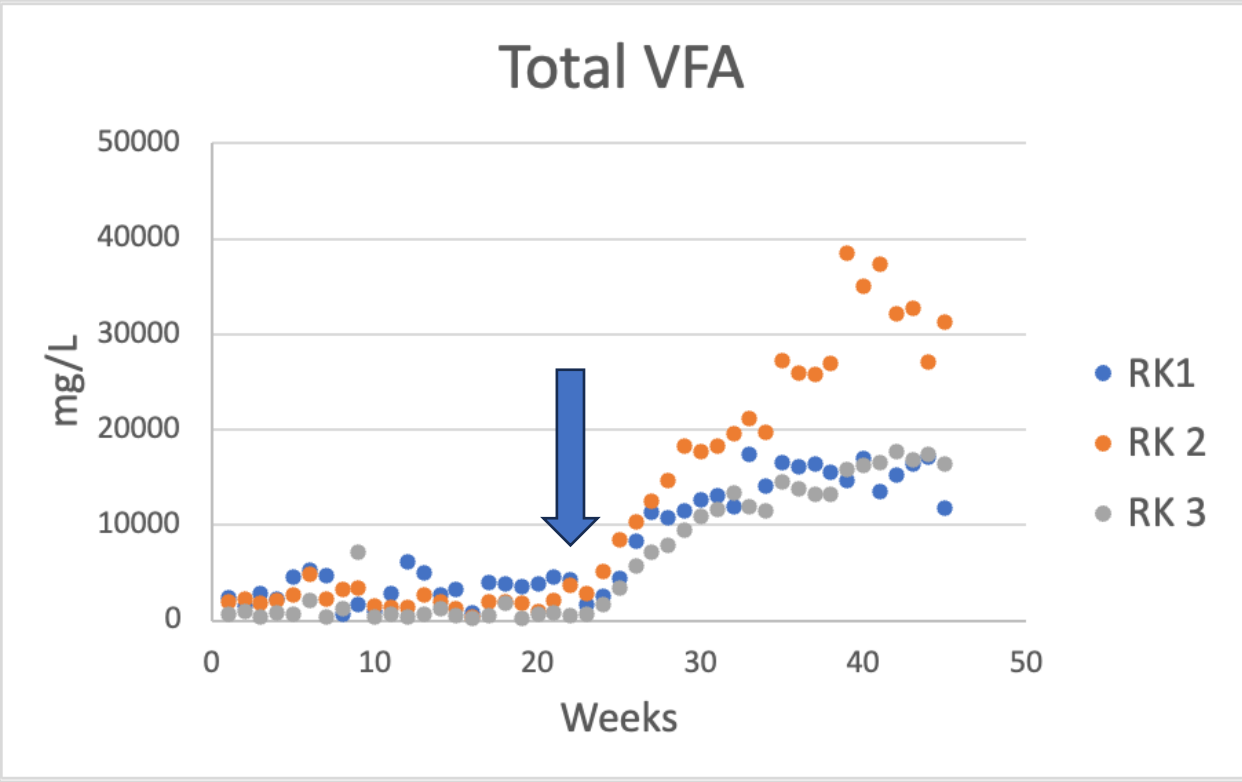
Substrate composition

INPUT

OUTPUT

UNSTABILITY

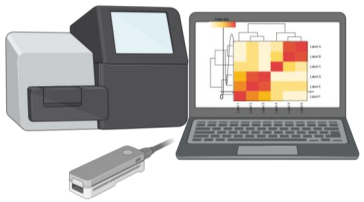
How we avoid problems today!

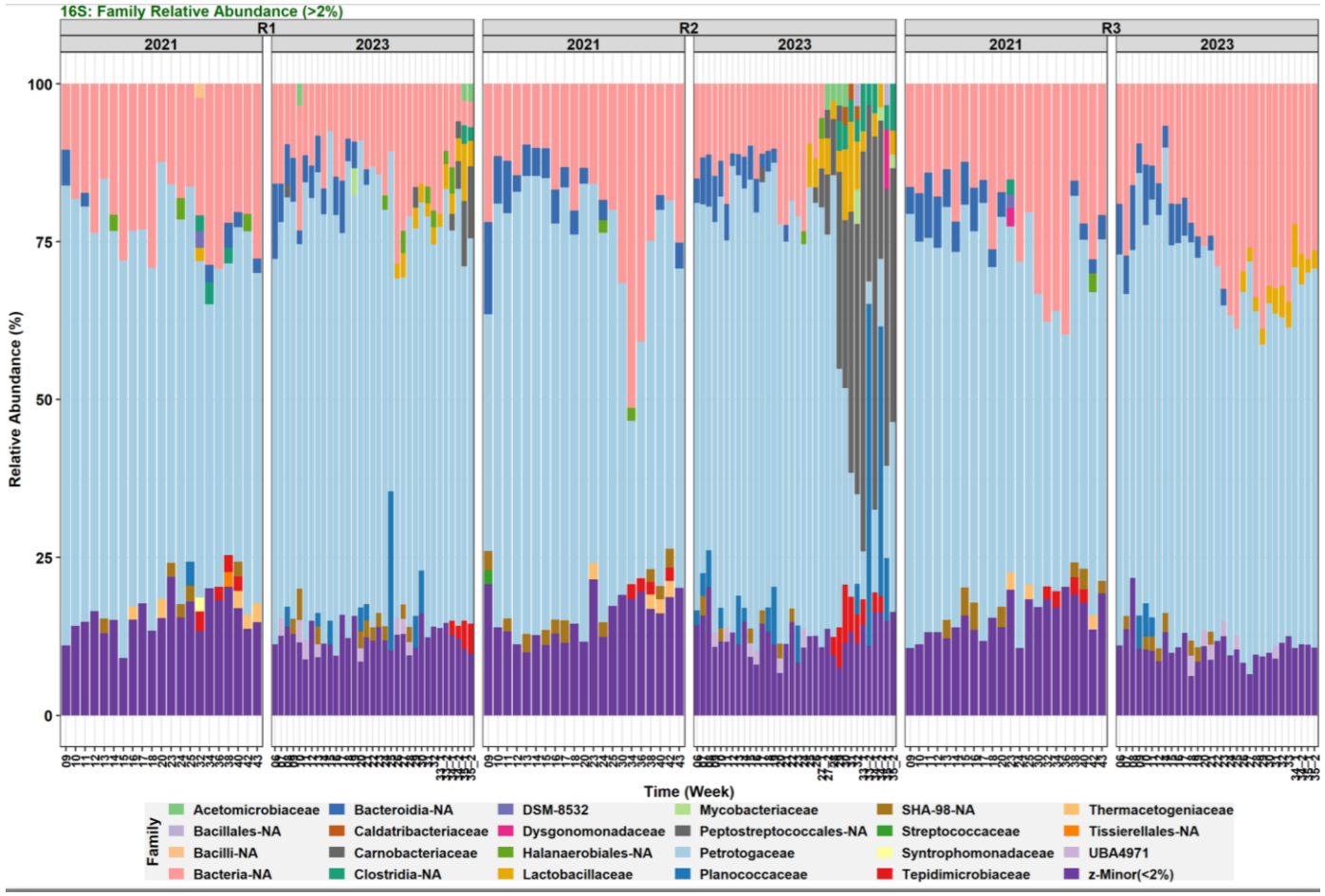


Limitation:

- Detection after the disturbance event and not in real time
- Difficult to know level of disturbance and when to react

Surveillance of the future!





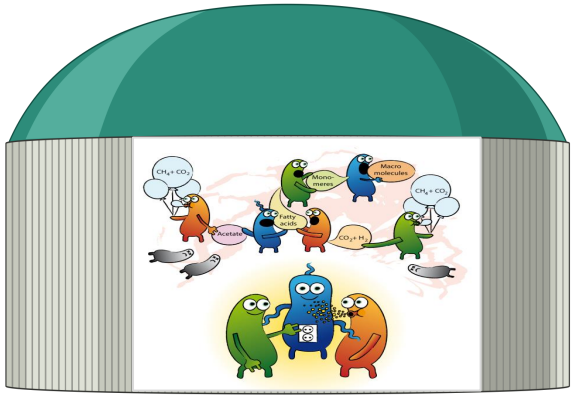
Microbial community profiling using DNA based sequencing

Each sample generate 10-20 000 “reads”

By machine learning it is possible to recognize disturbance patterns

AI supported microbial surveillance

- *Identifies process disturbance at an early stage*
- *Reduces the risk of operational failure*
- *Enables more efficient biogas production*
- *Can assist with startups*



Thank´s for listening!

Parallel breakout

Biogas 4.0: boosting efficiency with tech wizardry

Peter Schley

Managing Director

SmartSim GmbH

EUROPEAN BIOMETHANE WEEK

Gas Quality Tracking to Support Integration of Biomethane in Gas Networks

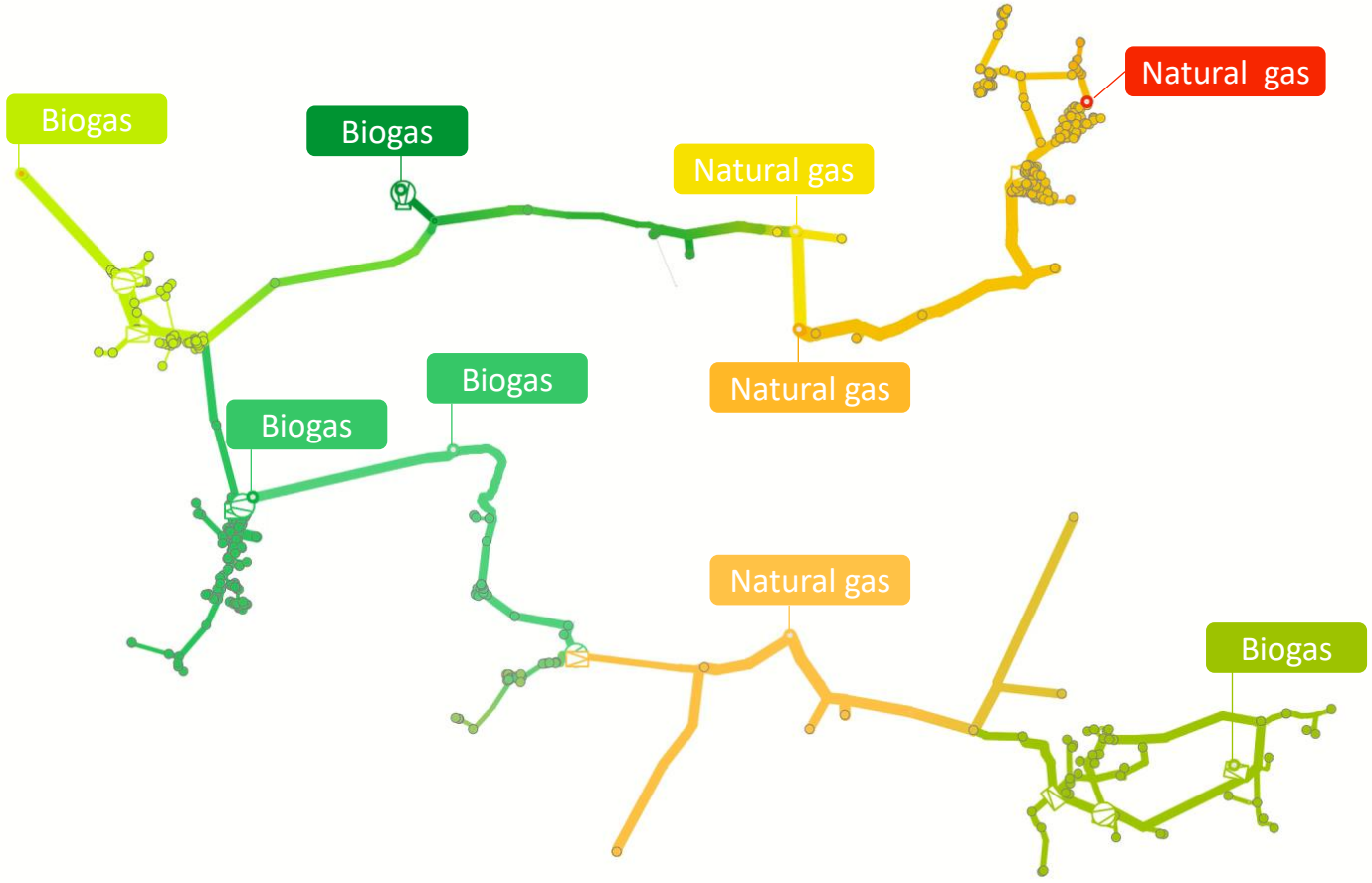
European Biomethane Week, Brussels, 23rd October 2024

Dr. Peter Schley, SmartSim GmbH

SmartSim

Why Gas Quality Tracking?

Example of a regional distribution grid in Denmark with 4 natural gas and 5 biomethane entry points (February 2022)



Biomethane injection

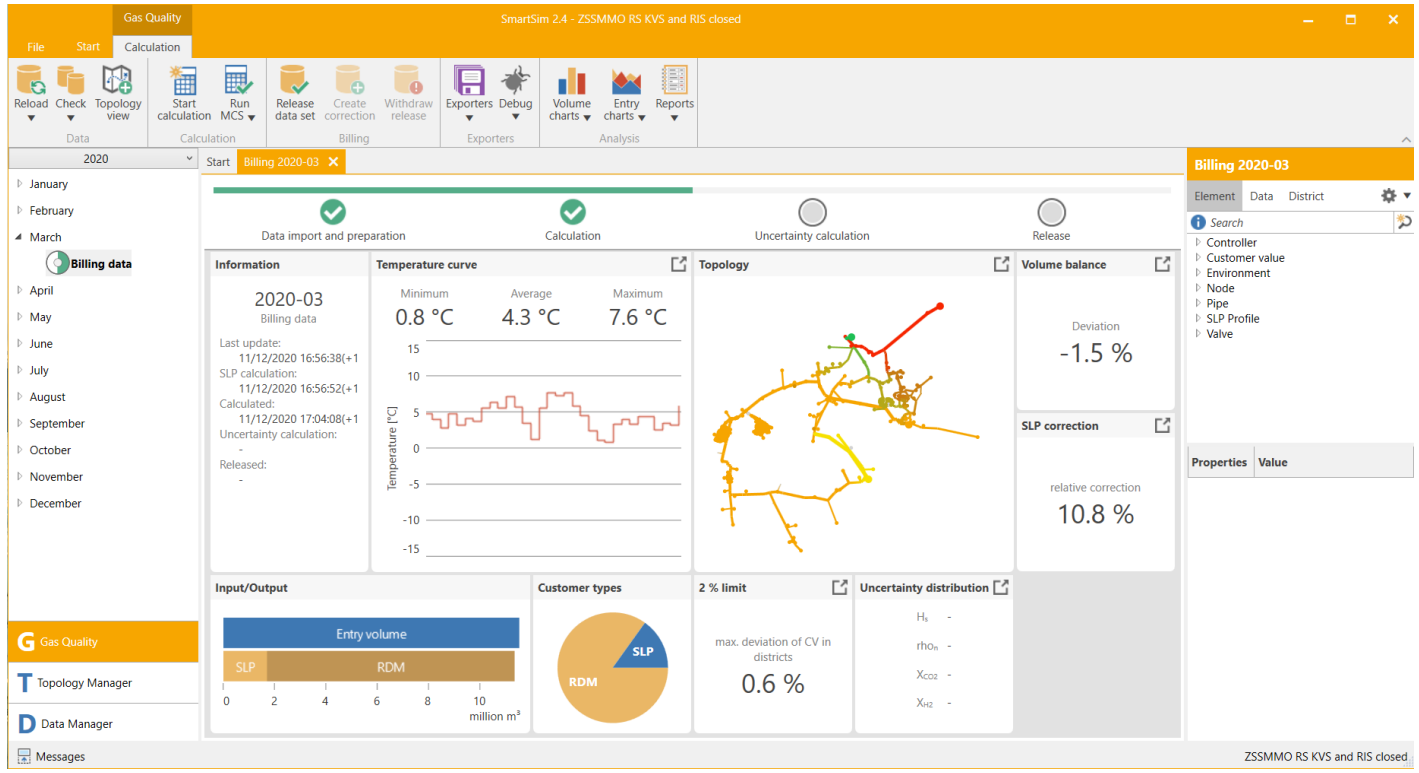
- Calorific Value (CV) of biomethane and natural gas differ by up to 10 %
- billing with a volume weighted mean CV only possible if CV of biomethane is increased by admixing LPG
- high costs and negative environmental impact

→ Gas Quality Tracking avoids admixing of LPG or investing in measurement devices

Digital Solution based on Gas Quality Tracking

SmartSim

- Windows based software which allows intuitive operation
- in accordance with ISO Standard 15112 (Energy determination), including an uncertainty calculation based on Monte Carlo simulation
- integrated calculation kernel ensures short computing times



How Does Gas Quality Tracking Works?

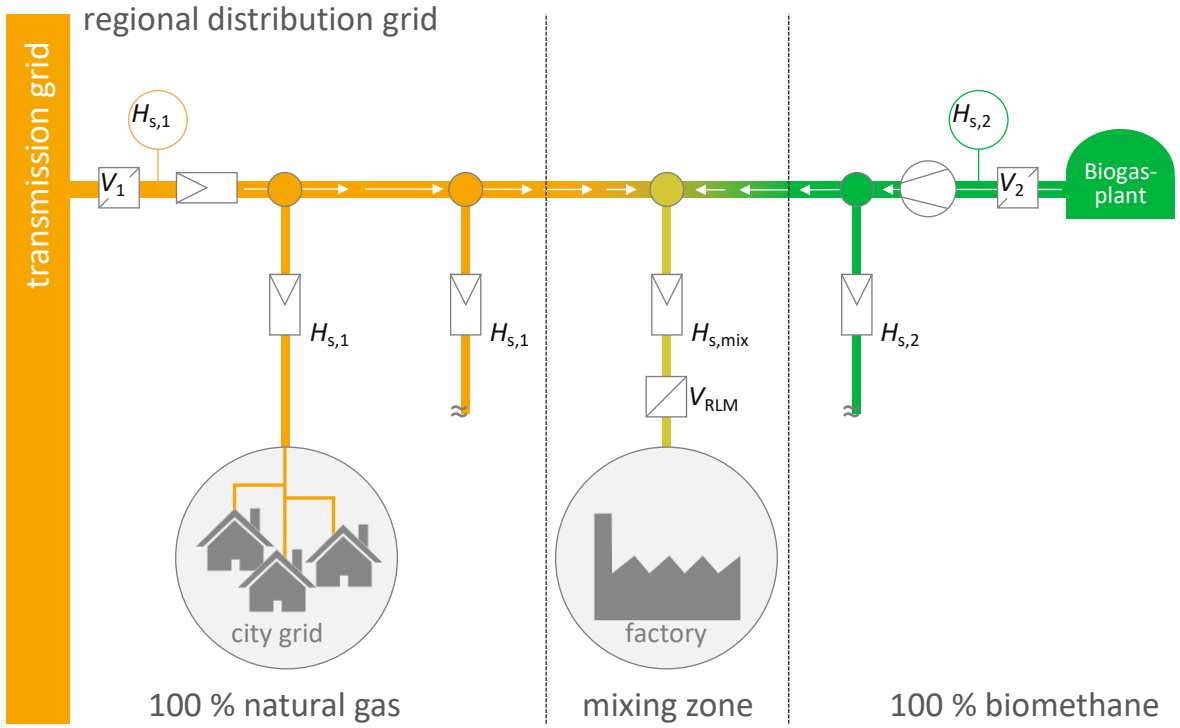
SmartSim

Input data for SmartSim

- Grid topology
- volume flows at entry and exit points
- yearly consumption/standard load profiles at exit points where no volume meters are available
- gas qualities (CV) at all entry points

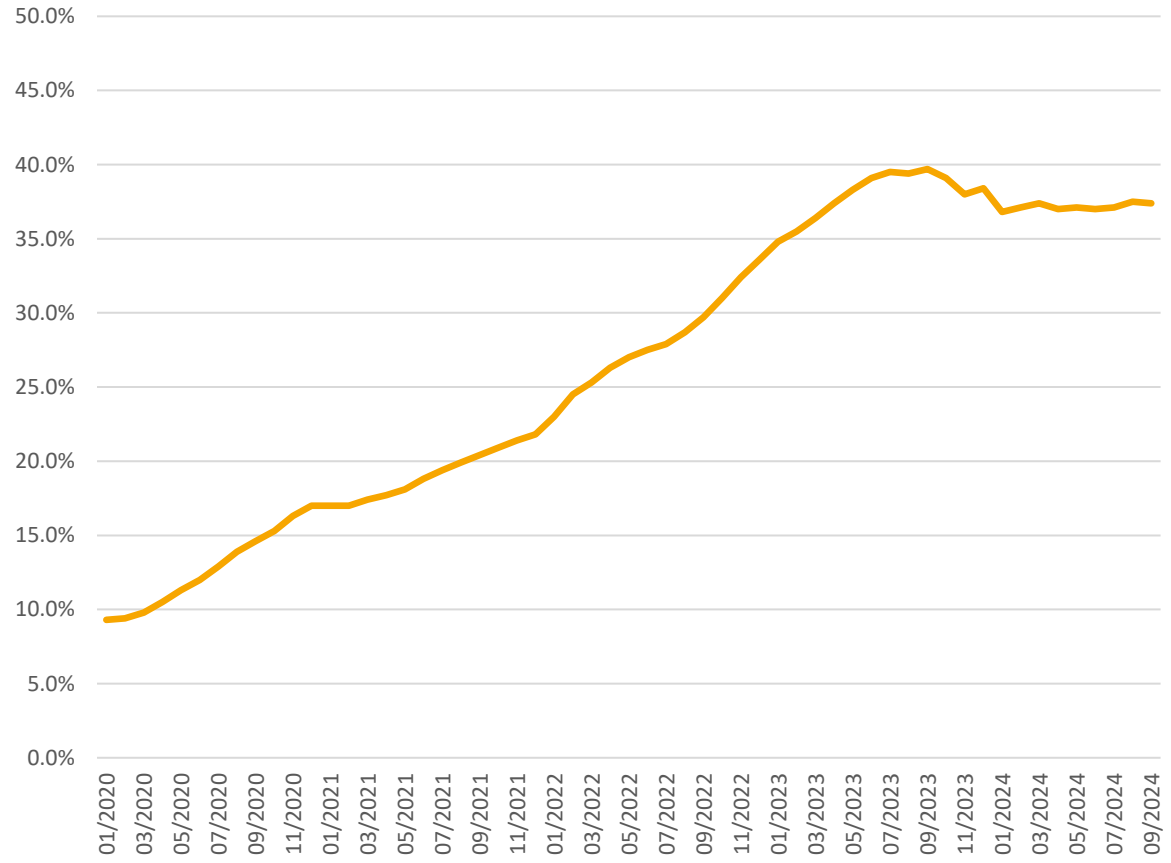
Calculation

- Grid Simulation (pressure, flow velocities in all pipes)
- tracking of “gas packages” through the grid with a new developed algorithm
- calculation of CVs and further gas quality properties at all exit points



Development of Biomethane in Denmark and How SmartSim Supported its Integration into the Gas Network

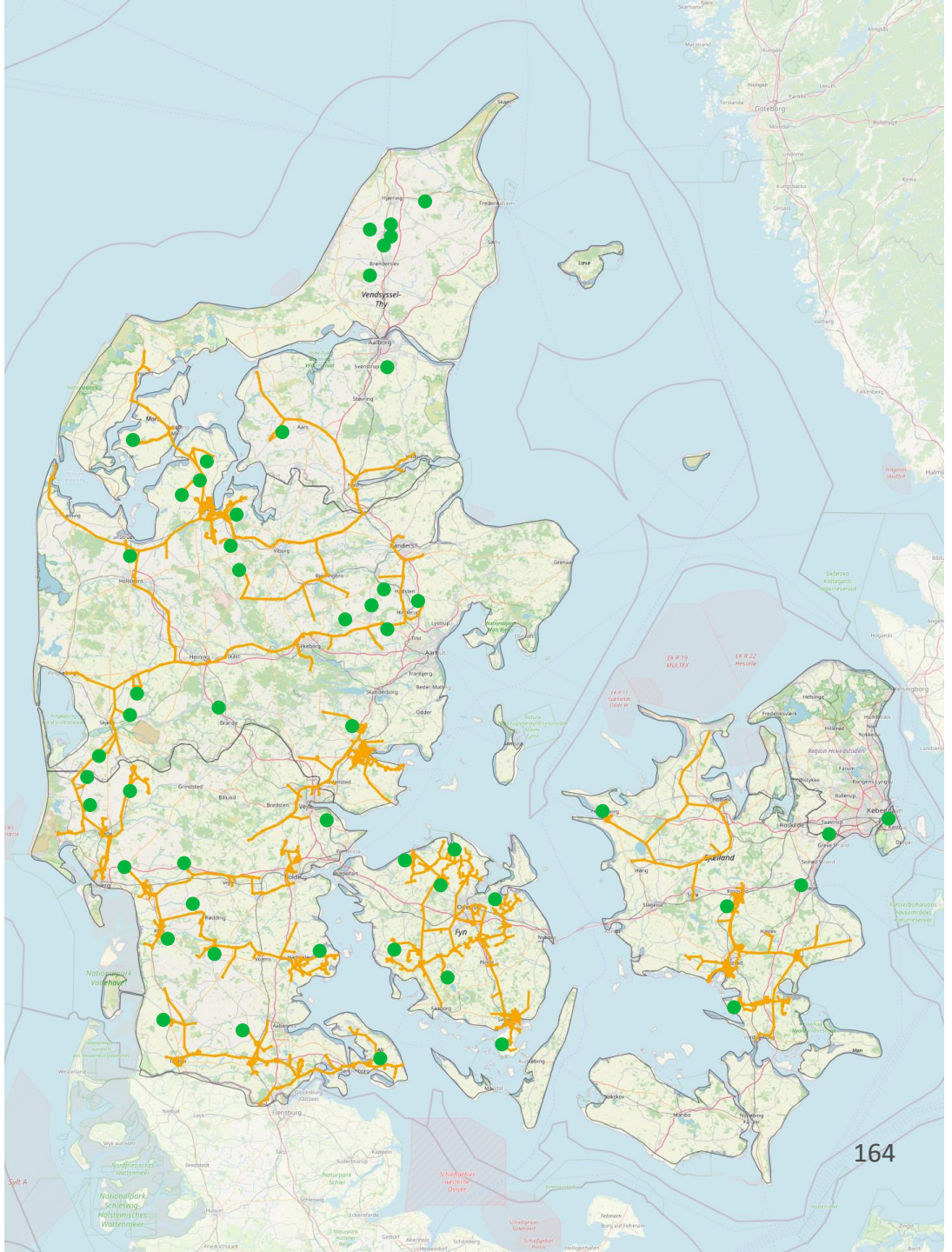
- Currently, 40% of Denmark's gas demand is supplied by biomethane



Source: https://en.energinet.dk/gas/biomethane/

Development of Biomethane in Denmark and How SmartSim Supported its Integration into the Gas Network

- Currently, 40% of Denmark's gas demand is supplied by biomethane
- 58 biogas plants produce approx. 800 Mio m³(n) upgraded biomethane (2022); this corresponds to an average production of approx. 1500 m³/h per plant
- biomethane is usually injected into the high-pressure grid without admixing LPG
- correct energy billing is ensured by gas quality tracking
- today about 3/4 of the Danish distribution grid is simulated with SmartSim



Conclusion

- Gas Quality Tracking is an efficient method to ensure correct billing when injecting biogas
- the SmartSim method is already being successfully used in many European countries today (i. a. Austria, Denmark, Germany, Ireland, Spain, Sweden)
- the further implementation of gas quality tracking will help in the decarbonization of gas networks in Europe

Q&A Session

Biogas 4.0: boosting efficiency with tech wizardry

Moderated by Dirk Bonse

Maja Rosiak

Xylem

Philippe Breuils

Green Data Science

Jhuma Sadhukhan

University of Surrey, UK

Anna Schnürer

Swedish University of Agricultural Sciences

Peter Schley

SmartSim GmbH

HARMEN'S BIOGAS BUILDING CHALLENGE

Biogas: can a vision be pragmatic?

Live double interview

Harmen Dekker

CEO

European Biogas Association

Tatiana Marquez Uriarte

Member of the Cabinet of the EU Commissioner for Energy

European Commission

EUROPEAN BIOMETHANE WEEK

Visual summary

EUROPEAN BIOMETHANE WEEK

Afternoon plenary

On target towards 2040 by resilience and pragmatism

Alexandre Paquot

DG CLIMA , European Commission

Mathieu De Carvalho

TotalEnergies

Andreas Graf

Agora Energiewende

Giulia Laura Cancian

European Biogas Association

Goetz Baumgarten

Evonik

Andreas Guth

Eurogas

EUROPEAN BIOMETHANE WEEK

Afternoon plenary

On target towards 2040 by resilience and pragmatism

Alexandre Paquot

Director of Innovation for Low Carbon, Resilient Economy

DG CLIMA , European Commission

EUROPEAN BIOMETHANE WEEK

Afternoon plenary

On target towards 2040 by resilience and pragmatism

Mathieu De Carvalho

Regulation & Public Affairs Sr Manager

TotalEnergies

EUROPEAN BIOMETHANE WEEK

Mathieu DE CARVALHO

Regulation & Public Affairs Sr Manager

On target towards 2040 by resilience and pragmatism

An objective of net zero by 2050, together with society

Our energy mix in 2050

CCS: 50-10 Mt CO_2e

Oil

- **Maintain production** to keep pace with changing demand
- Align sales with **production**

Gas

- Grow in integrated LNG production
- Increase production and sales of LNG, especially in countries where it can replace coal

Electricity & Renewables

- **Become an integrated operator** in electricity
- Renewables: **100 GW** in 2030

New Molecules

- **Grow in biofuels** (SAF), biogas, CCS
- Launch **pioneering projects in hydrogen**

The energy transition's three pillars

Ensuring that the world's growing population has access to the **affordable energy** necessary for human development

Ensuring **energy security** in every country (risk of unavailability and soaring prices)

Decarbonising energy to limit the effects in terms of Greenhouse Gases (~2/3 of which come from energy)

How to unlock the energy transition's potential?

TotalEnergies

OPPORTUNITIES

- Mounting public awareness
- "Green competition" amongst countries and industries
- Electrification growing rapidly
- Existing "clean" technologies already having significant impact
- Recent acceleration in energy intensity gains

ROADBLOCKS

- Too few public policies focused on demand and changing consumer behaviour
- Distribution of transition costs not fair enough: energy must remain affordable
- Planning, permitting and people bottlenecks
- Not enough "clean" technologies and R&D
- Global South far from sufficiently funded

Challenges to scale-up biomethane

To kick-start production through **subsidies** for countries that have not yet started injecting biomethane and where demand is still nascent or to be created

To switch to a demand-driven market for **compliance markets** or through **blending obligations** in the gas grid or via sectoral targets (e.g., transport).

1

Support the EU biomethane market through appropriate and harmonised mechanisms

- Set up of **ambitious targets** to provide visibility to investors and promote **additionality**
- Secure the trade of biomethane in the EU through the system of **GO + PoS**, relevant national registries and the UDB and clarify the way subsidised biomethane will be dealt with
- Provide visibility on the acknowledgment of **biomethane in both voluntary (GHGP, SBTi) and compliance (EU-ETS) markets** to build a solid business model through **regulatory stability** (ESR declarations vs. ETS)

2

Speed-up administrative procedures

- Permitting and authorisation are key factors of success of REPowerEU
- Need to adapt the regulation and permitting of digestate to simplify its use as a local **organic fertilizer**

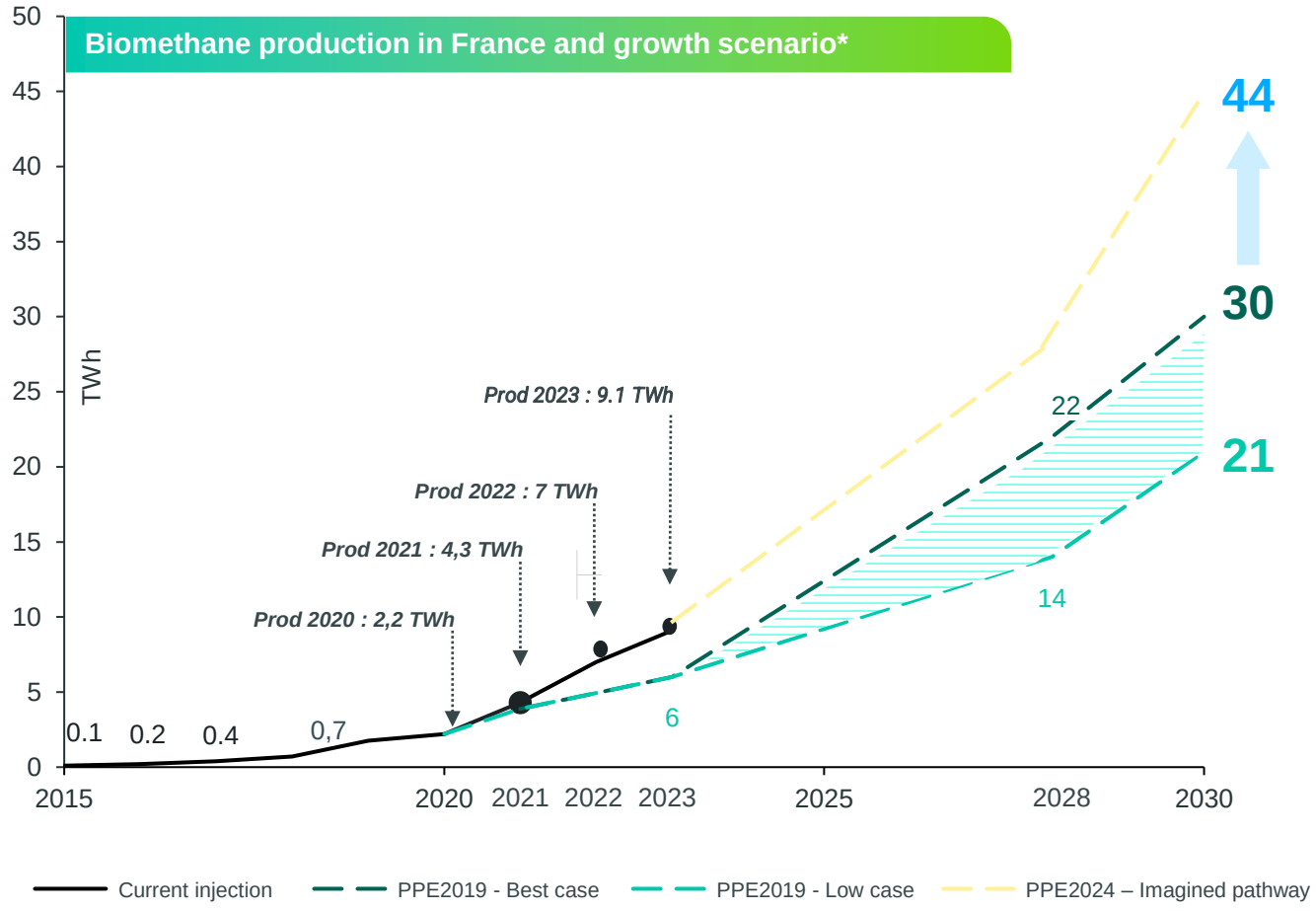
3

Build a strong and reliable customer's network

- Facilitate biomethane use in **hard to abate sectors** in a pragmatic way = **technological neutrality**
- **Increase available volumes** in line with 35bcm objective and **pave the way for 2040**
- Remove market barriers to reassure customers and give them long-term visibility : **harmonisation is key**

Focus on the French biomethane production

Biomethane production is currently surpassing earlier projections, with 2030 targets to be raised from **30TWh to 44TWh** (if PPE3 - multiannual energy plan approved). This is an indicator that the market is entering a scale-up phase in terms of production and gives visibility in the medium-term of biomethane supply.



2.4 % - 9.1 TWh
injected in 2023 (+ 2.1 TWh compared with 2022)

11.8 TWh
of booked capacity in 2023
(+0.7 TWh/year over Q4-2023, and +2.8 TWh/year in 2023)

15% - 44 TWh
of green gas in the networks in 2030

Sector Ambition

652
units dedicated to injecting biomethane into the network in 2023 *(+ 138 in 2023, including 18 landfill sites and 47 WWTPs)*

* *Source: PPE / GRDF*

Key message : speed & ease

On target towards 2040 implies doing everything possible to **exploit the identified potential as quickly as possible**, as a complement to other renewable energies

Speed

2030 ambition

35 bcm of injected biomethane

Accelerate biomethane development *via* both production and GHG targets at consumption. Active role in **BIP Europe's TFs** and **WBA #MakingBiogasHappen** program to support the **energy transition** and **sustainable development of territories.**

Ease

Ensuring a **supportive regulatory framework** is crucial, with a **full recognition** of biogas and its co-products (digestate and bioCO_2). This includes providing **subsidies**, **tax incentives**, and **streamlined permitting processes** for biomethane projects.

2040 ambition

The trajectory for biomethane in 2040 will lie on ambitious production targets, national initiatives, and stable financial & regulatory mechanisms for both producers and consumers

GREENHOUSE GAS PROTOCOL

WORLD BIOGAS ASSOCIATION

Thank you for your attention

Afternoon plenary

On target towards 2040 by resilience and pragmatism

Andreas Graf

Programme Lead EU Climate & Energy Policy

Agora Energiewende

EUROPEAN BIOMETHANE WEEK

The role of biogas and biomethane in the 2040 energy transition

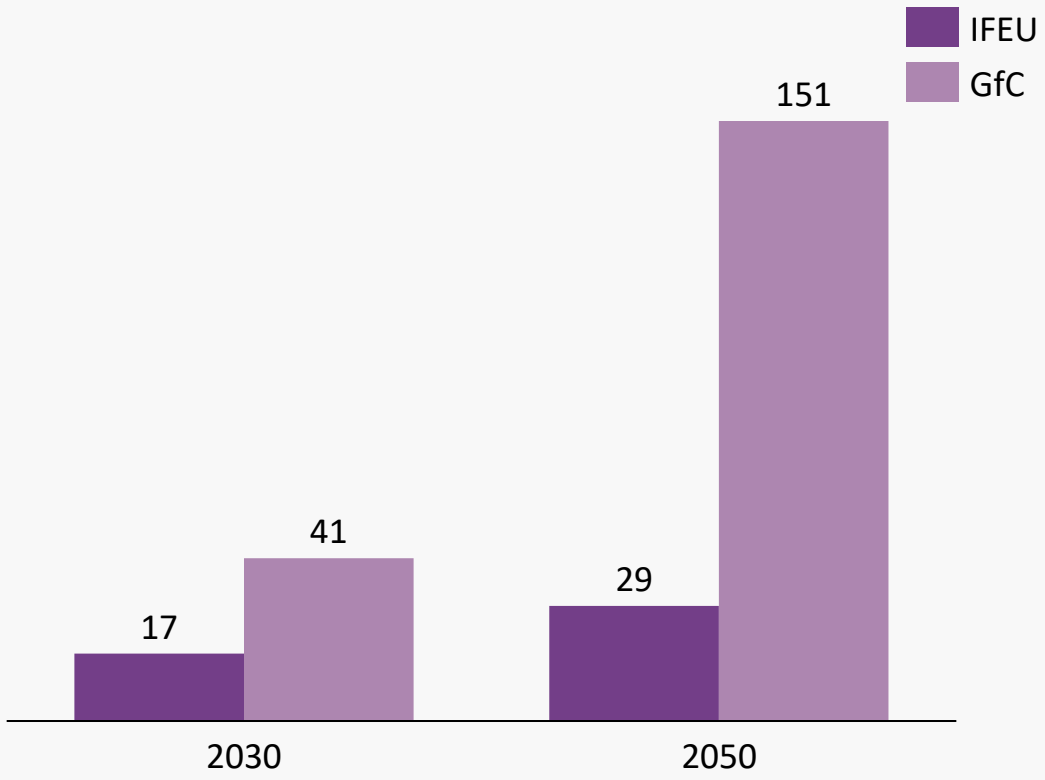
Andreas Graf

Programme Lead EU Climate & Energy Policy

23 October 2024

Sustainable production potentials for biomethane are hotly debated and remain unresolved

Estimated biomethane production potential, EU27



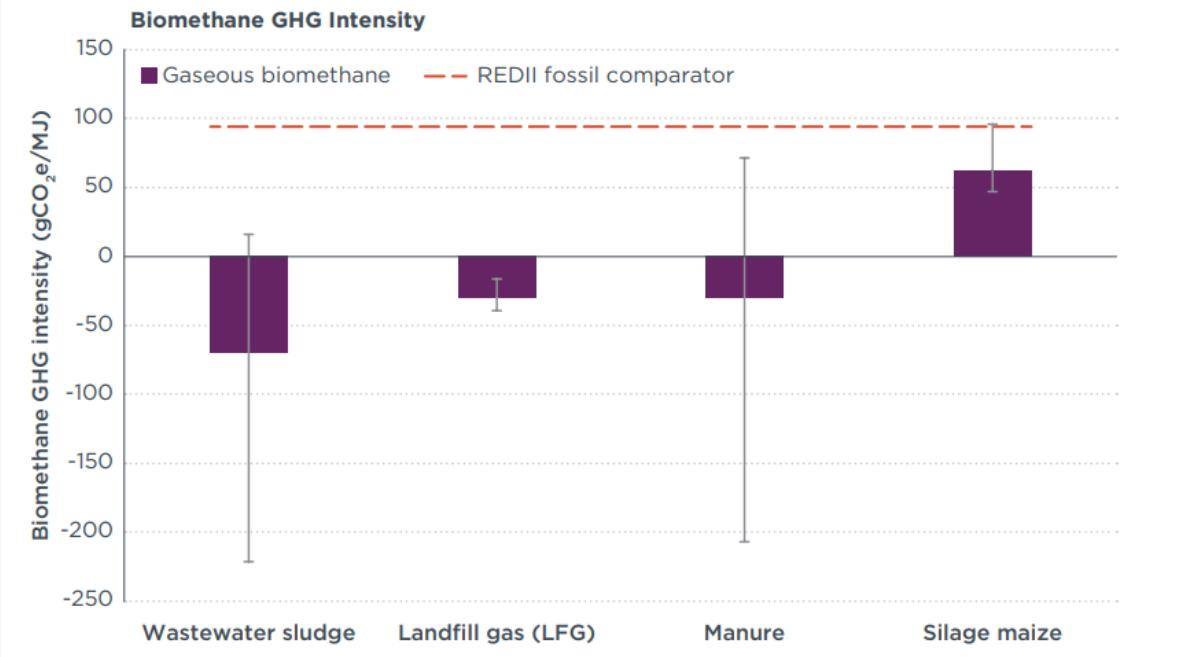
Estimates for sustainable biomethane production potentials ranging from 17.5-41 bcm in 2030 and 29-151 bcm in 2050.

Key concerns:

1. Expected reliance on energy and food crops leading to higher direct and indirect emissions
2. Competition for limited sustainable feedstocks with food and other bioenergy (e.g. biofuels) and biomaterial uses
3. Economic cost limitations
4. Methane leakage

Feedstock & sustainability - not all biogas/-methane feedstocks are equal

Life-cycle greenhouse gas intensities of biomethane pathways using 100-year GWP*



Different feedstock sources yield very different carbon intensities for biomethane production .

Biomethane upscaling needs to be focussed on manure & biowaste methanization

→ A comprehensive EU definition for sustainable biogases is needed.

→ **Couple subsidies to sustainable feedstock** i.e. focus policy support on waste and residues (e.g. RED III Annex IX feedstocks)

→ Set **caps for unsustainable feedstock** based on rules for transport sector in RED

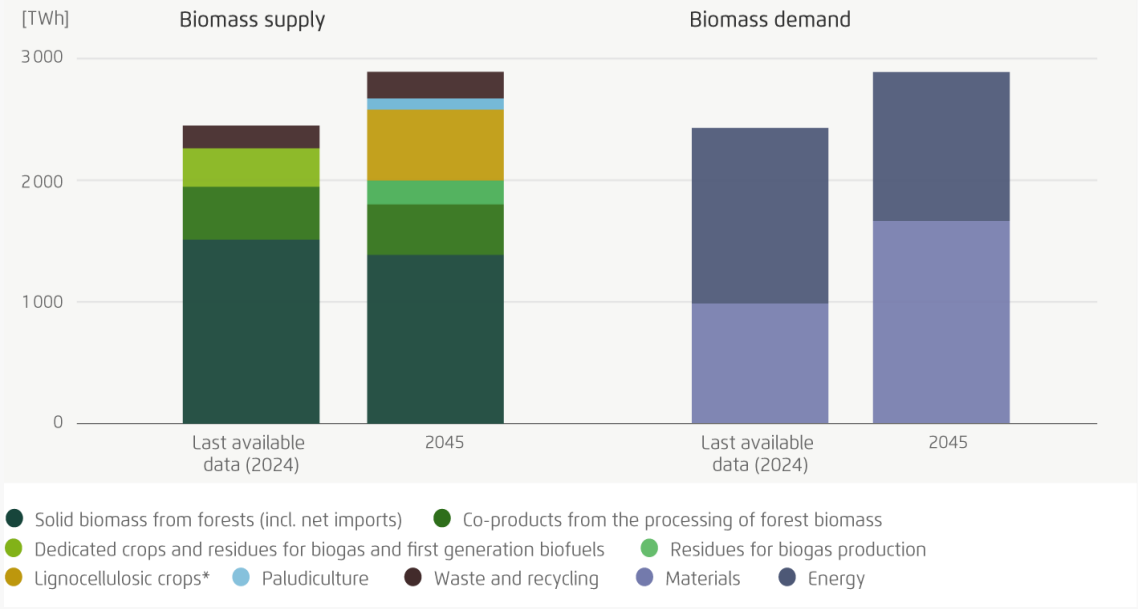
→ Establish minimum shares for waste & residues

1 Searle, S., Baldino, C., & Pavlenko, N. (2021). Biomethane potential and sustainability in Europe, 2030 and 2050. ICCT.

 *Error bars represent key parameters influencing the emissions of each pathway [1]

Total demand for biomass is set to increase significantly and there will be limits to what we can sustainably supply

Demand and supply of biomass in the EU



A new Agora Agriculture study, which is based on an efficient allocation of biomass, projects a 20% increase in demand for non-food, non-feed biomass uses between 2020 and 2045 – in particular for materials

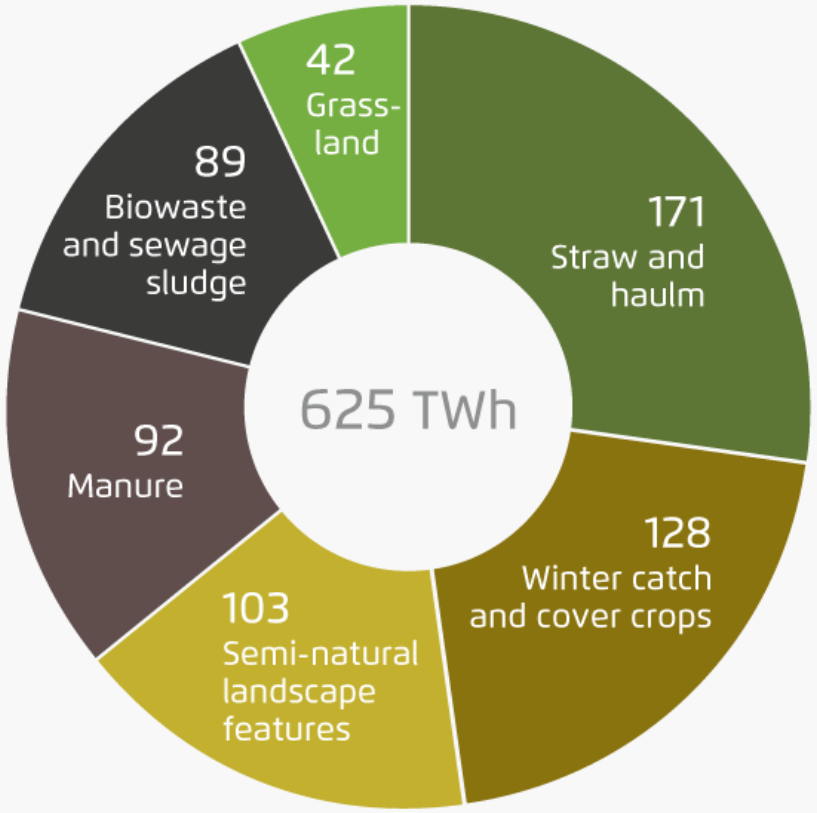
The EU's current policy framework lacks coherent, long-term incentives to stimulate a bioeconomy that efficiently utilises biomass.

The revision of the EU Bioeconomy Strategy in 2025 should include an action plan for the efficient use of biomass in the bioeconomy, including measures for carbon removal.

Agora Agriculture based on Agora Energiewende (2023), Dahms et al. (2017), European Commission (2021), Eurostat (2023), Material Economics (2021).
*e.g., short rotation coppics, agroforestry, miscanthus

Achieving technical potentials is also limited by key restrictions

Technical bioenergy potential* of residue biomass for anaerobic digestion in 2045, EU



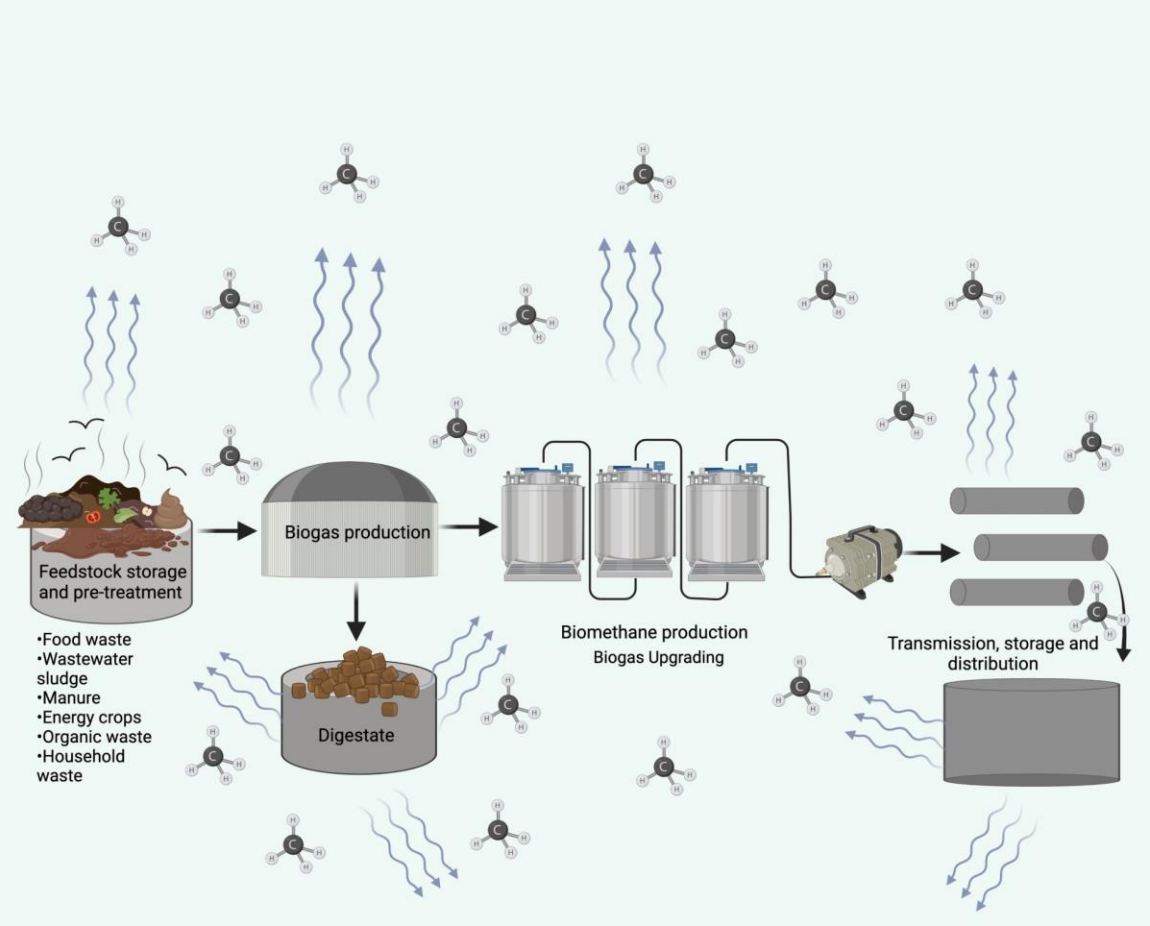
Agora Agriculture estimates an annual technical potential of agricultural residues, organic municipal waste and biomass from semi-natural features in the EU in 2045 at 625 TWh = 64 bcm.

However, the economic potential is estimated to be far lower due to several key restrictions:

- Maximum transport distances for biogas substrates
- Sustainable removal rates of crop residues.
- Competing uses of crop residues and organic waste

The mobilisation of these substrates will determine the realizable potential on a sustainable substrate basis.

Currently there are no methane-related obligations for biogas/methane production (only as of injection)



Special characteristics of biogas infrastructure (small-scale and less industrialized) → **increased risk of leakage** and **high range of uncertainty** (up to 15% leakage rate)

Processing & digestate storage most leak prone – MRV needed at site level

Biomethane leakage can quickly neutralize the gains from CO_2 capture

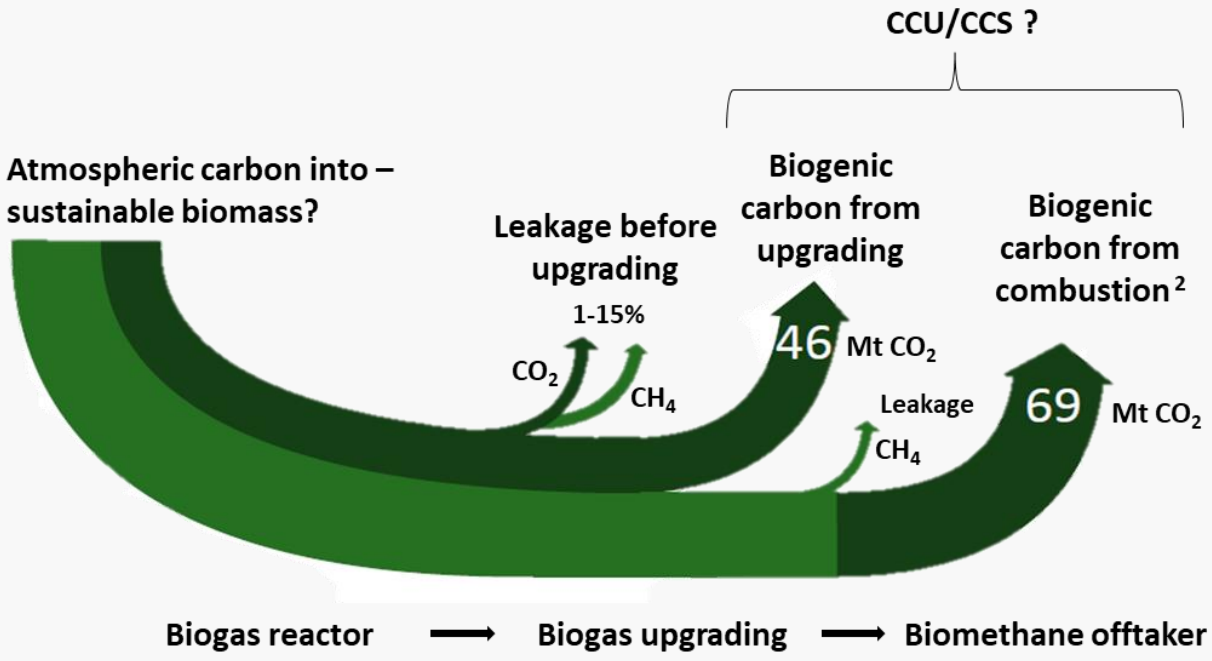
Targeted revision of the Methane Regulation needed to close the biomethane regulatory gap

Best practice DK: new regulations requiring MRV & fixing leaks to max 1% from 2025 in biogas plants

Agora Energiewende

Upgrading requires thinking about the role and management of biogenic carbon along the full value chain

Technical bioenergy potential* of residue biomass for anaerobic digestion in 2045, EU



CO_2 needs to be captured during 1) upgrading and 2) use of biomethane to obtain negative emissions.

4-22 $MtCO_2$ of biogenic CO_2 from upgrading of biogas to biomethane in EC 2040 IA.

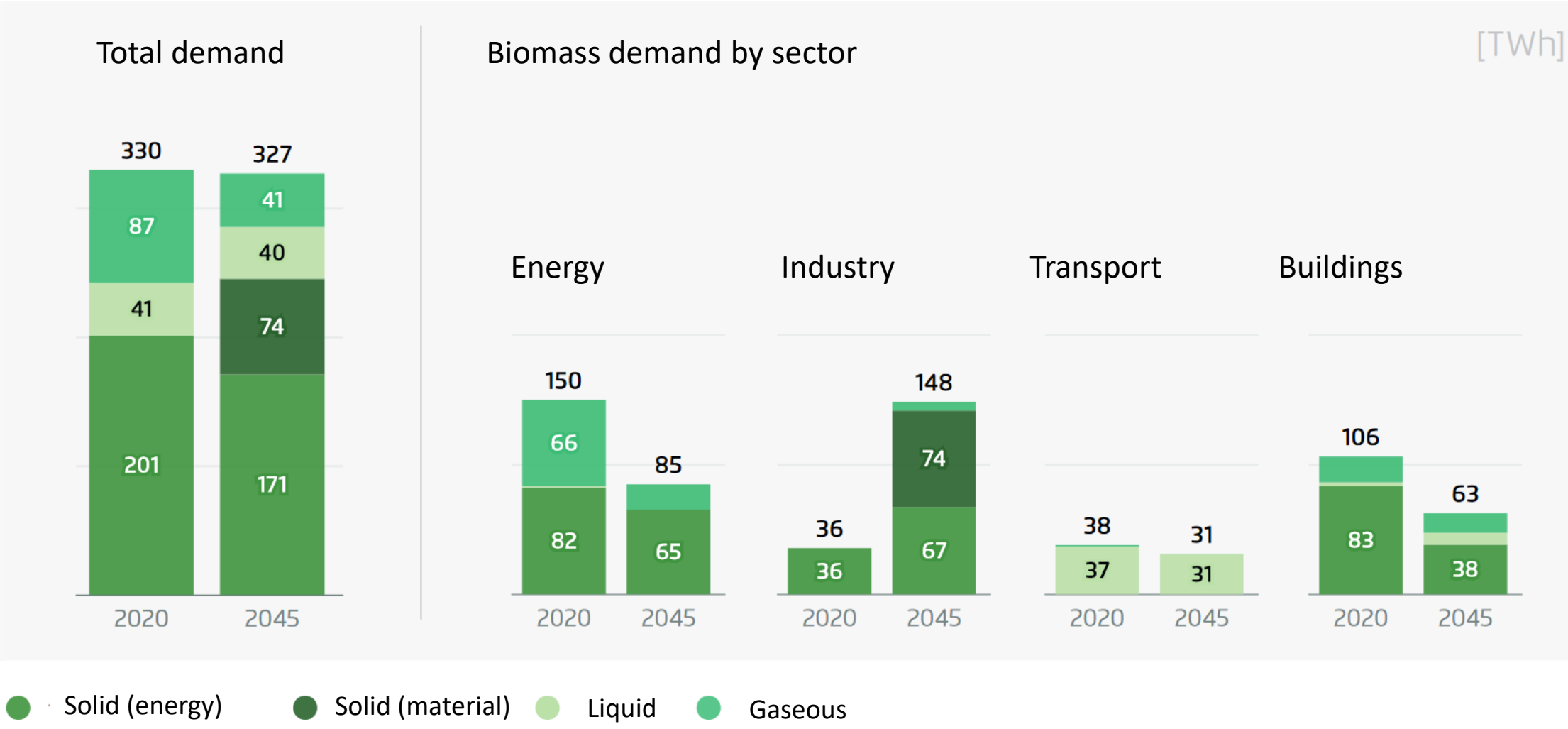
Need overall biogenic carbon (infrastructure) strategy including deployment of CO2 infrastructure, a chain of custody for CO2, guardrails for sustainable feedstocks and better biomethane leakage control.

Link biogas/methane upscaling with CCS rollout

- **Higher FiT for CCS integration in upgrading plant**
- **Adapt biogas/biomethane upscaling pace to CCS readiness through flexible production target**

1 assuming a 50-70 % CH4 and 30-50 % CO2 content in biogas, depending on feedstock composition and biogas recovery technology
2 in case biomethane is used for energy purposes or H2 production

A recent Agora climate-neutrality scenario for Germany projects a decline in total demand for biogases by 2045



Agora Energiewende, Prognos, Öko-Institut, Wuppertal Institut und Universität Kassel (2024): Klimaneutrales Deutschland – Von der Zielsetzung zur Umsetzung.

Agora Energiewende

Thank you for your attention!

Are there any questions or comments?

andreas.graf@agora-energiewende.de

Afternoon plenary

On target towards 2040 by resilience and pragmatism

Giulia Laura Cancian

Secretary General

European Biogas Association (EBA)

EUROPEAN BIOMETHANE WEEK

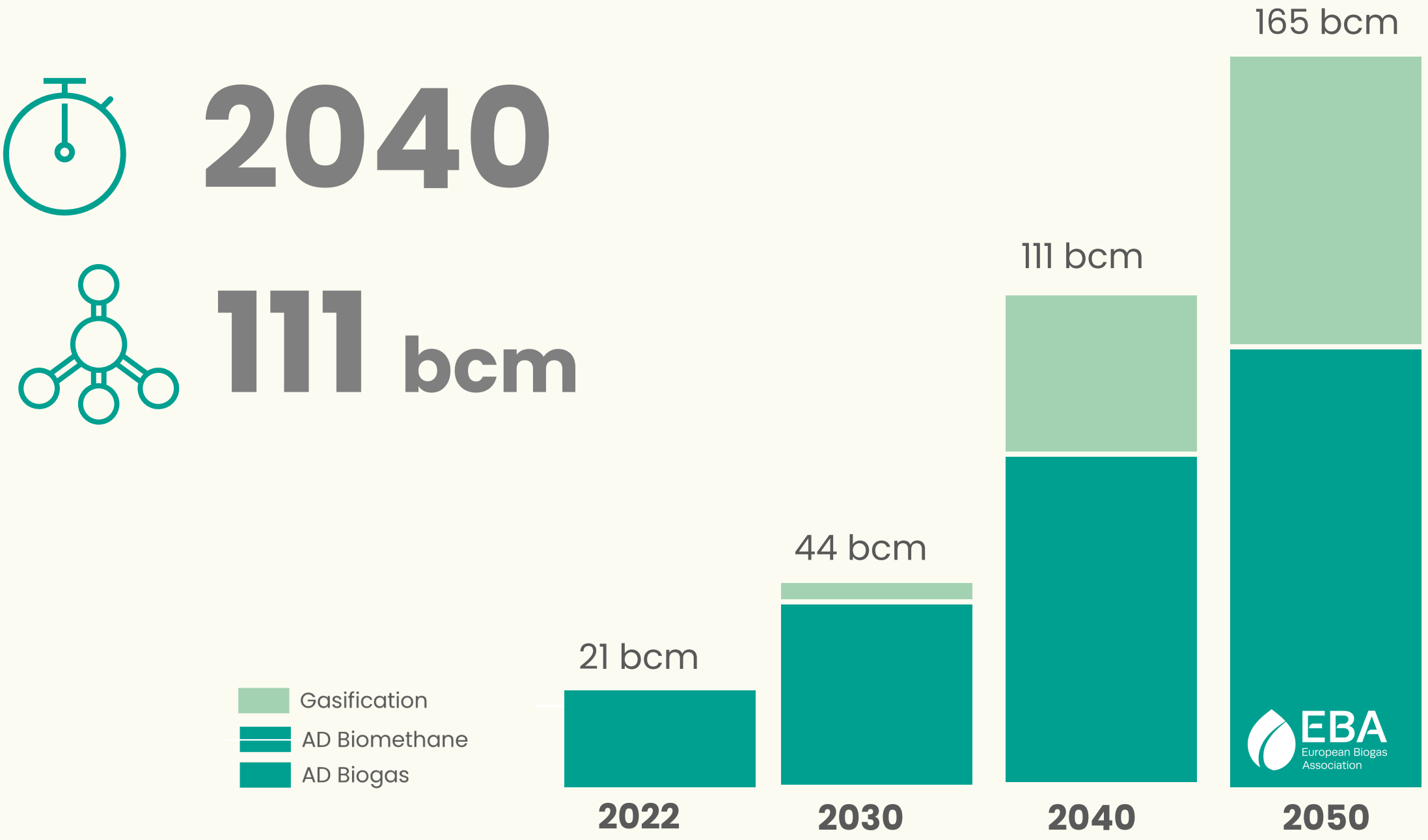
BIOMETHANE: BUILDING BLOCK OF A RESILIENT TRANSITION

European Biomethane Week, Brussels, 2024
Giulia Cancian, EBA Secretary General

EBA
European Biogas Association

2040

111 bcm


165 bcm
111 bcm
44 bcm
21 bcm
Gasification
AD Biomethane
AD Biogas
2022
2030
2040
2050
EBA
European Biogas Association

EBA
European Biogas Association

Today

1548 Plants

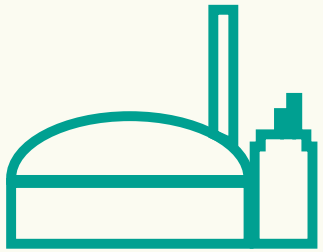
6.4 bcm/year

Installed capacity

EBA
European Biogas Association

2030

€ 27 bn



950 Plants

NECPs

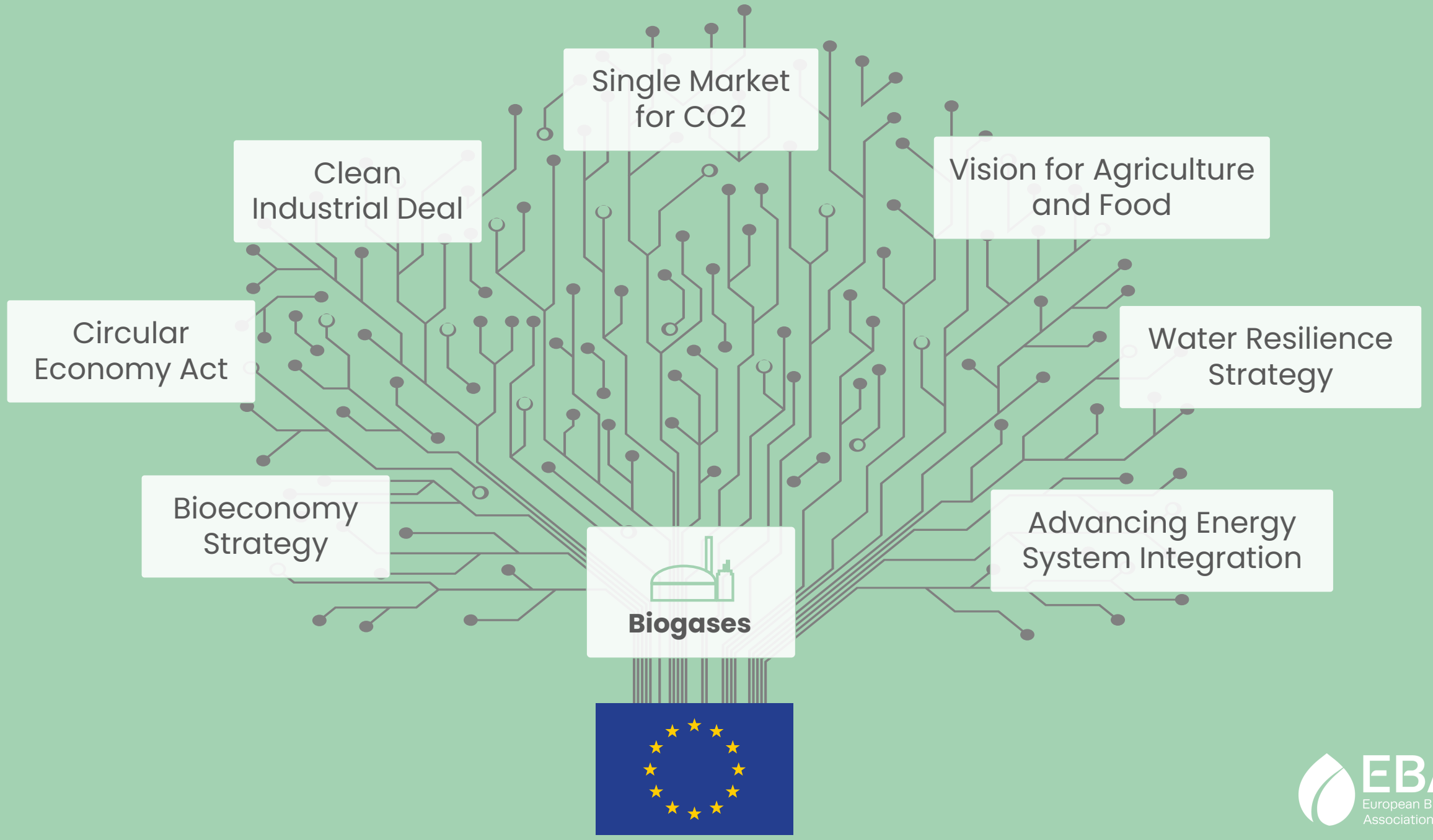
~ 15 bcm

EBA
European Biogas Association

1 Truly **Circular Model**

2 Enhanced **Efficiency**

3 **Actionable Tools** for Traceability



EBA
European Biogas Association

THANK YOU!

Giulia Cancian
cancian@europeanbiogas.eu

Re-thinking our economy. Making the energy transition happen.

www.europeanbiogas.eu

Follow us on

Afternoon plenary

On target towards 2040 by resilience and pragmatism

Goetz Baumgarten

Vice President Membranes at Evonik Operations GmbH, Marl Germany

Evonik

EUROPEAN BIOMETHANE WEEK

Revolutionizing biogas upgrading:

Evonik's innovative membranes

Dr. Goetz Baumgarten
European Biogas Conference 2024
Brussels

EVONIK
Leading Beyond Chemistry

Evonik at a glance

€15.3 bn
Sales

€1.7 bn (10.8%)
Adj. EBITDA (margin)

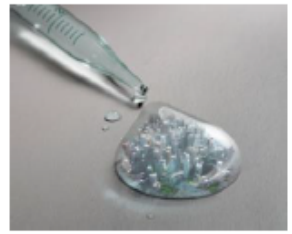
€801 m (48%)
Free Cashflow (conversion)

€1.17 (>6%)
Dividend (yield)

FY 2023

LEADING BEYOND CHEMISTRY

Specialty Additives
Small amount –
big effect



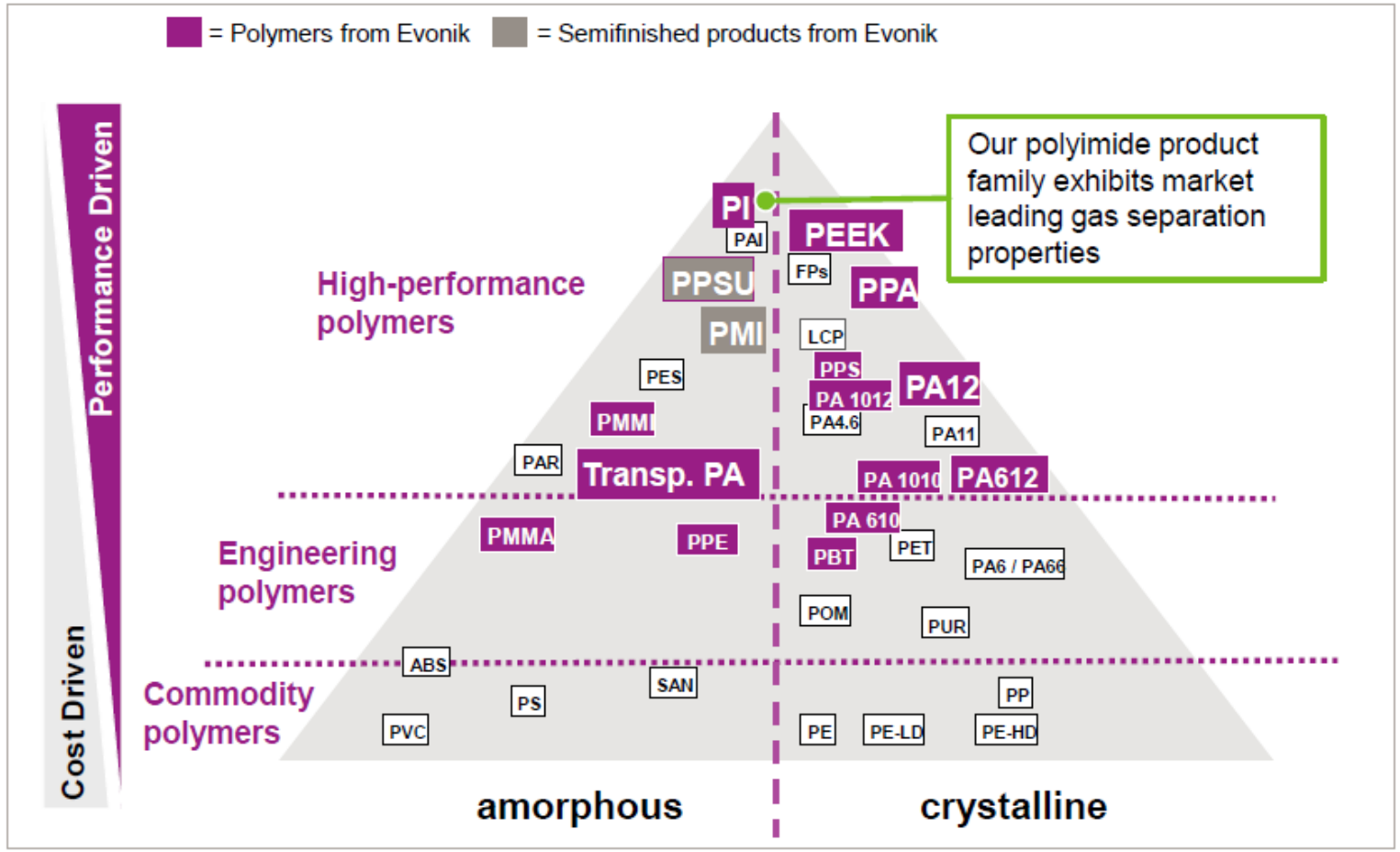
Nutrition & Care
Life at heart.
Systems in mind.
Partners at hand.

Smart Materials
We find solutions
for the needs
of today and tomorrow

EVONIK
Leading Beyond Chemistry

We achieve outstanding membrane performances with our polymers

Properties of Polyimide result in best selectivity and permeability results



SEPURAN® Hollow Fibre Membranes

- **High Efficiency:** SEPURAN® membranes offer exceptional gas separation efficiency, making them highly effective for various industrial applications.
- **Robust Design:** The membranes are designed for durability and reliability, ensuring consistent performance even under challenging conditions.
- **Versatile Applications:** They are suitable for a wide range of applications, including biogas upgrading and nitrogen extraction, providing flexibility for different industries.
- **Innovative Technology:** Evonik's advanced membrane technology and continuous innovation keep SEPURAN® at the forefront of the market.

EVONIK Leading Beyond Chemistry

SEPURAN® Green Membranes - Leading the Market Revolution!

Continuous market adaption is key to success

1984 Invention of P84® polyimid chemistry at Evonik

2011 Market entry of SEPURAN® Green Invention of 3-Stage process

2012

First grid-injection plant with SEPURAN® membranes realized in Poundbury, UK

2016 Portfolio expansion allows high flexibility and adaption

2017 Continuous expansion and development of hollow fibre and module production capacity

2019 New fibre type increasing performance significantly

2021

2023 Evonik's 1000th biogas reference plant fully live and operational

2024 „think big" launch of project ELVIS

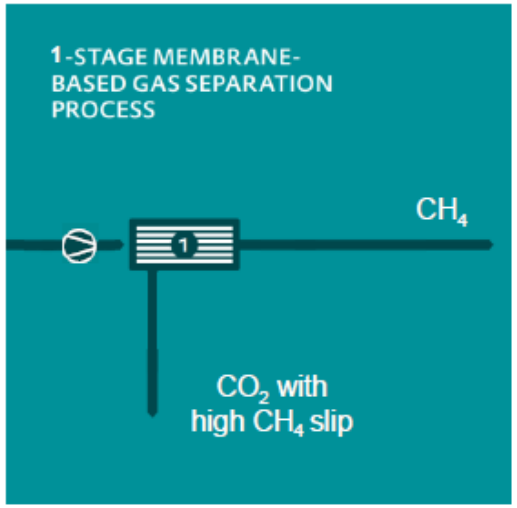
2026 New generation of spinning line will further boost production capacity

EVONIK Leading Beyond Chemistry

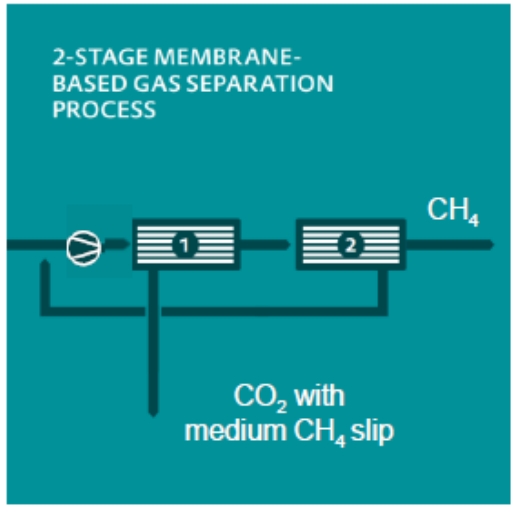
Evonik sets new standards: Inventor of 3-step process for biogas upgrading

Best optimum of investment and operating costs for CO_2/CH_4 separation

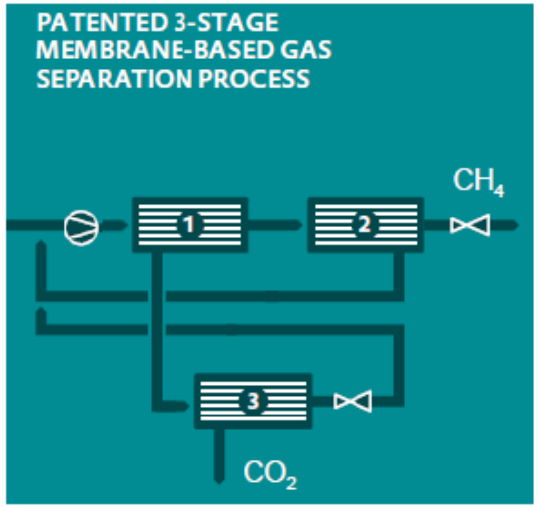
Pending on Market maturity



- CH_4 at high pressure
- **High** CH_4 purity
- **Low** CH_4 yield
- High CH_4 slip



- CH_4 at high pressure
- **High** CH_4 purity
- **Medium** CH_4 yield
- Medium CH_4 slip



- CH_4 at high pressure
- **High** CH_4 purity
- **High** CH_4 yield
- Low CH_4 slip

EVONIK Leading Beyond Chemistry

EVONIK
Leading Beyond Chemistry

Technology of choice
SEPURAN® Green Membranes make the difference

Highest product purity & methane recovery

10+ years lifetime

Maintenance-free

Process optimization

Modular set-up allows highest flexibility

Simplicity of process and operation

Innovation Leader

High leverage on process improvement by membrane as center-piece

EVONIK Leading Beyond Chemistry


EVONIK
Leading Beyond Chemistry

Afternoon plenary

On target towards 2040 by resilience and pragmatism

Andreas Guth

Secretary General

Eurogas

EUROPEAN BIOMETHANE WEEK

Biomethane is not an option

It is a necessity

eurogas

Q&A Session

On target towards 2040 by resilience and pragmatism

Alexandre Paquot

DG CLIMA , European Commission

Mathieu De Carvalho

TotalEnergies

Andreas Graf

Agora Energiewende

Giulia Laura Cancian

European Biogas Association

Goetz Baumgarten

Evonik

Andreas Guth

Eurogas

EUROPEAN BIOMETHANE WEEK

Visual summary of the plenary

EUROPEAN BIOMETHANE WEEK