Biomethane market uptake

A holistic framework of Key Performance Indicators for assessing national biomethane market uptake in European countries

Ronja Wollnik, Laura García Laverde, Nora Szarka

DBFZ - Deutsches Biomasseforschungszentrum gGmbH
Department: Bioenergy systems
Working group: Biomass in the energy system

EUBCE 2024
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24-27 June | Conference & Exhibition
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Why biomethane market uptake matters in EU countries?

- European Green Deal: climate-neutrality by 2050
- Fit for 55: reducing EU emissions by at least 55 % by 2030
- RePowerEU: 35 billion cubic metres (bcm) of biogas/biomethane per year by 2030

Biomethane production volumes are growing rapidly, but not fast enough to meet targets

Figure 1.5

Achieving the 35 bcm target: current vs. required growth rate

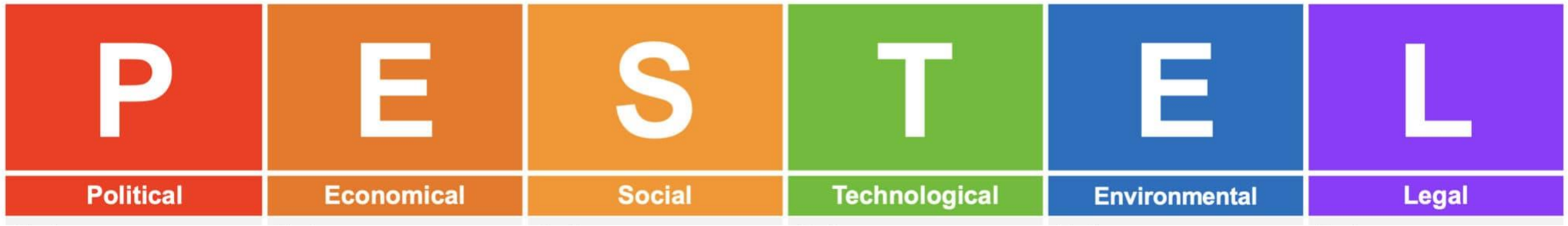
Source: EBA Statistical Report 2023

Why develop Key Performance Indicators?

State of market uptake of biomethane at national level

- Status quo and future potentials
- Integration of biomethane into value chains
- Different production routes, different end uses
- KPIs for country analysis

The PESTEL framework is useful to capture all system components:



Picture source: https://business-docs.co.uk/wp-content/uploads/2020/08/BDUK-27062-PESTEL-02-scaled.jpg

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How did we develop the indicators

1. Longlist

Collection of all potentially relevant indicators according to PESTEL categories (literature, exchange with colleagues)

Approx. 70 indicators

2. Selection of key indicators

Workshop-based prioritization of indicators

8 indicators

3. Method for measuring the indicators

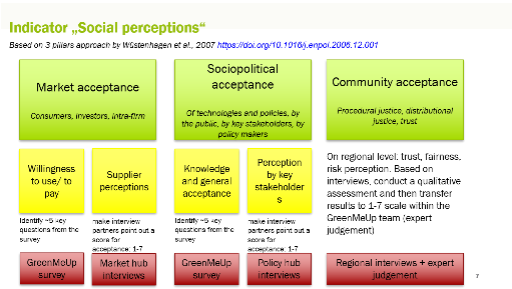
Definitions, data sources, scoring on a scale of 1 to x

4. Test runs

Apply to example countries and improve method, provide instructions for framework completion

5. Complete set of indicators

(Indicator n: definition, measuring, scoring, data sources, instructions for application)



Key indicator		Scores			Bandwidth		Normalized scores		
Number	Name	Status quo	2030	2050	Min (=0%)	Max (=100%)	Status quo	2030	2050
1	Level of policy commitment				0	4	0%	0%	0%
2	Feedstock readiness				0	3	0%	0%	0%
3	Valorization of by-products				0	6	0%	0%	0%
4	Infrastructure performance				0	4	0%	0%	0%
5	Emission reduction potential				0	2	0%	0%	0%
6	Social perceptions				0	6	0%	0%	0%
7	Financial support				0	4	0%	0%	0%
8	Stakeholder networks				0	6	0%	0%	0%

Which indicators describe the market uptake of biomethane

Eight key indicators for evaluating the biomethane market uptake at national level

Indicator number	PESTEL category	Indicator name
1	Policy	Level of policy commitment
2	Technological	Feedstock readiness
3	Economic	Valorization of by-products
4	Technological	Infrastructure performance
5	Ecological	Emission reduction potential
6	Socio-cultural	Social perceptions
7	Legal	Financial support
8	Socio-cultural	Stakeholder networks

1) Level of policy commitment

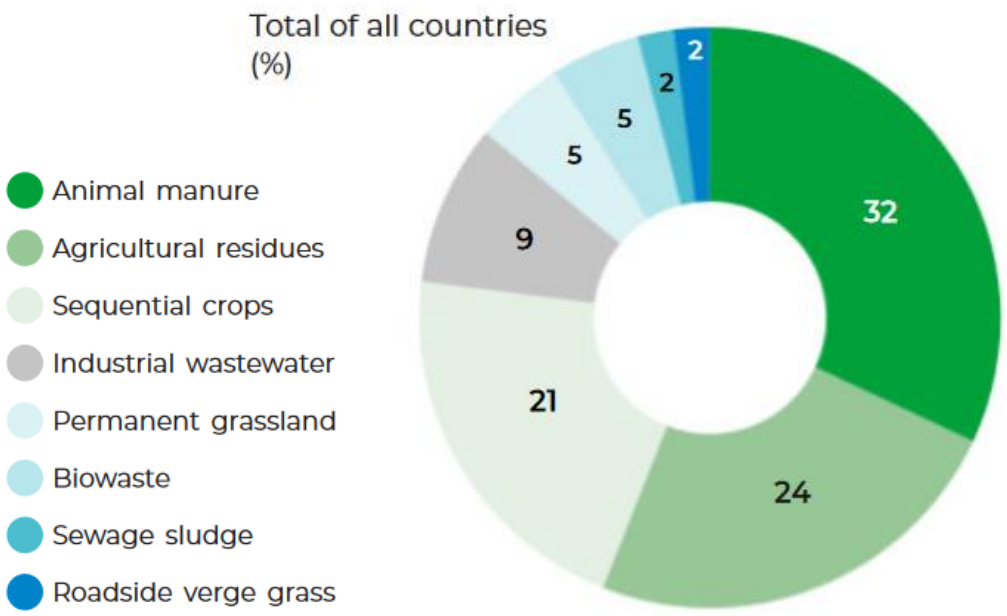
- EU National Energy and Climate Plans (NECPs) submitted by Member States
- 24 draft updated NECPs were published in 2023, among which
  - 12 contain a biomethane target for 2030,
  - 6 contain a biogas target only for 2030
  - 6 contain no target for biogas or biomethane

4	3	2	1	0
NECP with 2030 biomethane target in place	Pre-NECP 2030 biomethane target in place	Action plan in place	Study on potential without a target in place	None of the above in place

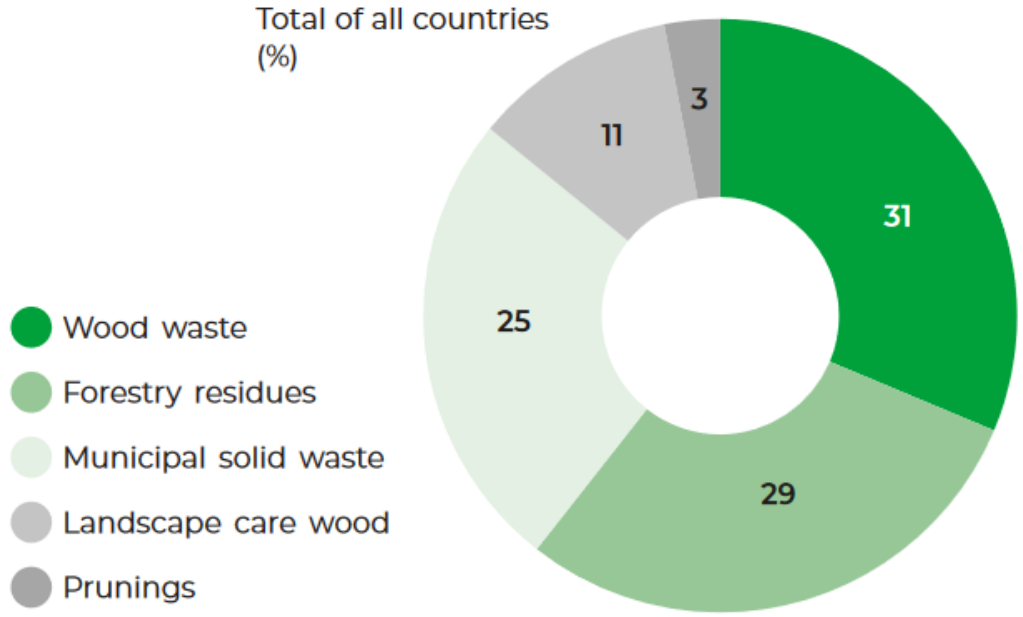
100 % 0 %

Source: EBA, personal communication: Overview on NECPs by EBA (last update: 11/01/2024)

2) Feedstock readiness



Anaerobic digestion: feedstock potentials for biomethane production in the EU-27 in 2030. Adapted from Guidehouse (2022).



Thermal gasification: feedstock potentials for biomethane production in the EU-27 in 2030. Adapted from Guidehouse (2022).

Source: Guidehouse (2022): Biomethane prduction potentials in the EU. A Gas for Climate report. Available from: https://gasforclimate2050.eu/wp-content/uploads/2023/12/Guidehouse_GfC_report_design_final_v3.pdf

2) Feedstock readiness

- Data avilability
- Feedstock potential
- Feedstock mobilization rate

8

3	2	1	0
Feedstock available in **large** amounts, **large** percentage of feedstock is in use	Feedstock available in **large** amounts, **small** percentage of feedstock is in use. OR: Feedstock available in **small** amounts, **large** percentage of feedstock is in use	Feedstock available in **small** amounts, **small** percentage of feedstock is in use	No country-wide assessment on feedstock potential available

100 % 0 %

3) Valorization of by-products

- Is the use of by-products incentivized?
- Do the by-products contribute to generating economic value?

	Existing incentives		Economic value generation	
Energy*	Yes O	No O	Yes O	No O
CO_2	Yes O	No O	Yes O	No O
Digestate**	Yes O	No O	Yes O	No O

*heat (boilers, gas engines and turbines), combined heat and power (CHP) plants, and fuel cells
**e.g., for fertilizer, algae, and biopolymers production

4) Infrastructure performance

- Availability, quality, and compatibility of the supporting infrastructure

Gas grid:

- ✓ Clear regulatory framework for grid connection
- ✓ No injection fee
- ✓ Cost-sharing mechanism in place

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Filling stations:

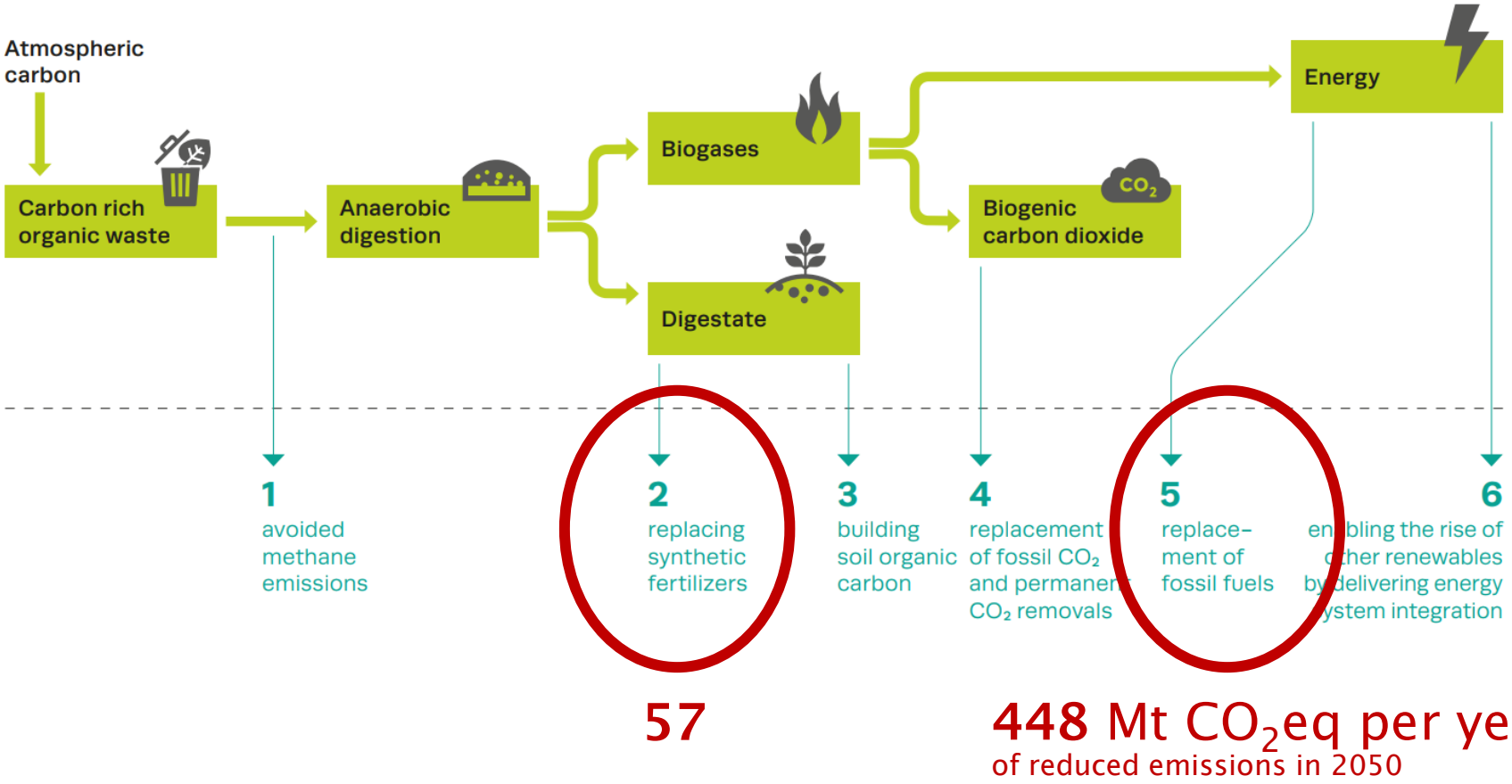
- ✓ Number of compressed natural gas (CNG) + liquefied natural gas (LNG) stations over European average (n=130)

Fig: Number of CNG stations in Europe by country, as of 2024. Source: NGVA Europe Stations map. Available from https://www.ngva.eu/stations-map/

4	3	2	1	0

100 % 0 %

5) Emission reduction potential



- Replacement of fossil fuels in the energy system has the highest potential
- Followed by digestate application replacing synthetic fertilizers

Fig: Routes in which the production of biogas and biomethane contributes to the reduction of GHG emissions. Source: EBA Statistical Report 2023.

5) Emission reduction potential

- Assumption: biomethane partly replaces natural gas in the energy system
- National reduction potentials are expressed as the share of total transport emissions
- Score for the status quo: below or above the current (2024) European average of 4 %
- Score for the 2050 potential: below or above 100 % of total 2050 transport emissions [1,2]

2	1	0
Data available and potential over 4 %	Data available and potential under 4 %	No data available on national level

100 % 0 %

Source: Own calculation based on EBA Statistical Report 2023; Gas for Climate Report 2022; COM(2016) 767; Joint Research Centre 2017

6) Social perceptions

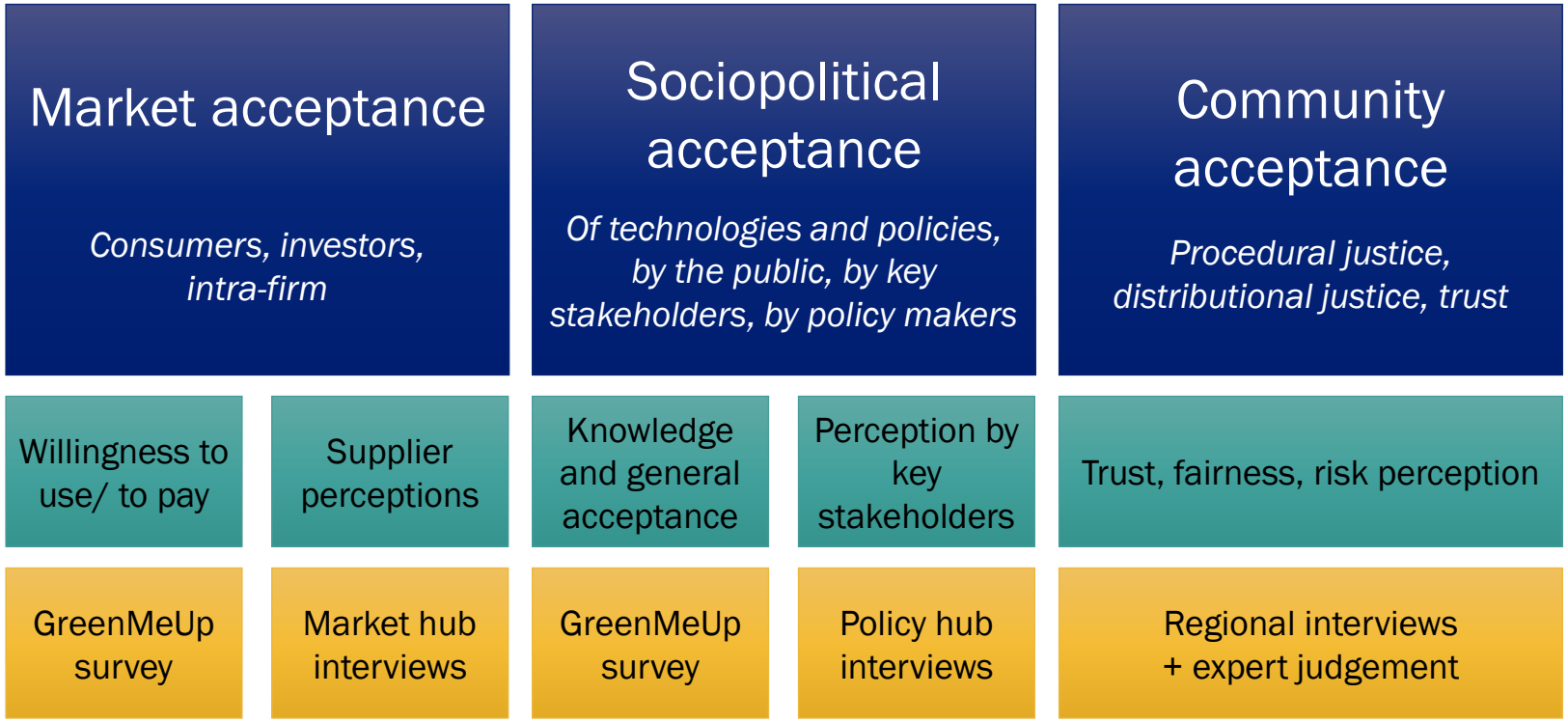


Fig: Application of the three-pillar approach to evaluate the national biomethane market uptake. Dark blue: Acceptance pillar, light blue: assessment parameter, orange: data sources.

Source:Wüstenhagen, Wolsink and Bürer, 2007. Social acceptance of renewable energy innovation: An introduction to the concept. Available from: https://doi.org/10.1016/j.enpol.2006.12.001

6) Social perceptions

Market acceptance

Sociopolitical acceptance

Community acceptance

Sub-scores are averaged to give the final score

Source:Wüstenhagen, Wolsink and Bürer, 2007. Social acceptance of renewable energy innovation: An introduction to the concept. Available from: https://doi.org/10.1016/j.enpol.2006.12.001

7) Financial support

Market-based mechanisms: feed-in tariffs (for biomethane injection or electricity), heat recuperation bonus, connection cost principles, CAPEX support, and other incentives for construction and production

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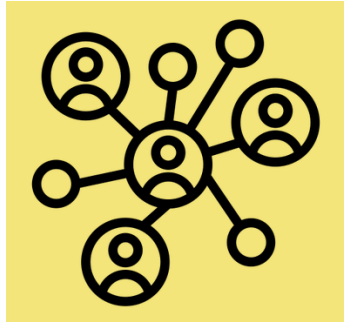
4	3	2	1	0
Demand-driven support mechanism for specific end-uses in place, e.g., targets for transport	Subsidy operated through public tenders to maximise CO_2 reduction/ public expenditures	Subsidy for only biomethane (whatever the award mechanism)	Subsidy for both biogas and biomethane	Subsidy for CHP only

100 % 0 %

8) Stakeholder networks



- level of communication among key actors, such as government, feedstock providers, plant operators, gas grid operators, and potential users
- based national experts' knowledge and judgement on stakeholder networks

✓ Very strong biogas/biomethane **industry representation** in the country (e.g., associations representing the industry)

✓ Very active **dialogue between the government** and other key actors, such as industrial actors and civil society

✓ Very active **collaboration and communication channels** between biogas producers and potential partners (feedstock providers, gas grid operators, potential users, etc.)

What are our main lessons learned

- There is no one-size-fits-all solution.
- It is essential to look from all angles.
- Partners are grateful for an easy overview.
- Cooperation is key.

How do we want to apply the indicators

- Project-internal
  - Inform a SWOT analysis
  - Inform fuzzy cognitive maps
  - Country factsheets and other collaborative synthesis products

- Project-external
  - Stand-alone tool to communicate key areas of development to decisionmakers
  - Broadly applicable to EU countries

What key things should you take away

- The key indicators:

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- Please reach out if you are interested in applying the indicators!

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PARTNERS

RONJA WOLLNIK

DBFZ - Deutsches Biomasseforschungszentrum gGmbH

Department: Bioenergy systems
Working group: Biomass in the energy system

Ronja.Wollnik@dbfz.de
+49 341 2434-619
https://www.dbfz.de/en/
info@greenmeup-project.eu

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