

WEBINAR

Dig Deep!

12 December 2024

10h - 11h15 AM CET

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www.europeanbiogas.eu

Diversifying biomethane production: Gasification potential unlocked



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Casper van Mourik

Dutch Ministry of Climate
Policy and Green Growth



Staffan Hellsén

Cortus Energy



Nicola Bruni Zani

Pietro Fiorentini



Gustav Rogstrand

Rise Institute

Welcome

Mieke Decorte

Technical Director, European Biogas Association

Get the EBA Gasification White Paper

The full report can be accessed free of charge on the EBA website www.europeanbiogas.eu



Download the report



For any questions, please contact us at info@europeanbiogas.eu

Agenda

10:00 – 10:05 Welcome

Mieke Decorte, Technical Director, European Biogas Association

10:05 – 10:20 Keynote

Casper van Mourik, Senior Policy Advisor Renewable Heat, Dutch Ministry of Climate Policy and Green Growth

10:20 – 10:40 Gasification White Paper Unlocked

Anastasiya Agapova, Technical and Project Officer, European Biogas Association

10:40 – 11:10 Panel Discussion

Moderated by: Mieke Decorte, Technical Director, European Biogas Association

- Staffan Hellsén, HSEQ Manager, Cortus Energy
- Nicola Bruni Zani, Renewables Business Developer, Pietro Fiorentini
- Gustav Rogstrand, Chief Unit, Rise Institute

11:10 – 11:15 Conclusion and wrap-up

Mieke Decorte, Technical Director, European Biogas Association

Keynote

Casper van Mourik

Senior Policy Advisor Renewable Heat, Dutch Ministry of Climate Policy and Green Growth



Ministerie van Economische Zaken
en Klimaat







Subsidy for the gasification of waste streams

2024-12-12

Casper van Mourik, senior
policy advisor renewable heat
at the Ministry of Climate
Affairs and Green Growth

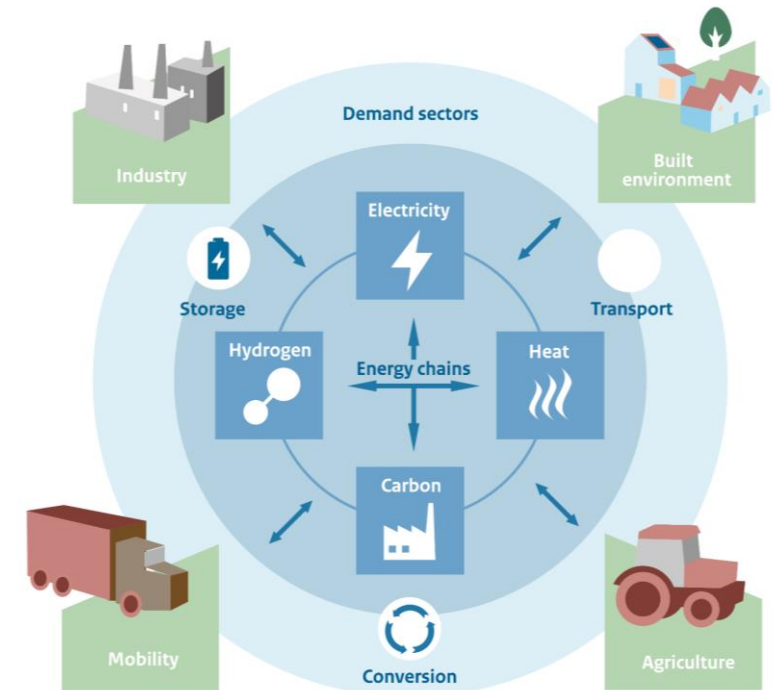


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-  The green gas blending obligation act
-  Why do we subsidize gasification?
-  The Dutch innovation ecosystem
-  DEI+ gasification of waste streams
-  IEA task 33 country report of gasification in the Netherlands

Gasification is an important technology for the carbon chain

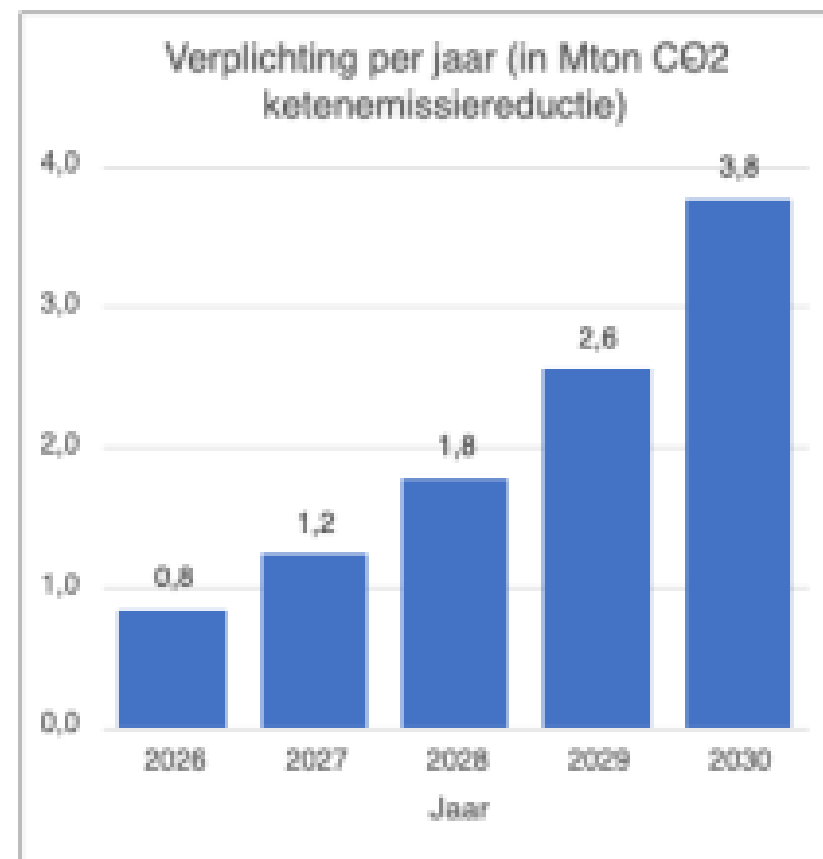
- In December 2023 we published our National Plan Energy System. The plan identifies four energy chains, among them the carbon chain.
- In accordance with the aim to achieve a circular economy, the goal is to minimize or ideally phase out fossil carbon by 2050.
- Potential sources of renewable carbon:
 - Bio-based materials
 - Secondary raw materials
 - Synthetic carbon carriers
- Gasification is an important conversion technology to increase the supply of renewable carbon





Green gas blending obligation act

- > The Dutch government proposed a green gas blending obligation to reduce 3,8 Mt of CO₂ chain emissions in 2030 or \pm 1,1 billion cubic meter (bcm).
- > We have estimated that about 0,4 bcm of this target will need to be met by gasification
- > In 2023 we produced 0,28 bcm biomethane in the Netherlands
- > The proposal is set to start in 2026 but still has to be approved by the Dutch parliament.





Why do we subsidize gasification?

- > We believe the main barriers for gasification are technological risks and high capital costs (similar to this excerpt from the EBA whitepaper).
- > Additional capex (capital expenditures) subsidy can decrease the cost of capital.
- > If new projects are demonstrated, the technological risks of new plants will decrease over time.
 1. **High Capital Costs:** initial investment for setting up gasification plants is high, which can be a barrier to entry for many investors.
 2. **Technological Risks:** as gasification technologies are complex and require advanced engineering and operational expertise, the risk of technological failures and operational issues can deter investment.

Research

Development

Demonstration

Scaling up

Realization/ Large-scale roll-out

NWO

(Top Sector Energy)

Grant for fundamental research and knowledge development for the climate and energy transition

MOOI

(Top Sector Energy)

Subsidy for large-scale, multidisciplinary innovation projects that lead to more sustainable energy systems, built environments and industry

EKOO

(Top Sector Energy)

Subsidy for small-scale innovation projects that lead to more sustainable energy systems, built environments and industry

TNO contribution

Annual contribution to the implementation of applied research carried out by TNO in the field of climate and energy

International co-funding opportunities

Active role and cofunding in Horizon Europe, Clean Energy Transition Partnerships (min €8 mln per year), Innovation Fund

Generic innovation schemes (Ministry of Economic Affairs)

General arrangements for innovation in industry. This also includes many innovation projects that contribute to the climate and energy transition (examples: Innovation Box, WSBO, MIT, PPP allowance)

DEI+

Subsidy for pilot, demonstration and scale-up projects of energy and climate innovations

Climate Fund measures from the Early Phase Scale-up plot

OWE & IPCEI H2

Subsidy for scaling up the production, use, transport/storage of hydrogen

SDE++

Subsidy for large-scale renewable energy production and CO2-reducing measures

SCE

Subsidy for energy cooperatives and owners' associations for the production of renewable energy

EIA

Investment deduction for entrepreneurs for measures that lead to lower CO2 emissions

ISDE

Subsidy for homeowners and businesses for measures that lead to less CO2 emissions

WIS

Subsidy for investments in heat networks for existing homes and buildings

VEKI

Subsidy for unprofitable investments in making the industry more sustainable with proven techniques

NIKI (in development)

Subsidy for large investments in innovative techniques in industry that lead to lower CO2 emissions



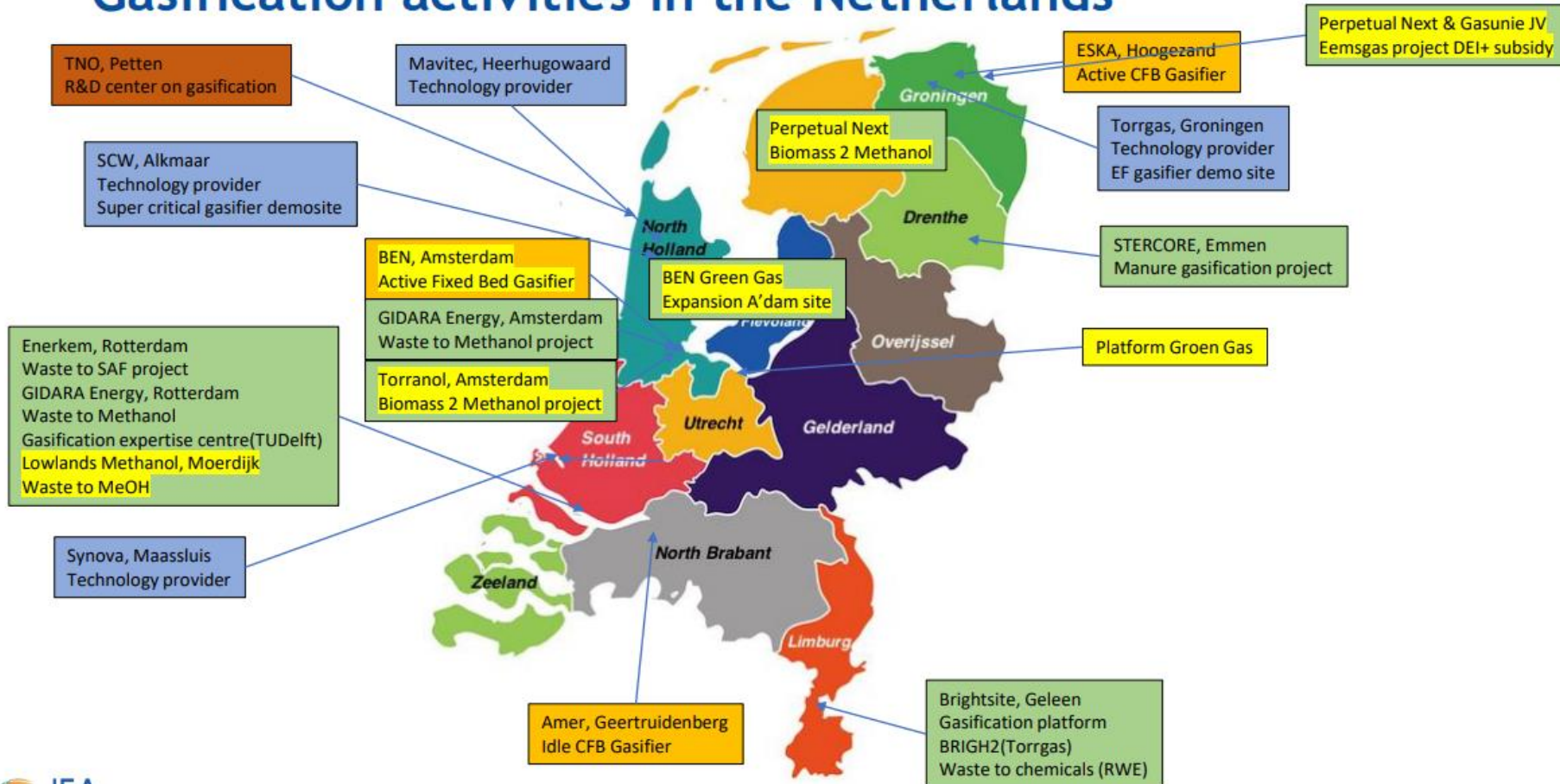
DEI+ gasification of waste streams

- › In 2024 we expanded our Subsidy Demonstration Energy Innovation (DEI+) with a separate budget for [gasification of waste streams](#).
- › The DEI+ is focused on capex. It was possible to apply for up to 30 million euro per project, with a total budget of 98 million euros.
- › The DEI+ can be combined with *opex-arrangements*: the biomethane blending obligation, the RED or the Dutch SDE++-subsidy for large scale energy production.
- › The subsidy intensity depends on the type of project but does not exceed 45%*.
- › The scheme applies to projects that produce biomethane, methanol, syngas or Sustainable Aviation Fuels.
 - The production of (primarily) hydrogen, recycled carbon fuels or CHP (combined heat and power) are excluded from the DEI+.
- › The biogenic feedstocks must comply with the sustainability criteria of annex IX of the Renewable Energy Directive (RED). Mixed waste is also included, as long as at least 40% of the feedstock is of biogenic origin.
- › We had a market consultation in 2023 to investigate the market interest in the scheme. Even though there was a lot of interest, the 2024 call came too early for potential projects.
- › We are currently preparing another opening in 2025.

*55% for medium enterprises, 65% for small enterprises.

IEA task 33 country report (October 2024)

Gasification activities in the Netherlands



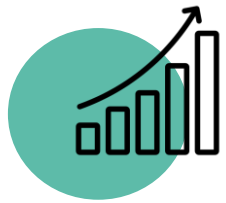
Gasification White Paper Unlocked

Anastasiya Agapova

Technical and Project Officer, European Biogas Association

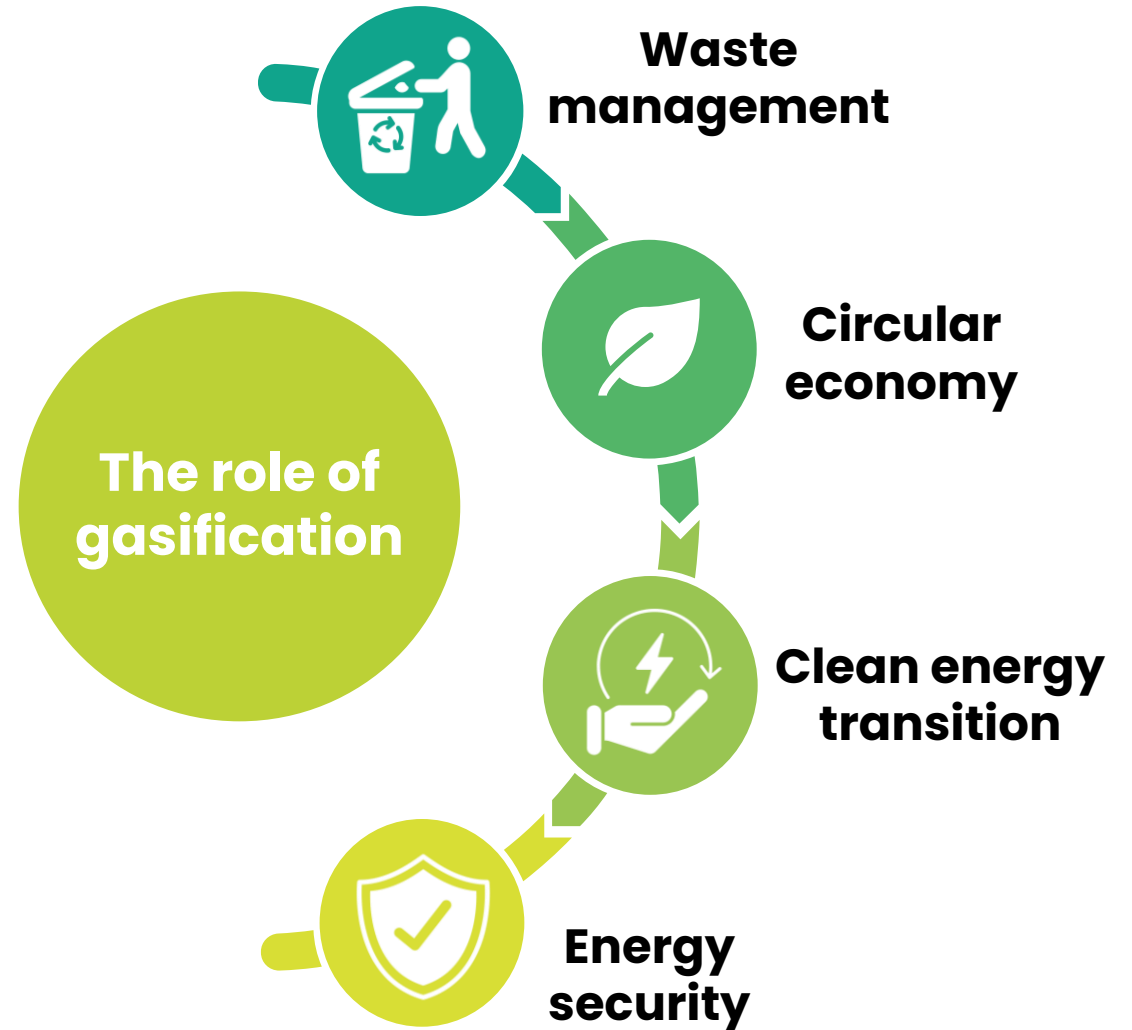
Biomass and waste gasification

Gasification: diversification of biomass processing and waste utilisation

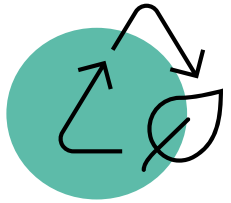


Potential for gasification in Europe is significant:

- **37 bcm gasification production capacity** by 2040 in Europe
- Global gasification market expected to reach **€204 billion** by 2032

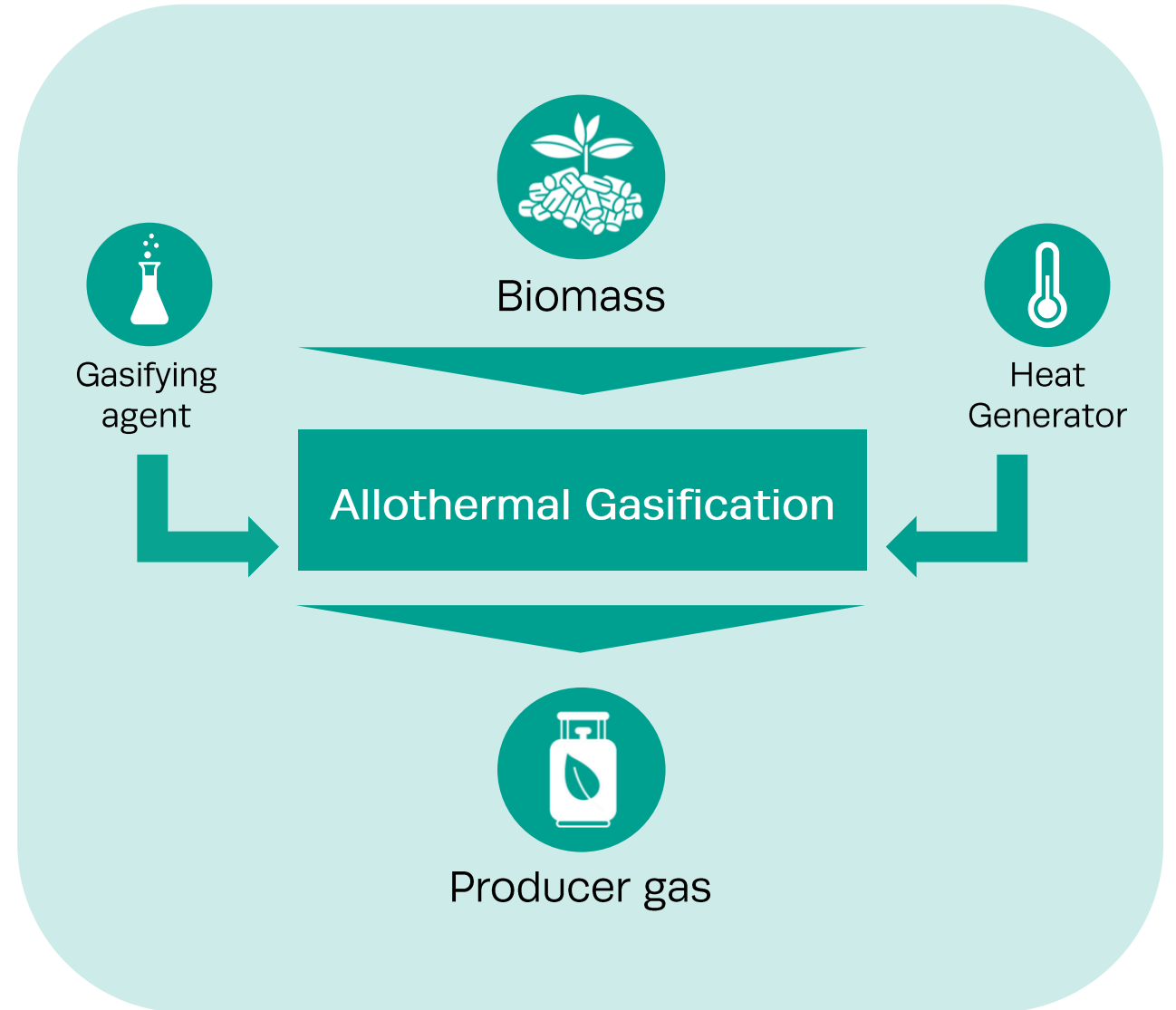


What is gasification?



Gasification enables the recycling of waste materials

- **Agricultural waste:** straw, manure, sunflower stalk
- **Forestry by-products:** wood chips, saw dust, bark, logging residues
- **Municipal solid waste and solid recovery fuels**

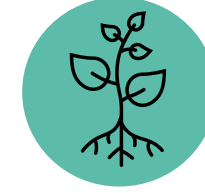


Research and innovation



Technological advancements – search for improved versatility, efficiency and environmental performance

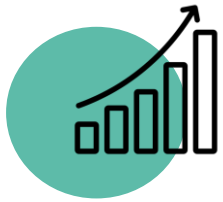
- Microwave-assisted gasification
- Inclined rotary kiln
- Chemical looping gasification
- Plasma gasification
- Integrated Gasification Combined Cycle
- Multi-step gasification
- Co-gasification



Biomass and waste pretreatment – crucial for expanding the range of viable feedstocks

- Torrefaction
- Hydrothermal carbonisation

Syngas upgrading



Syngas upgrading allows for end-use application tailoring

MATURE TRL:

CHP, FT fuels, methanation, high T industrial processes

HIGH energy efficiency:

CHP

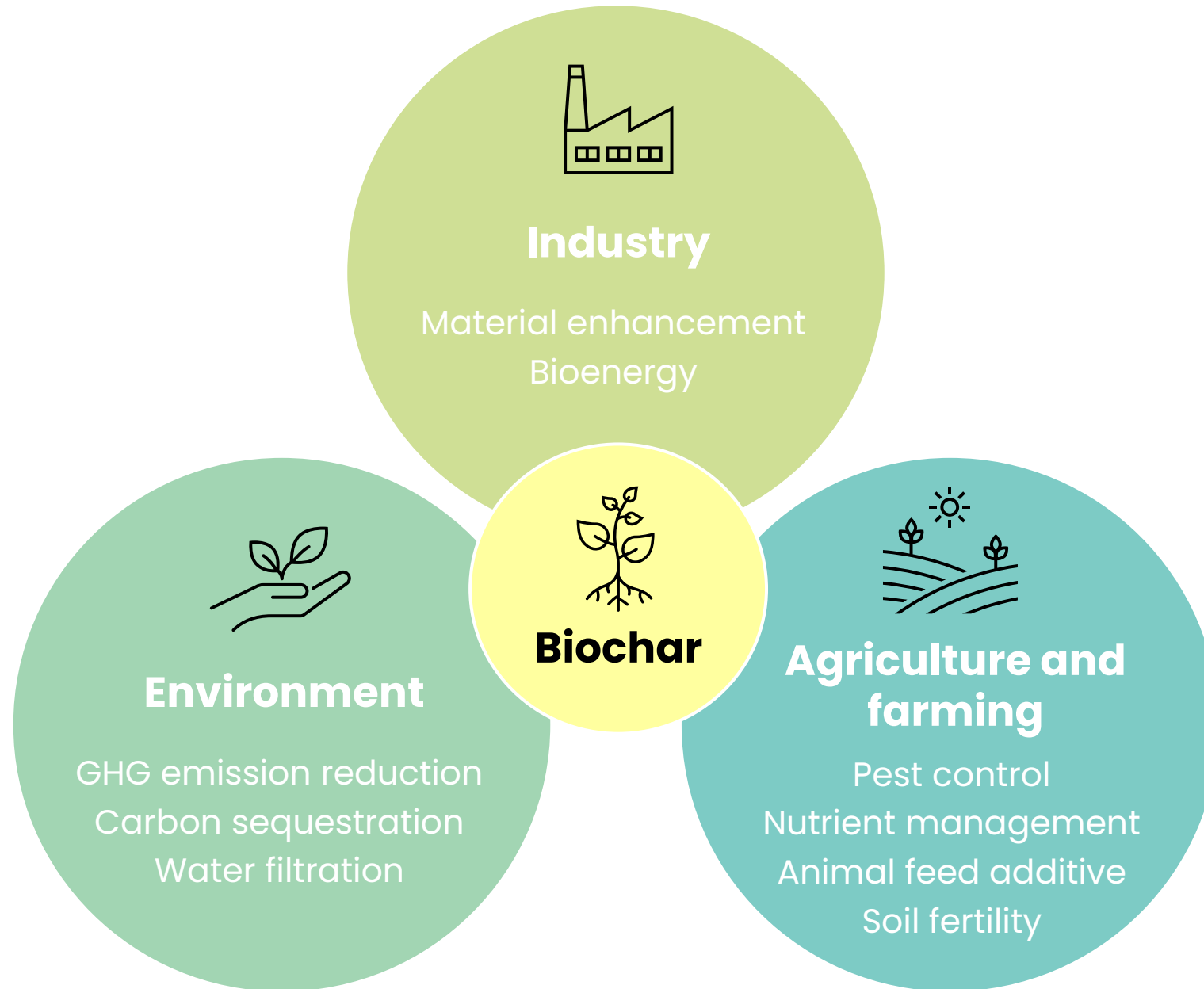
LOW thermodynamic losses:

CHP

Comparison of syngas upgrading pathways

Syngas upgrading			
	Energy efficiency	Technological readiness (TRL)	Thermodynamic losses
Direct CHP	High	mature	low
Methanation	moderate	mature	moderate
Hydrogen upgrading	moderate	low	moderate
FT fuels	low	mature	high
Chemicals synthesis	low	moderate	high
High T industrial process	low	mature	moderate

Gasification byproduct valorisation

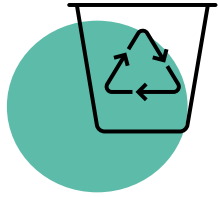


Policy and Market Context



Microsoft Azure IoT Suite
Google Cloud IoT
Amazon AWS IoT Core
IBM Watson IoT Platform
Cisco IoT Services
Verizon IoT (5G)
ThyssenKrupp (PTC)
Siemens (LogMeIn)
SAP IoT Cloud

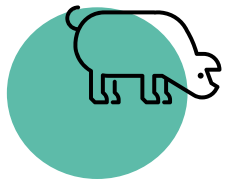
Policy context



**Waste Framework
Directive 2008/98/EC**

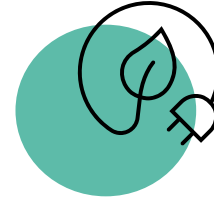


**Fertilising Products
Regulation (EU) 2019/1009**

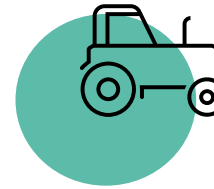


**Animal By-Products
Regulation 1069/2009/EC**

+ Regulation (EU) 142/2011
+ Delegated Regulation (EU) 2023/1605



**Renewable Energy
Directive 2018/2001**



**EU Carbon Removals and
Carbon Farming Directive**

Opportunities for growth and investment



MARKET DRIVERS

Environmental Regulations

To reduce GHG emissions and promote renewable energy

Energy Security

Countries aim to diversify energy mix with renewables

Waste Management

Urban areas are seeking solutions to waste management challenges

Technological Advancements

Improve efficiency, lower costs, and diversify feedstocks

Supply and Demand

Availability and cost of feedstocks



CHALLENGES

High Capital Costs

High initial investment for setting up gasification plants

Technological Risks

Complexity of gasification technologies requires advanced engineering expertise

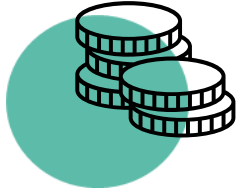
Regulatory Uncertainty

Navigate regulatory risks and ensure compliance with evolving environmental standards

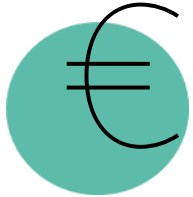
Market Competition

Highly competitive renewable energy sector

Cost-benefit considerations



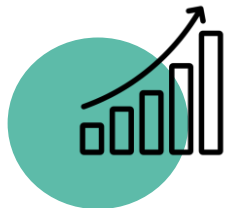
Capital and operational costs: costs are substantial and need to be meticulously planned.



Revenue generation: revenue generated through the sale of syngas, electricity and by-products such as biochar and ash. The economic viability of gasification projects depends on market prices for these products and the ability to secure long-term contracts.



Economic Impact: benefits include job creation (especially locally), reduced waste disposal costs, decreased reliance on fossil fuels (increasing energy independence, security and resilience), improve public health and quality of life.



Subsidies and Incentives: government subsidies and incentives play a crucial role in the economic feasibility of gasification projects: tax credits, grants, feed-in tariffs and renewable energy certificates.

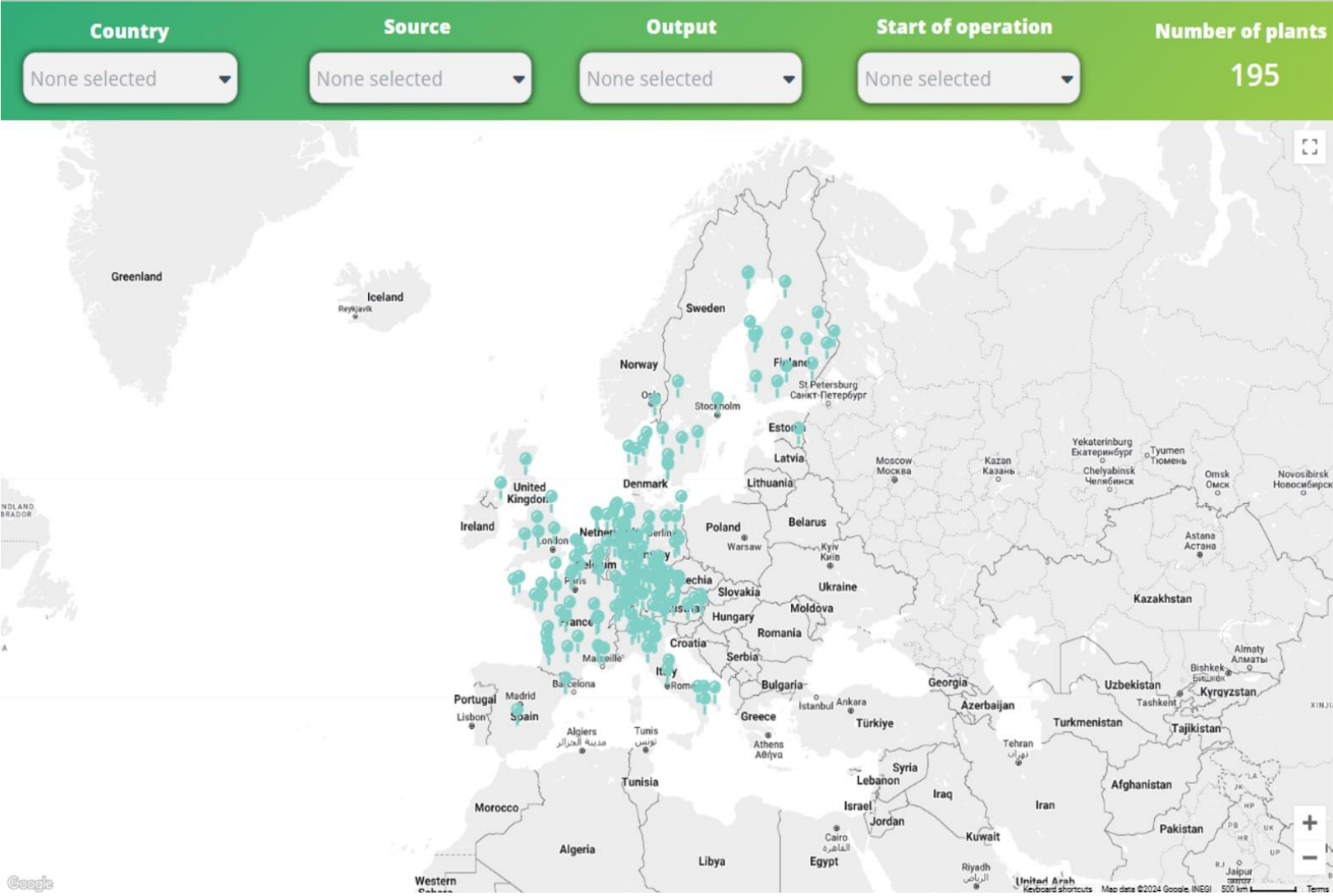
Gasification plants in Europe

Mapping gasification plants in Europe



195 biomass and waste gasification plants across Europe

- **141 plants** at operational level
- **54 plants** under development



Distribution of gasification plants by country



14 countries have gasification installations

Germany, France, Italy and Finland are the countries with the most gasification plants

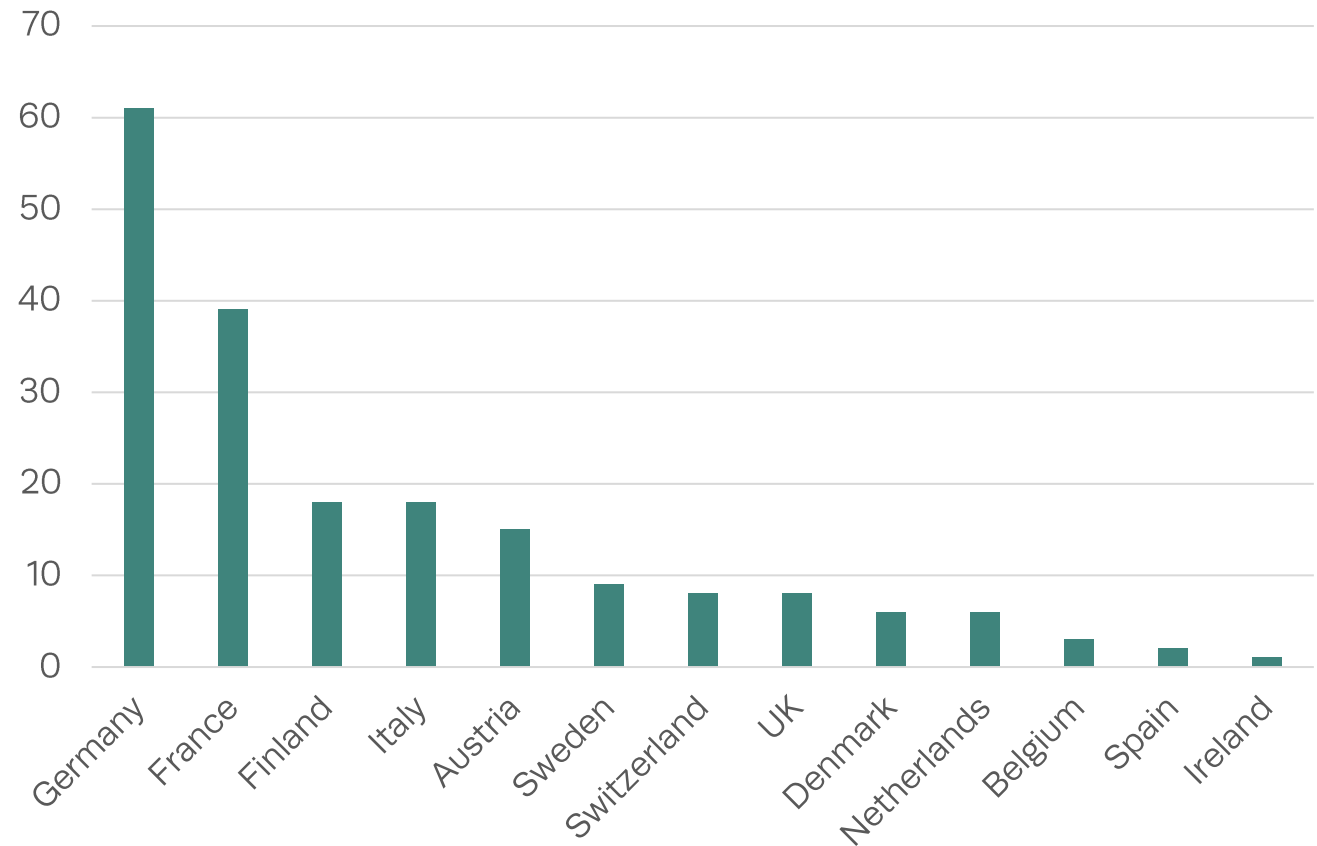


Gasification products:

- Power, heat, steam: 85% of all installations
- Synthetic Natural Gas (SNG)
- Methanol
- Fischer-Tropsch fuels and Sustainable Aviation Fuel (SAF)

Majority of planned/under construction installations will upgrade to SNG

Distribution of gasification plants in Europe



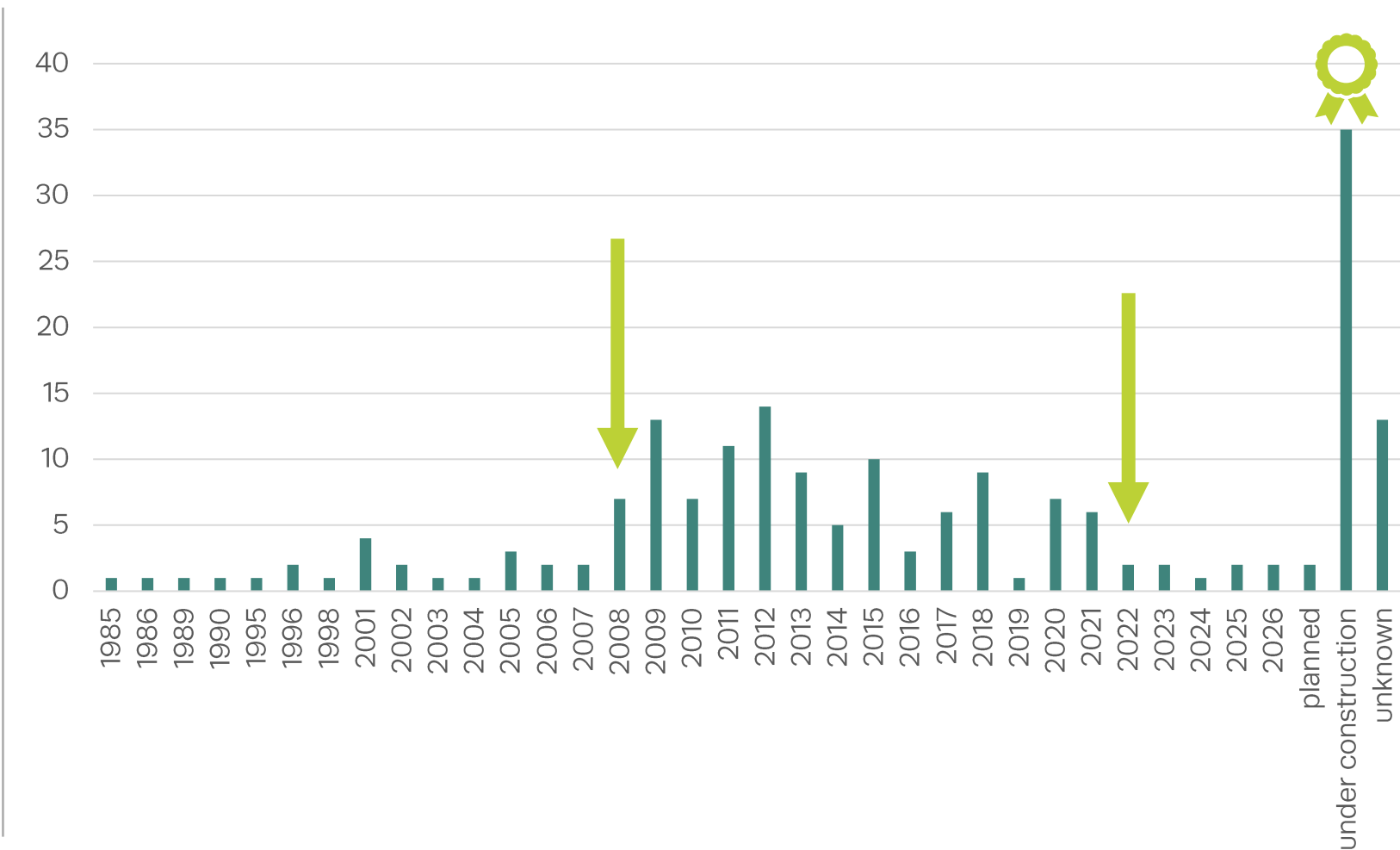
Distribution of gasification plants by year



Plants construction: a direct response to policies

- **Renewable Energy Directive** in 2008-2009 (+ introduction of FiT and other incentives)
- **Emission Trading System** in 2009
- **Waste Framework Directive** in 2008

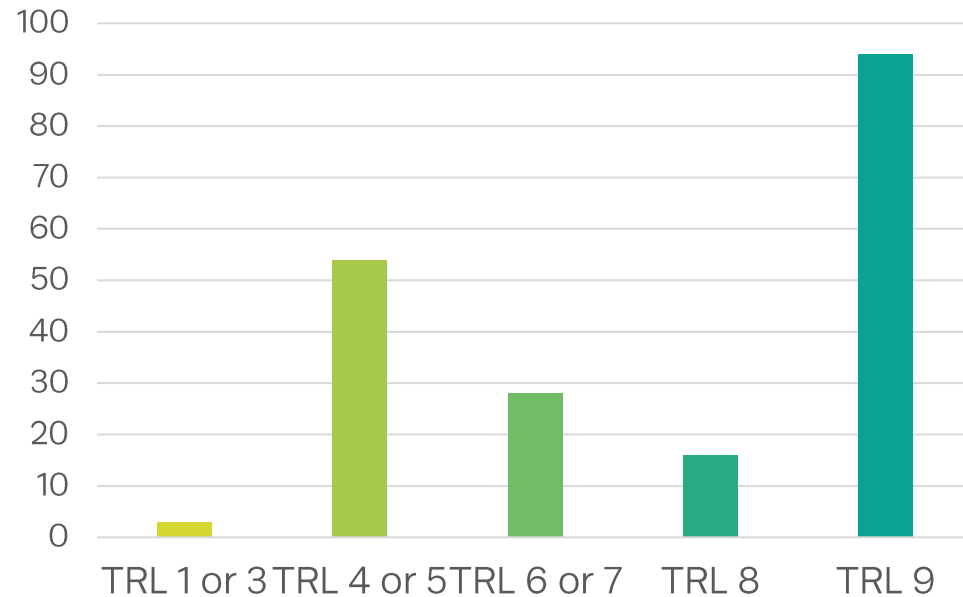
Distribution of number of plants by start of operation date



Technological Readiness Level (TRL) and feedstocks type



TRL prevalence among European gasification installations

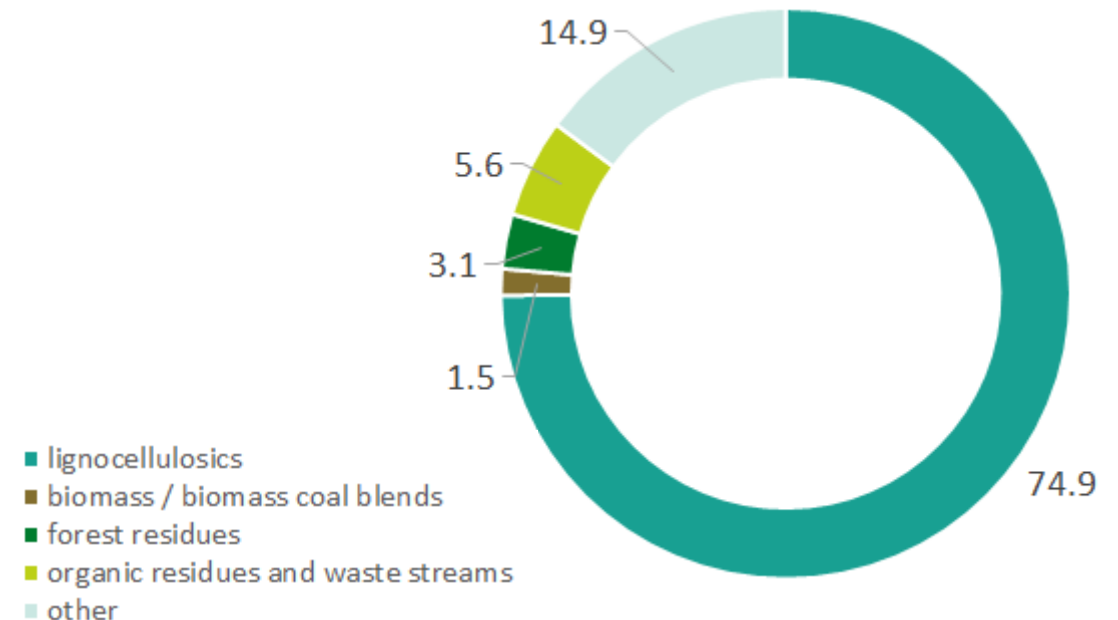


61% of operational gasification plants in Europe are TRL \geq 9



Proportions of feedstocks (%) for biomass and waste gasification

- **75%** from forest and agricultural residues
- **6%** from waste streams



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THANK YOU!

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Panel Discussion

Staffan Hellsén

HSEQ Manager, Cortus Energy

Nicola Bruni Zani

Renewables Business Developer, Pietro Fiorentini

Gustav Rogstrand

Chief Unit, Rise Institute

Conclusion and wrap up

Mieke Decorte

Technical Director, European Biogas Association

Thank you!

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