



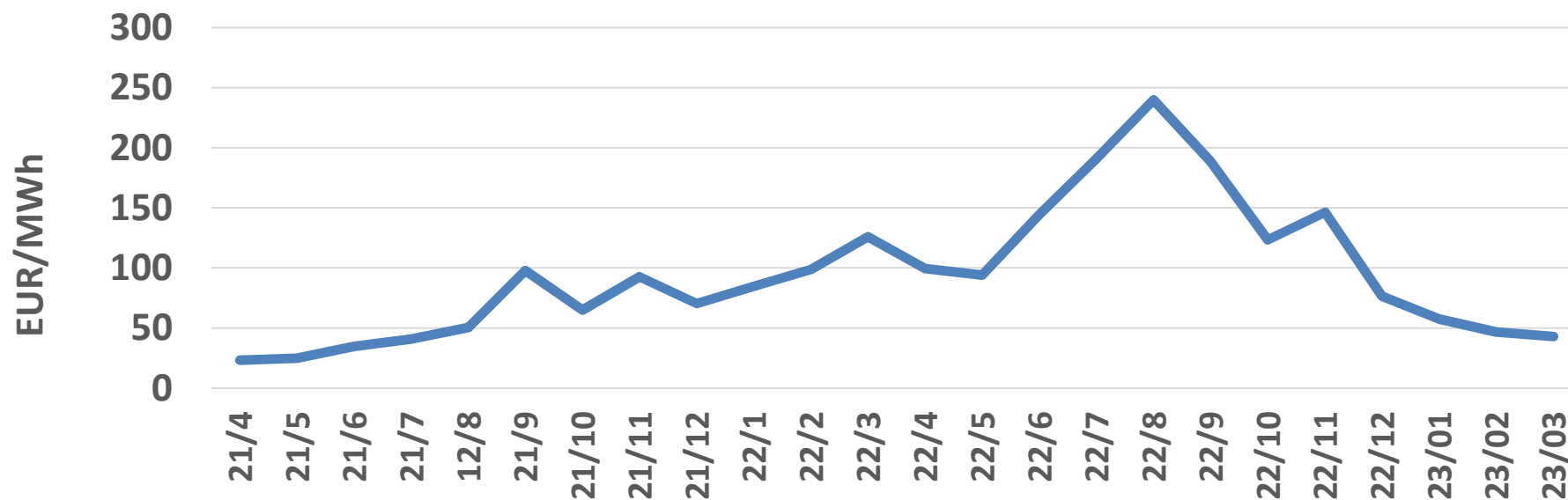
R2 GAS

Biomethane workshop, April 25th 2023
Biomethane – The most evident renewable fuel today

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MONETISING THE BENEFITS OF BIOMETHANE

- Introduction
- Overall benefits of biomethane
- Recognition of benefits at macro level
- Monetising the benefits at project level
- Additional revenue possibilities
- Conclusion



- Due to the difference in the costs of production under normal circumstances bioCH₄ is not price competitive with natural gas as energy carrier.
- Without monetising the benefits of biomethane no major investment activity can be expected.
- The question: how and how far can the benefits be cashed?

Benefits of biomethane production – macro level



Field	Benefit
Environment	Greenhouse gas emission reduction
	Organic waste treatment
	Improvement in soil health
Economy	Energy security (replacement of imported natural gas)
	Contribution to energy system balancing
	Provision of biogenic carbon dioxide
	Diversification of agricultural revenues
	Replacement of resources (synthetic fertilisers)
Society	Job creation
	Local energy transition (energy communities)

Source: „Beyond energy – monetising biomethane’s whole system benefits”
Guidehouse 2022

Monetising the benefits of biomethane at project level



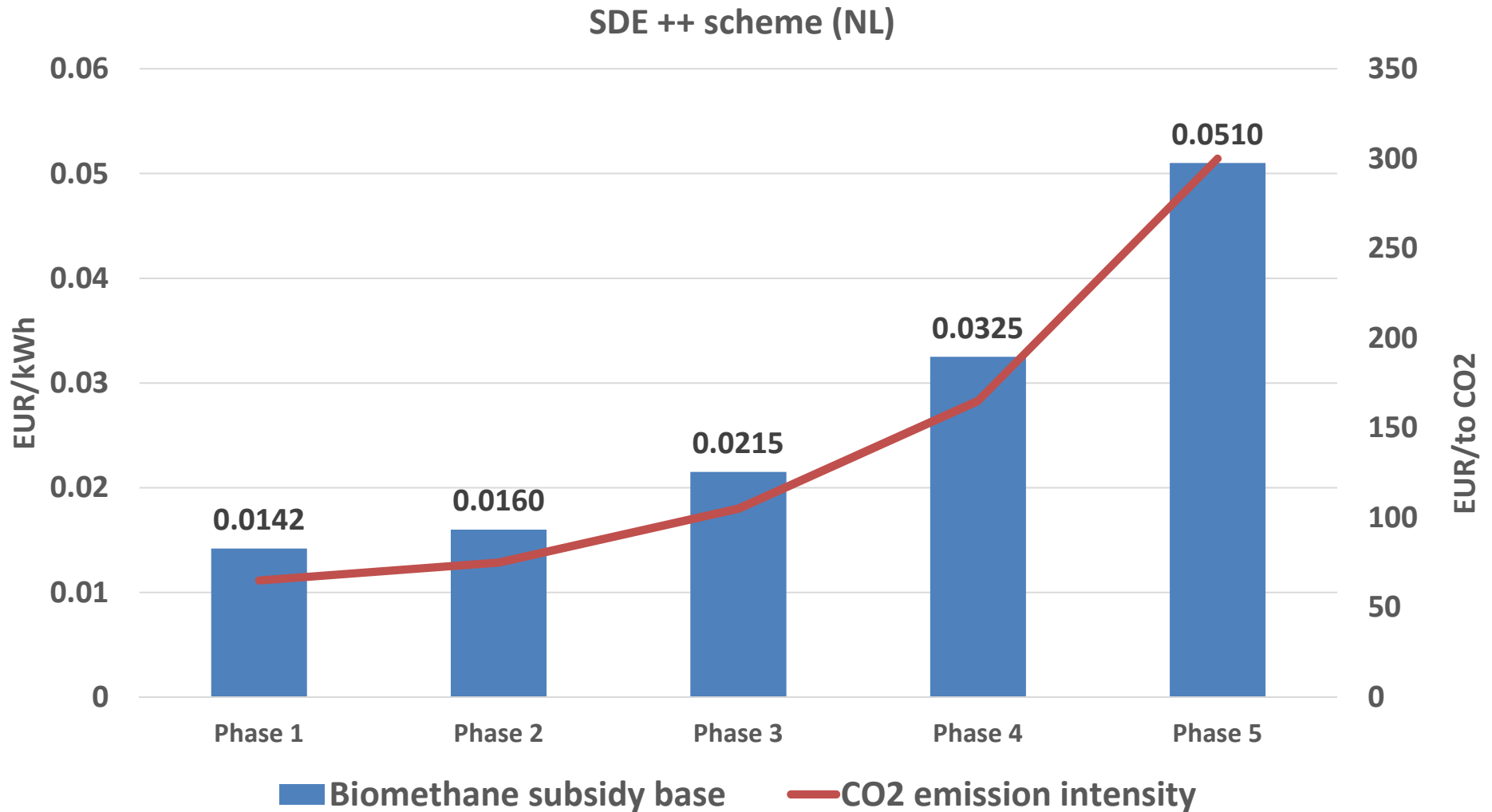
Field	Benefit
Environment	Greenhouse gas emission reduction
	Organic waste treatment
Economy	
	Provision of biogenic carbon dioxide
	Replacement of resources (synthetic fertilisers)
Society	

Recognition of environmental benefit – six different indicators



1. FIP provided in national support schemes (examples: NL, UK),
2. Tax/levy benefit (compared to natural gas) provided by national legislation (example: SE),
3. Biofuel certificates – biomethane must be verified for sustainability (examples: DE, NL, UK)
4. Biomethane Guarantees of Origin (DK, UK – mainly subsidized biomethane),
5. ETS certificates issued for biomethane consignments (from 2023 onwards biomethane must be verified for sustainability),
6. Market value acknowledged and accepted by climate-conscious consumers on voluntary basis (examples: CH, DE),

SDE ++ Support Scheme 2022 - NL



Example: Green Gas Support Scheme - UK



- The tariffs were calculated based upon CAPEX and OPEX estimates for model plants in view of 10% IRR
- Initial average guaranteed tariff up to 100.000 MWh/year (Tier 1 and Tier 2): **56,14 EUR/MWh**
- Annual review of the guaranteed tariff by the government
- Revenue from the Green Gas Certificates is considered at 2 GBP/MWh
- Share of wastes in input: min. 50%
- Estimated carbon cost effectiveness for the whole scheme: **173 GBP/to CO₂eq**

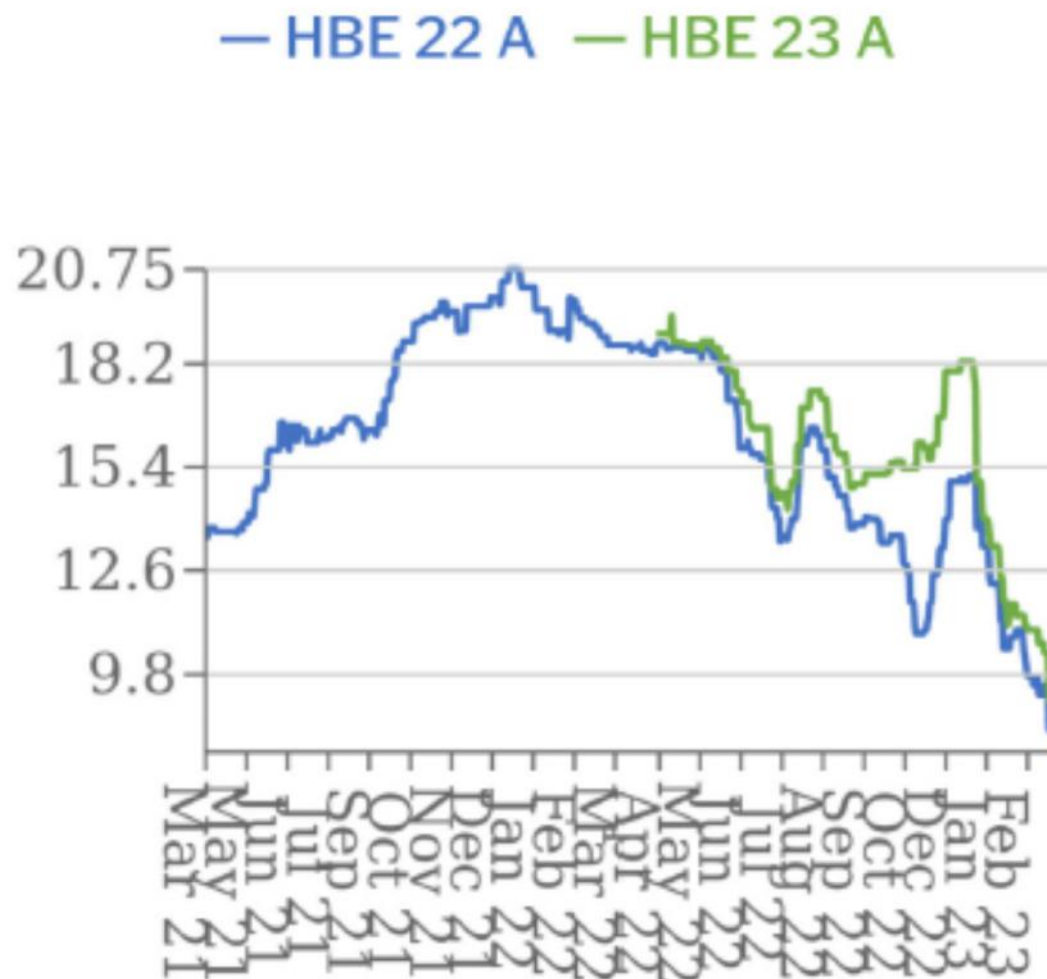
	Tariff applicable for	Plant size	p/kWh	EUR/MWh
Tier 1	first 60.000 MWh	up to 750 m ³ /h	5,51	65,57
Tier 2	next 40.000 MWh	up to 1250 m ³ /h	3,53	42,01
Tier 3	> 100.000 MWh	above 1250 m ³ /h	1,56	18,56

Tax benefit for biomethane		
In transportation compared to natural gas	0,023	EUR/kWh
In transportation compared to gasoline	0,074	EUR/kWh
In heating (incl. industrial), compared to natural gas	0,032	EUR/kWh

The tax benefits are endorsed by the European Commission and are applicable until 2030

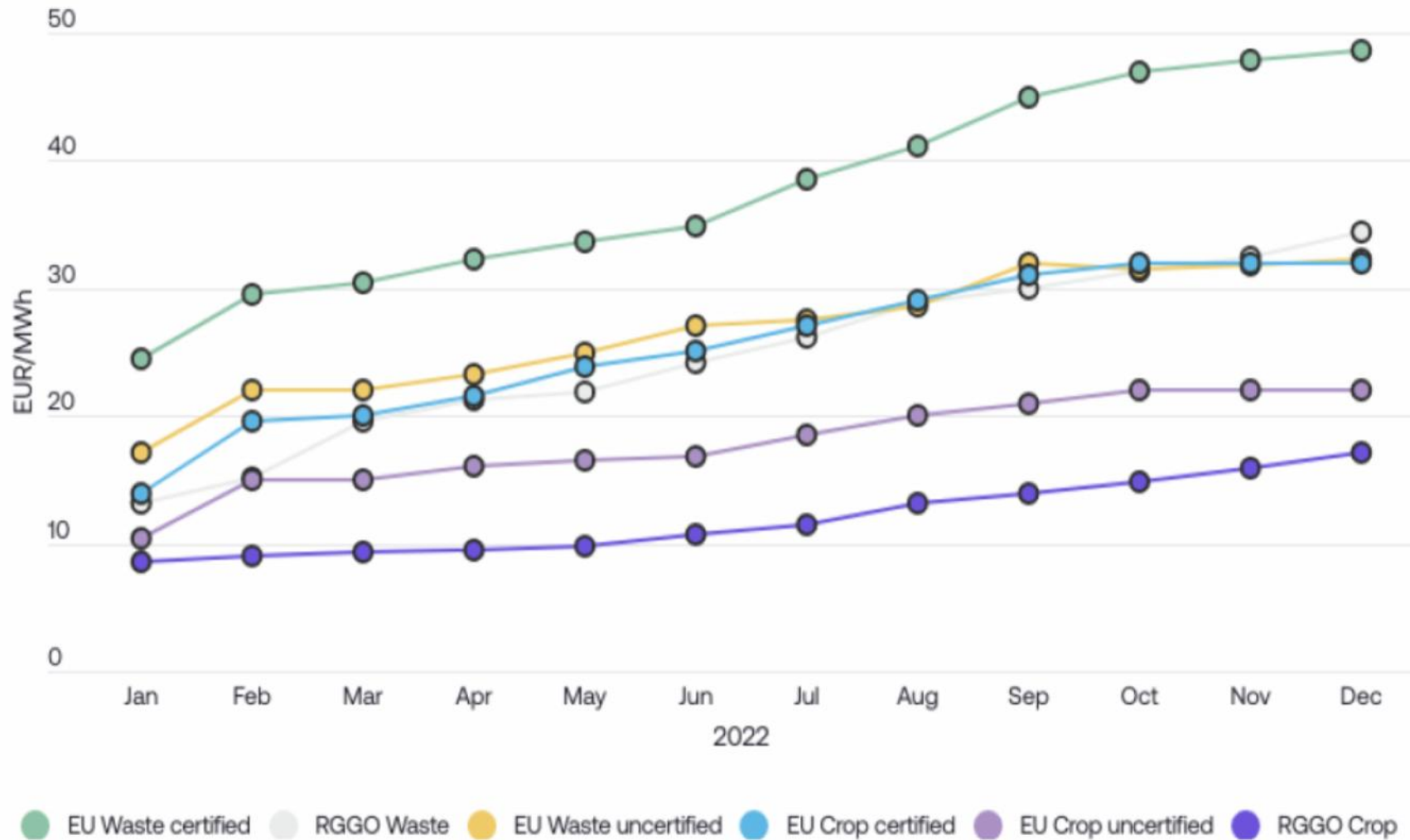
The tax benefit represents the „green“ value of biomethane in comparison to natural gas: **23 - 32 EUR/MWh**

The volatile markets of biofuel certificates



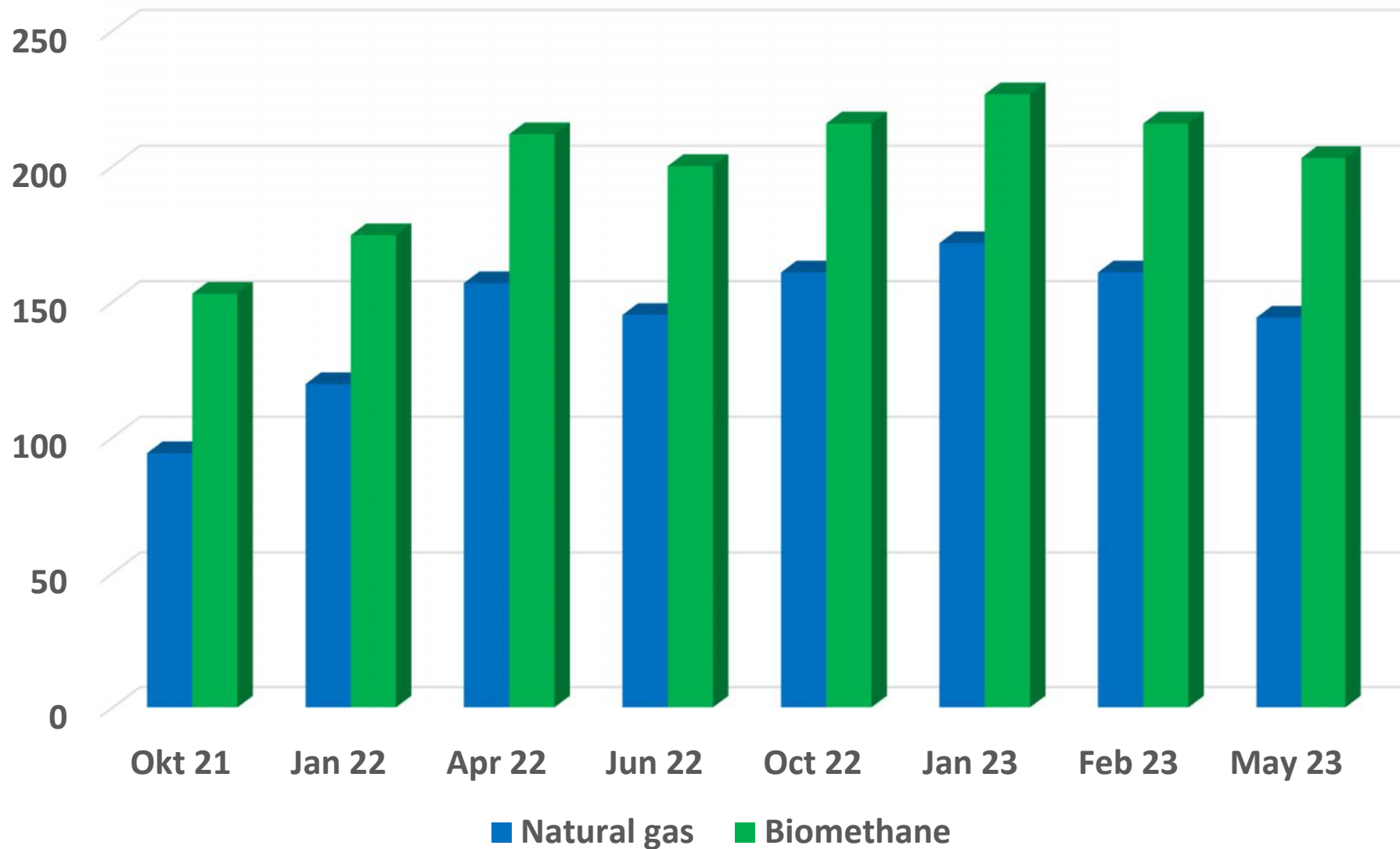
- Example: HBE - Renewable Energy Units in NL (*Source: OLYX*)
- Fluctuations in HBE relevant to biomethane: between 25 -80 EUR/MWh;
- Biomethane is competing with all other biofuels, **but** the biomethane supplies have minor impact on the biofuel certificate market;
- In DE and UK the **ceiling** for prices is determined by penalties to be paid in case of non-fulfilment.

Biomethane GO prices in 2022 (monthly average)



Source: Greenfact: 2022 Market Recap Green Certificate and Carbon Markets

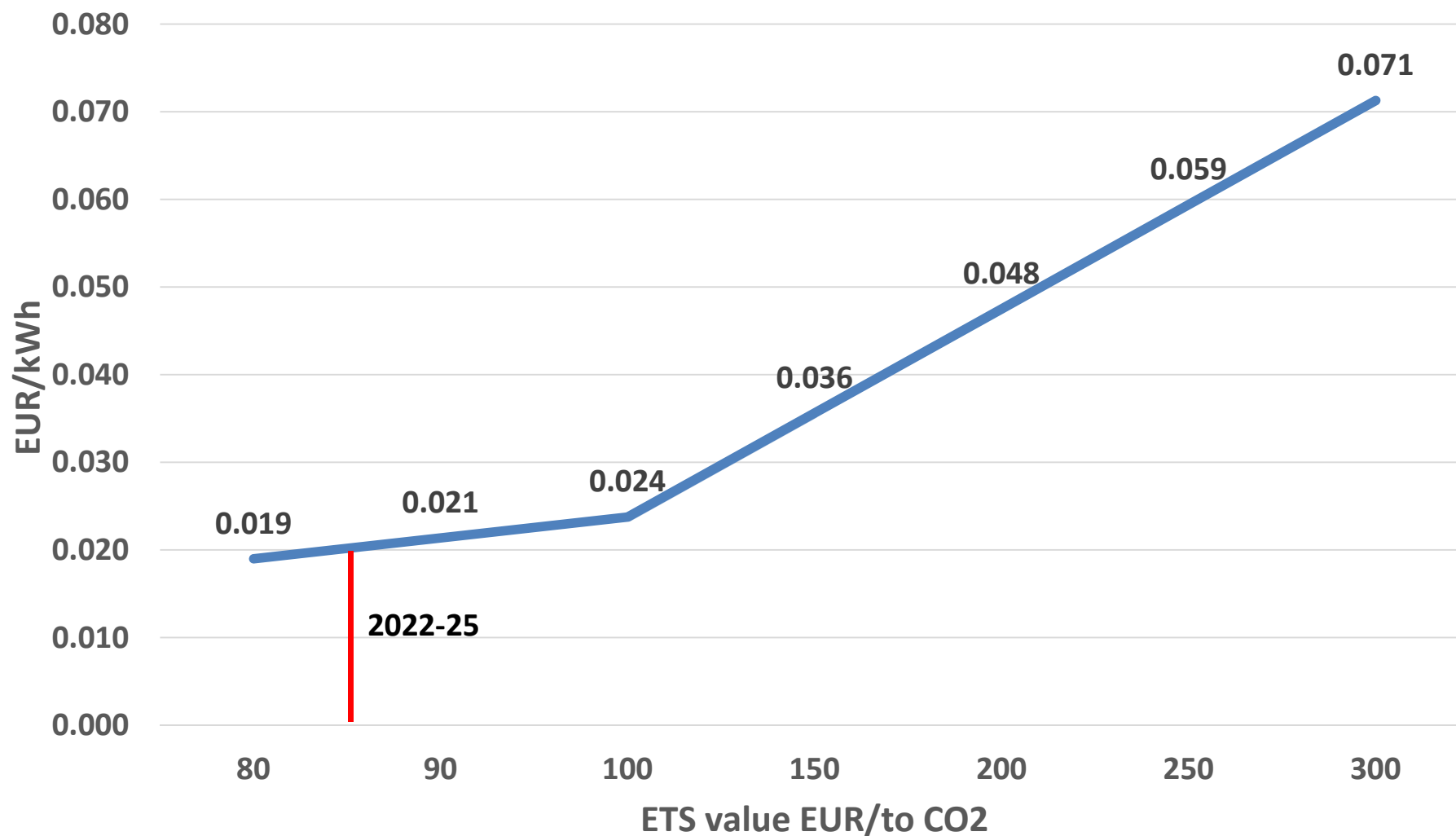
Energie 360° price structure in EUR/MWh (home heating)



Biomethane value in EU-ETS



ETS certificate price converted to EUR/kWh biomethane



„Green” value in different market segments in 2023



Field of application	Unit	Transport	Electricity	Heating	Material use
Main competitor		liquid biofuels	solar/wind	natural gas	natural gas
Proof of Sustainability		required	GO: not required	GO: not required	GO: not required
			ETS: required	ETS: required	ETS: required
Fossil fuel comparator	gCO ₂ eq/MJ	94	abt. 85	abt 72	66
GHG emission reduction required		65%	70% (ETS) (> 2 MW RED)	70% (ETS) (> 2 MW RED)	70% (ETS)
GHG emission allowed	gCO ₂ eq/MJ	32,9	25,5	21,6	19,8
Certification		MB and PoS	GO or EU ETS	GO or EU ETS	GO or EU ETS
Estimated revenue above NG market price	EUR/MWh	30 - 120	15 - 30	15 - 40	20 - 25

Additional revenue possibilities for biomethane producers



1. **Gate fees** paid by the industrial waste owners are diminishing in view of the energy potential of these streams.
2. The **fermentation residue** has added value only in case of digesting biowastes and agricultural by-products (estimated at 4 EUR/MWh) – Note: no added value when manure and second crops are processed).
3. The investment needed for producing food-quality **carbon dioxide** may not be feasible in lack of adequate price premium over industrial production from fossil sources. The potential for additional revenue is 7 - 12 EUR/MWh.

- There are rare exceptions when the biomethane production is feasible without state aid, such as
 - extraordinary natural gas market situations,
 - sales on efficient biofuel certificate markets (in few countries).
- Nevertheless, no major expansion in biomethane investment activity can be expected without appropriate national government measures, while
 - the estimated revenue of the biomethane producers from monetising the „green” value **and** selling the by-products is not sufficient to cover the gap between the costs of natural gas and biomethane supplies.



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Many thanks for your attention!

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