

Pilot-SBG

GHG-quota as a driver for renewable methane from regional biogenic residues and waste materials

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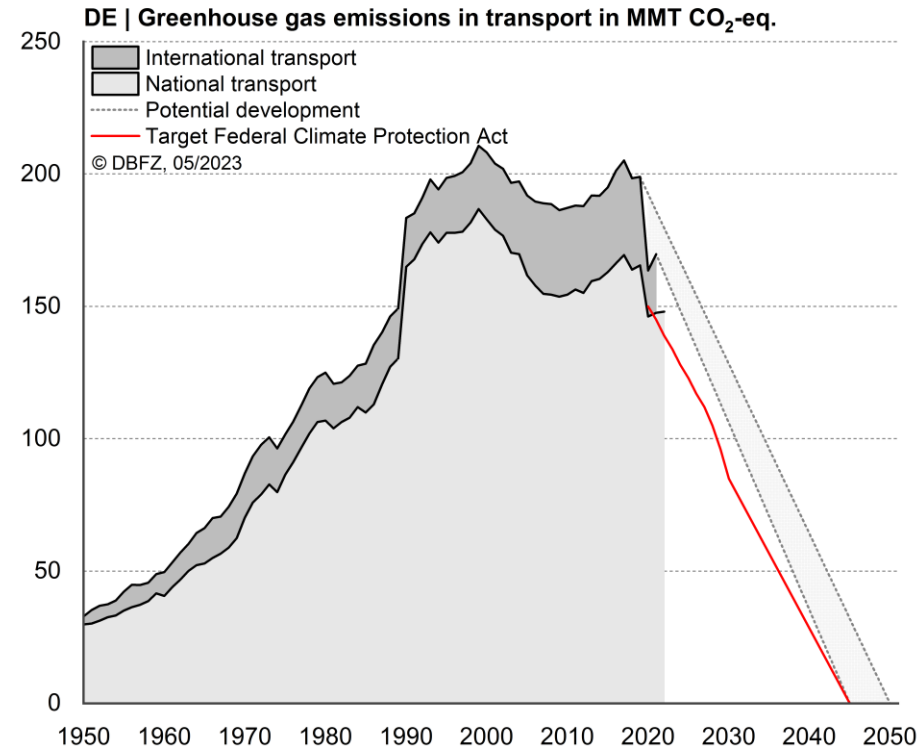
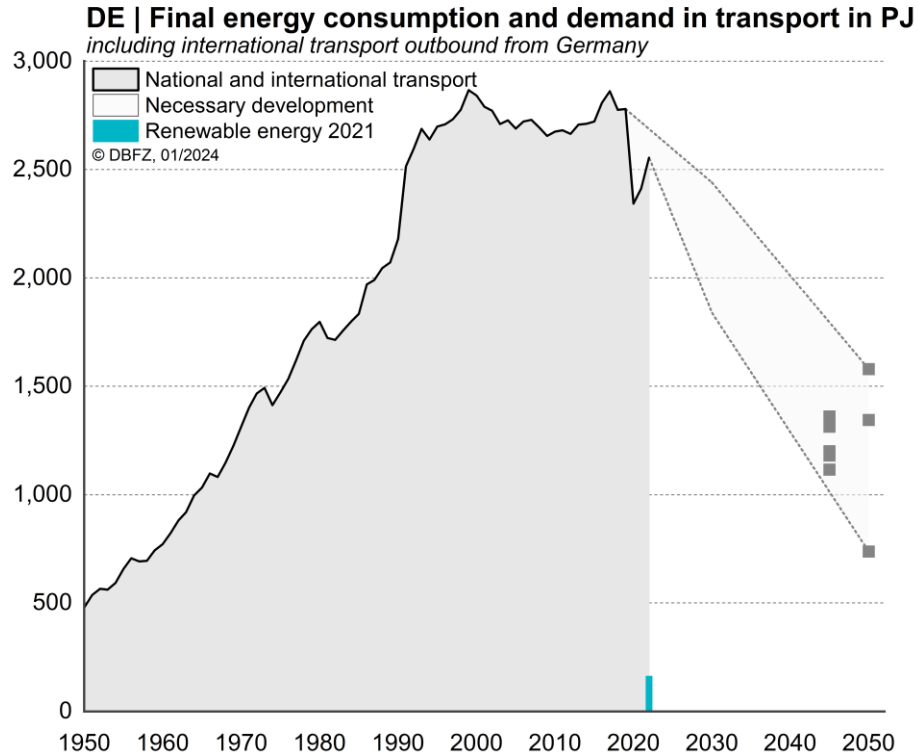


Federal Ministry
for Digital
and Transport

Agenda

- Pilot-SBG | Fact sheets
- Resources | Potential of urban residues
- Technology | Hydrothermal pretreatment
- Market | GHG quota as a driver
- Conclusion

Background - Transport development and climate neutrality



- Massive gap between trends and targets in transport
- GHG quota as part of the energy transformation: 8 % in 2023 > 9,25 % in 2024 >> 25 % in 2030

Motivation and targets



Climate-friendly,
renewable methane as a
fuel



Innovative process
concept following a
zero waste approach



Utilization of **residues and
waste materials for advanced
fuels production**

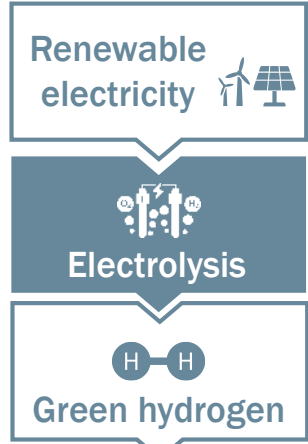


Integration of **electricity
& green hydrogen**

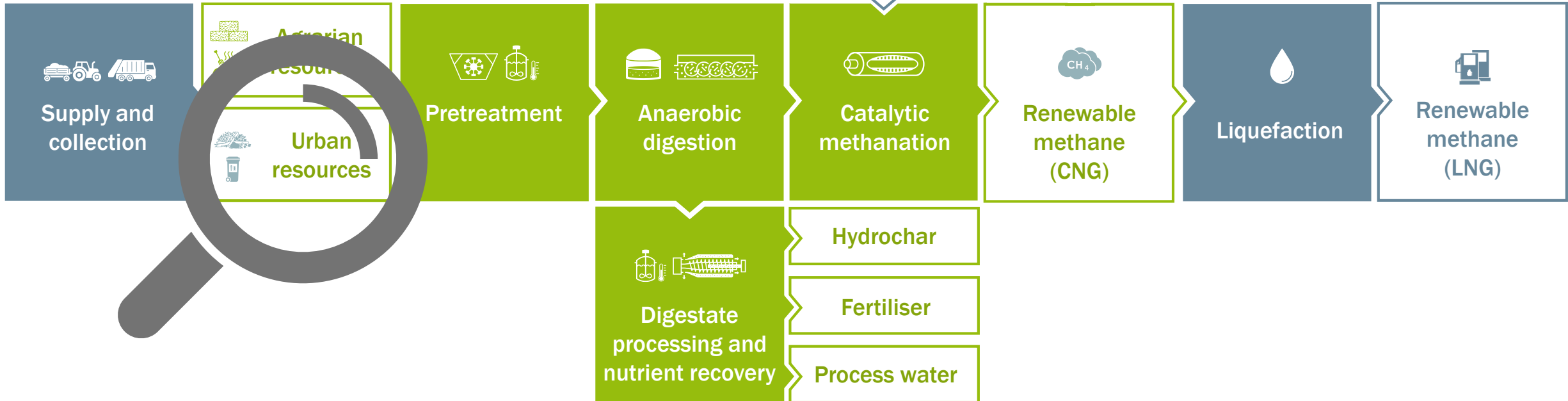
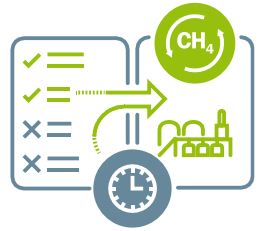
Piloting and concept development



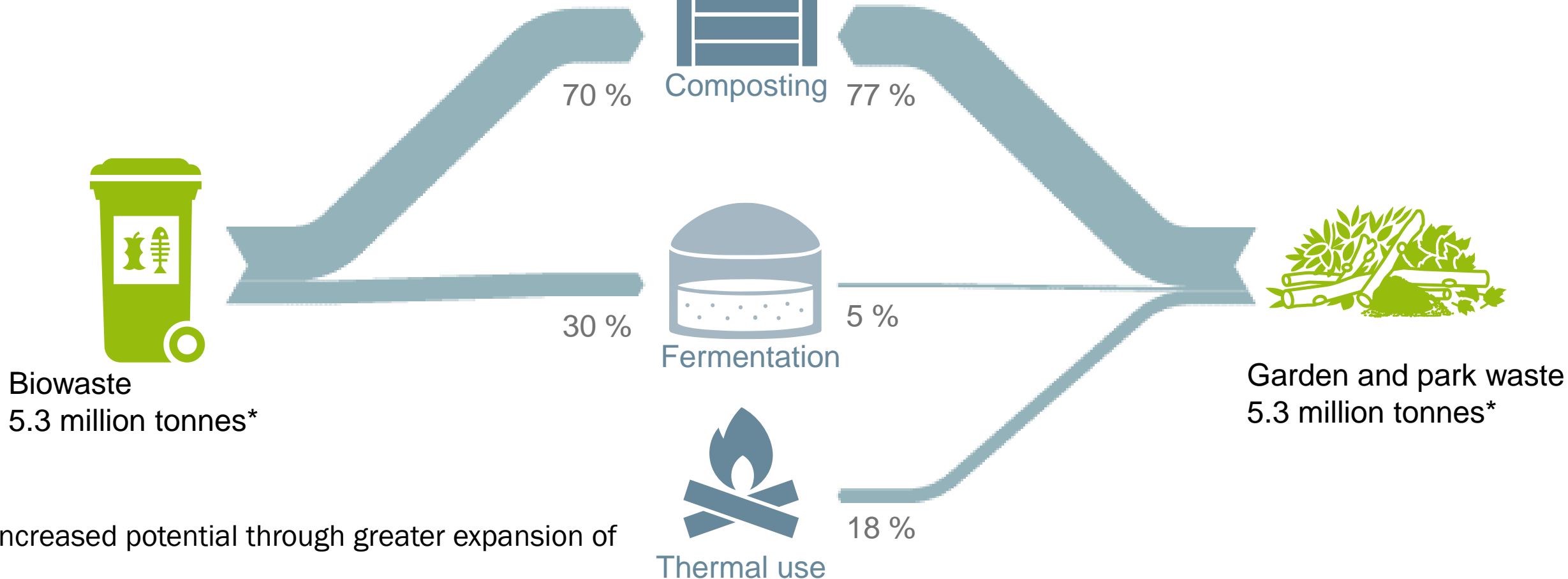
Optimisation of **resource efficiency**, especially with regard to maximising the specific **methane yield** and recycling fermentation residues



Identification of **criteria** for viable plant concepts for renewable methane



Potential and current use



Biowaste
5.3 million tonnes*

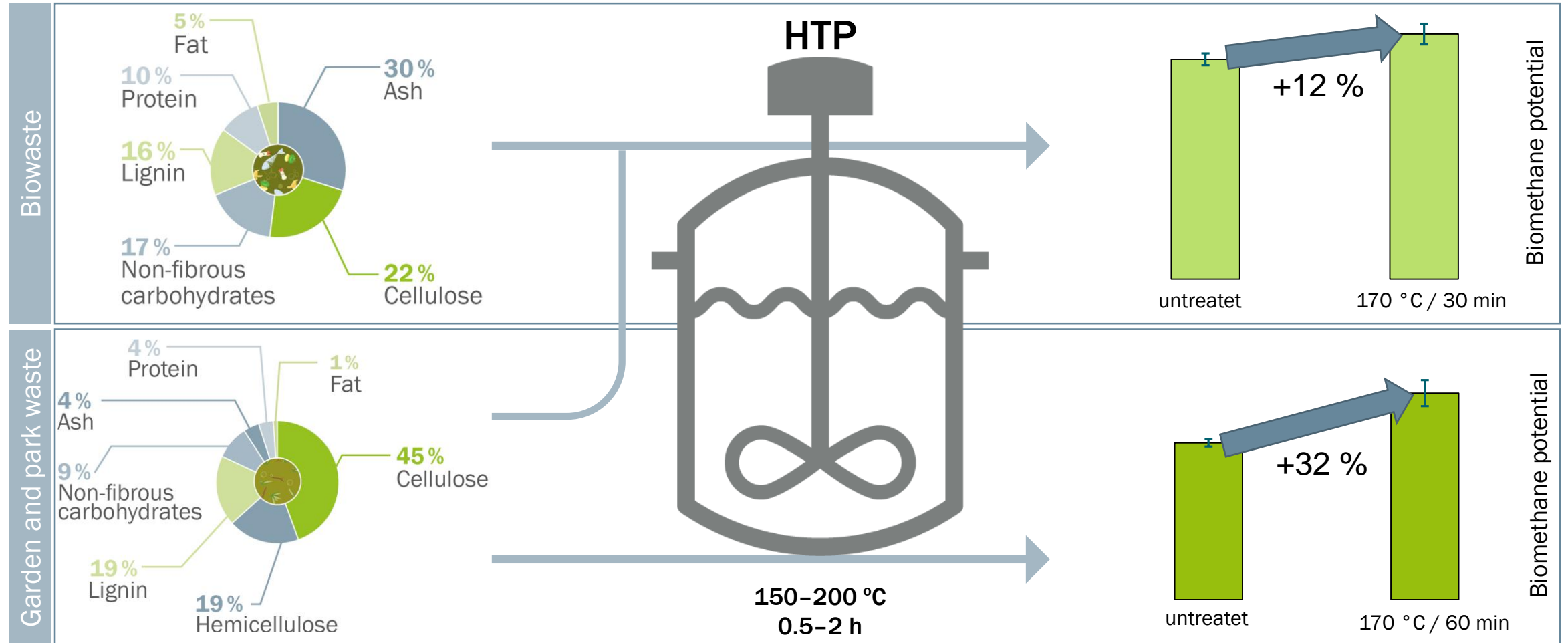
Garden and park waste
5.3 million tonnes*

Increased potential through greater expansion of the recycling and utilisation cascade for biowaste:

- ✓ Greater resource efficiency

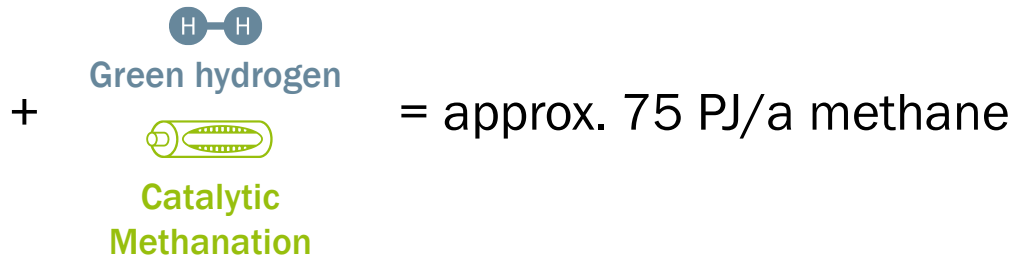
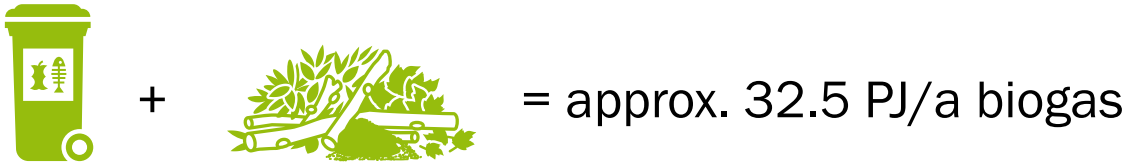
*Technical potential from separate collection by public waste management authorities (2020)

Hydrothermal pretreatment of urban wastes

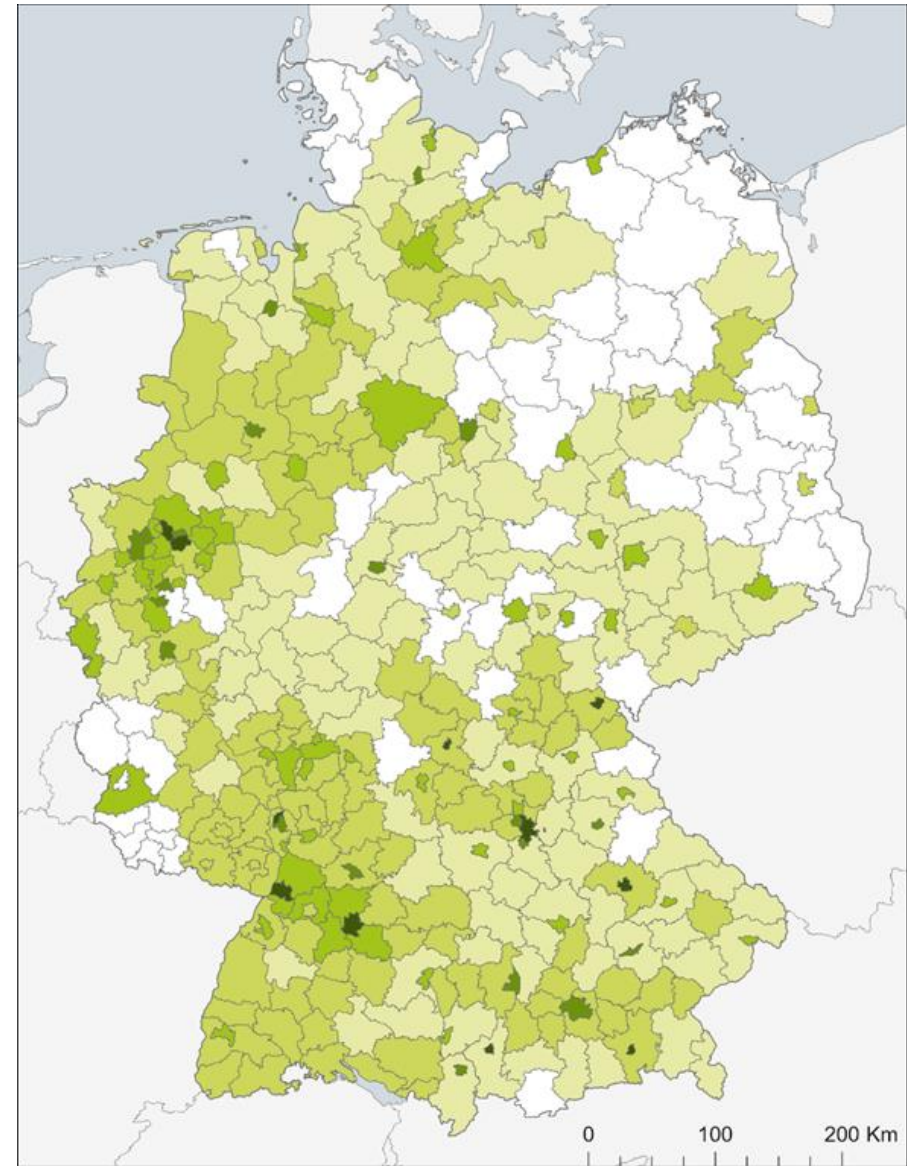


Technical potential for renewable methane

- Concept with **urban** (municipal) waste:



- Biomethane creditable as “advanced” (§ 14 38. BImSchV)
- Assumption: synthetic methane is renewable fuel of non-biological origin (RFNBO)

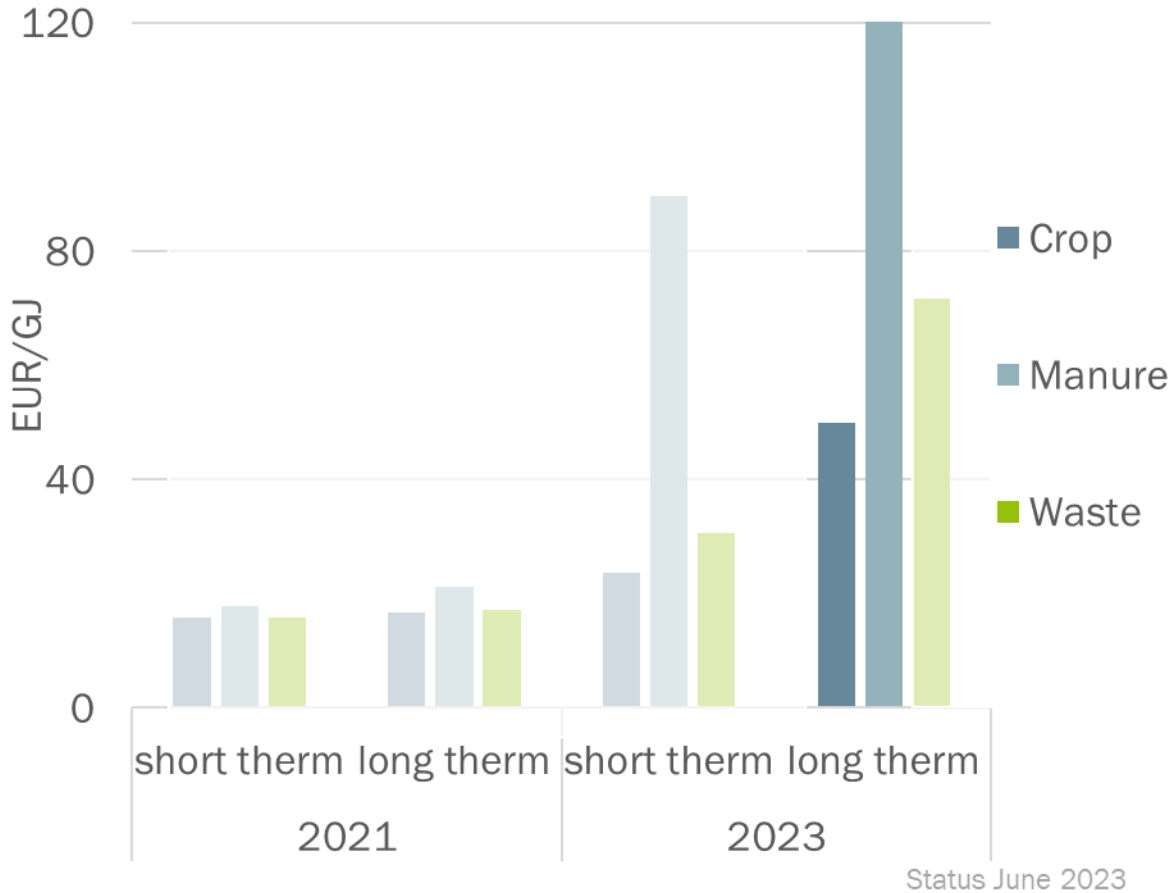


Technical potential of renewable methane from biowaste and green waste 2020, incl. methanation with hydrogen in GJ/km²

≤ 50	≤ 500	≤ 1.500
≤ 150	≤ 1.000	≤ 2.500

The price of biomethane

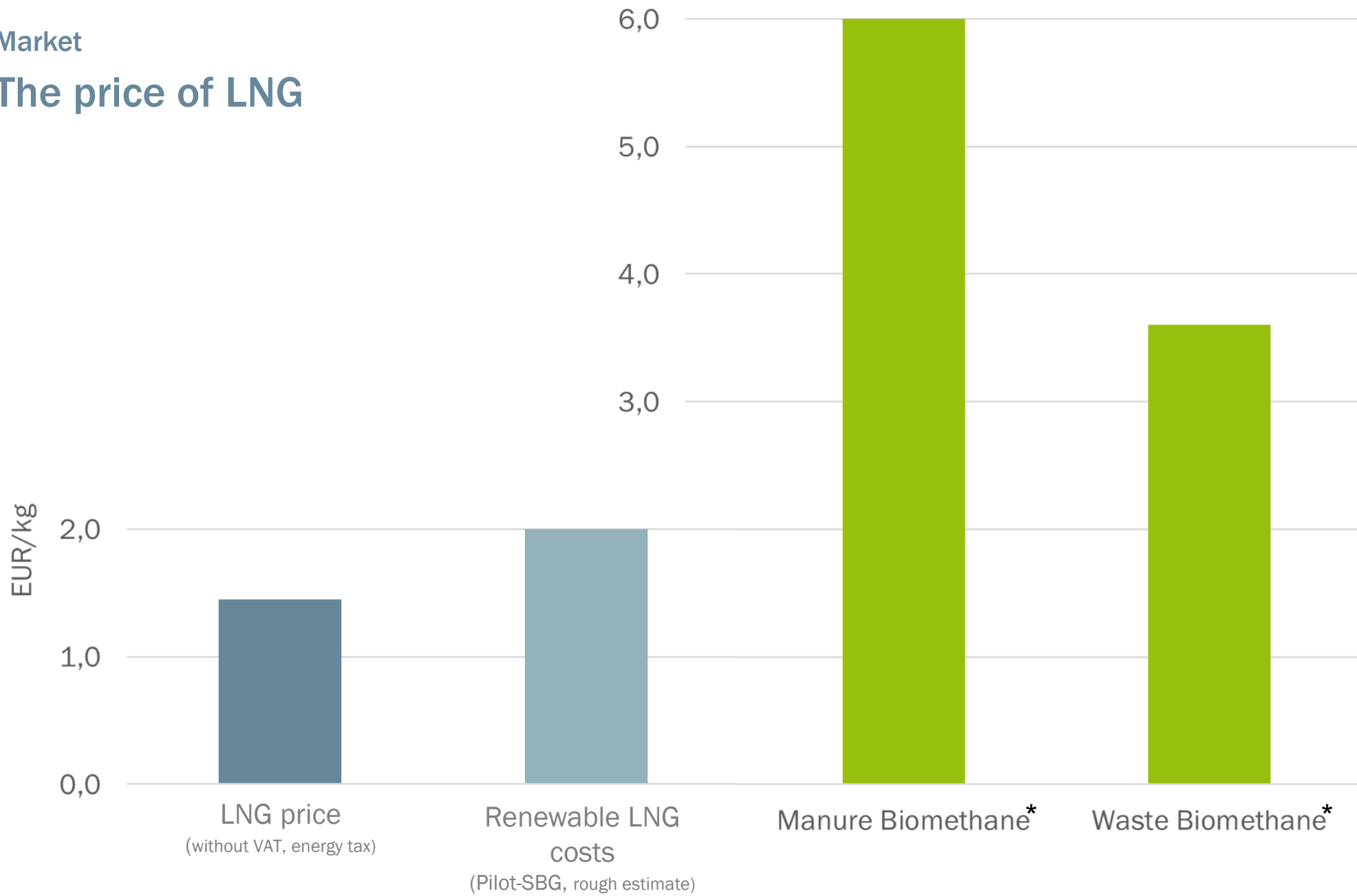
Average purchase prices of biomethane



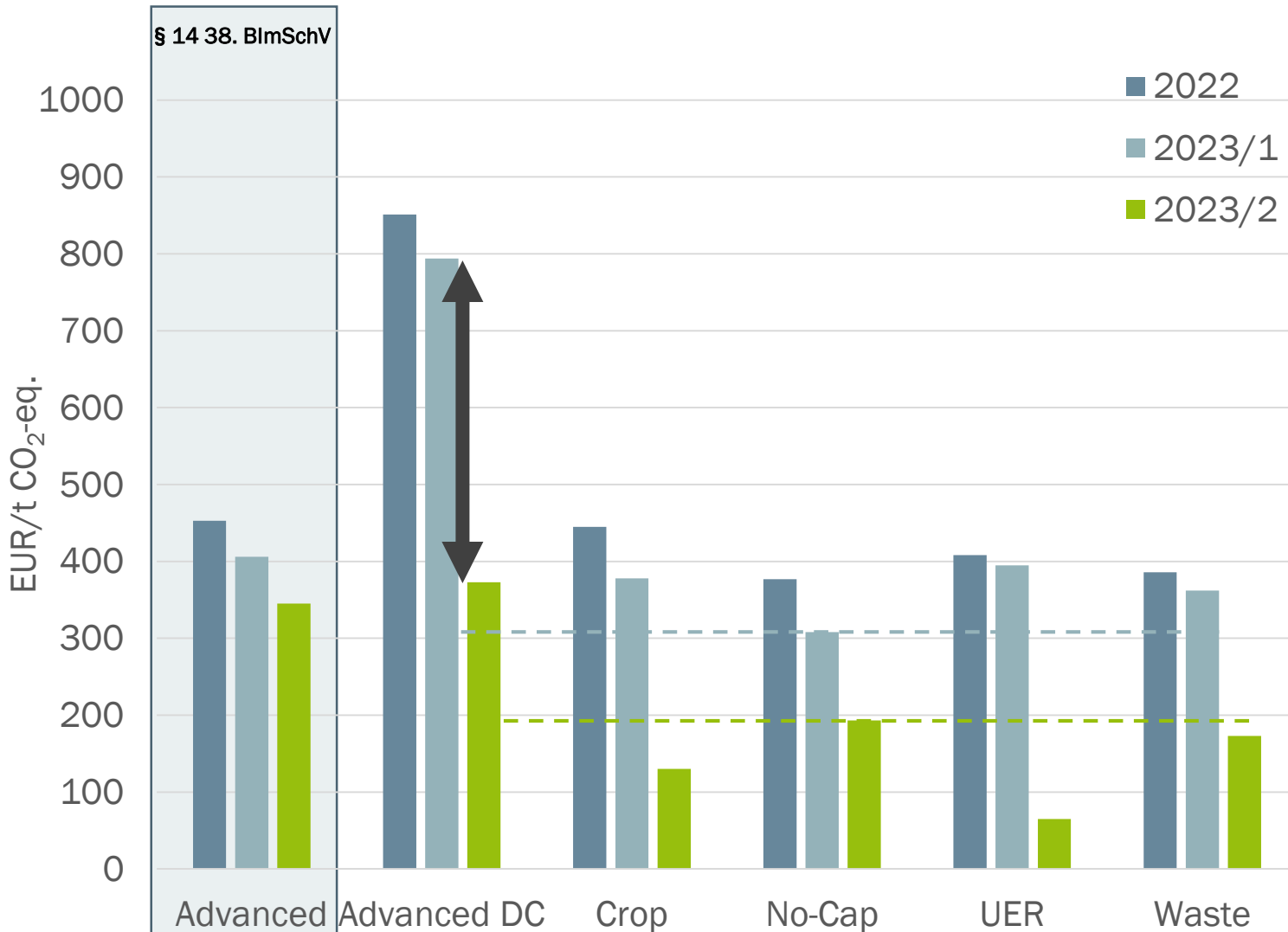
- Prices increase in the range of 49 % to 470 %
- General price increase for methane
- Growing difference in methane from different resources
- Manure biomethane 140 % more valuable than crop biomethane
- Can only be explained by additional revenues (mostly) from GHG quota

Market

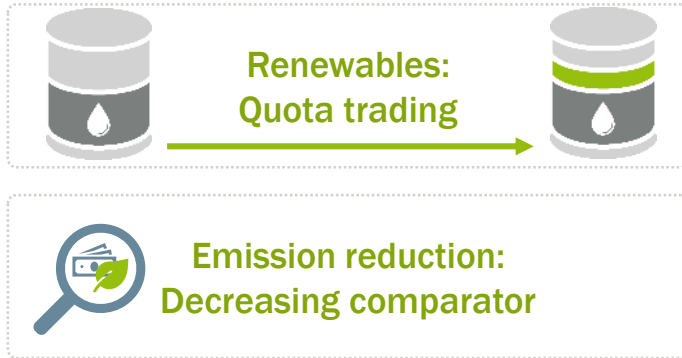
The price of LNG



Market GHG-quota prices



- Price decline of approx. 50 % in the second half of 2023
- No-Cap price is base reference
- Crop and waste (§ 13a 38. BImSchV) expected lower due to limitation
- Advanced double counting (DC) approx. 1.8 to 2 times higher
- Bandwidth for advanced biofuels 370–800 EUR/t CO₂-eq. (2023)



- Crediting of renewable methane in the GHG-quota must be calculated
- Adding a fulfillment option increases both the numerator and the denominator in the quota formula
- This reducing effect could be calculated as followed

Revenues = Emission reduction × Quota price

$$Emission\ reduction = E \times MC \times (EF_{Base} \times (1 - GHG-Quota) - EF_{Fuel} \times DE)$$

Energy quantity

Multi counting

Emission factor base (94.1)

Emission factor of the fuel

Drive efficiency

GHG-quota revenues for advanced LNG

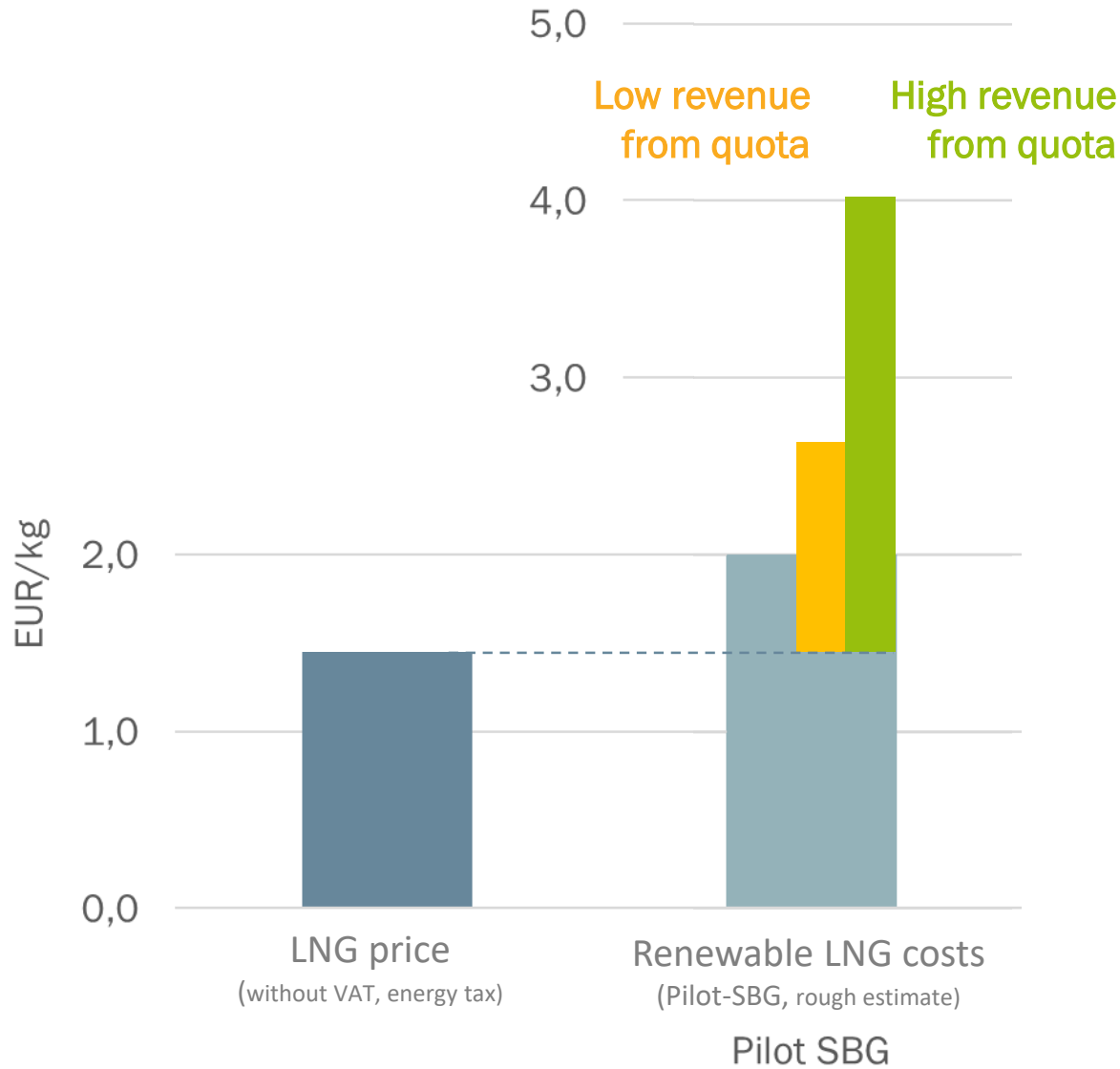
- Bandwidth of 370 to 800 EUR/t CO₂-eq.
- Assumption: renewable LNG with emissions of 20 g CO₂-eq./MJ

	GHG quota	Comp.	Emission reduction (ER)	Comp.	ER in g CO ₂ -eq./MJ CH ₄	ER in kg CO ₂ -eq./kg CH ₄	Low revenue from quota EUR/kg CH ₄	High revenue from quota EUR/kg CH ₄
2024	9.25 %	94.1	74.1 (79 %)	85.3	65.3 (77 %)	3.3	1.21 EUR	2.62 EUR
2026	12 %	94.1	74.1 (79%)	82.8	62.8 (76%)	3.1	1.16 EUR	2.51 EUR
2028	17.5 %	94.1	74.1 (79%)	77.7	57.7 (74%)	2.9	1.07 EUR	2.31 EUR
2030	25 %	94.1	74.1 (79%)	70.6	50.6 (72%)	2.5	0.94 EUR	2.02 EUR

- High revenue from quota possible (equal or higher than revenue of LNG itself)
- Emission reduction decreases with increasing quota!

Market

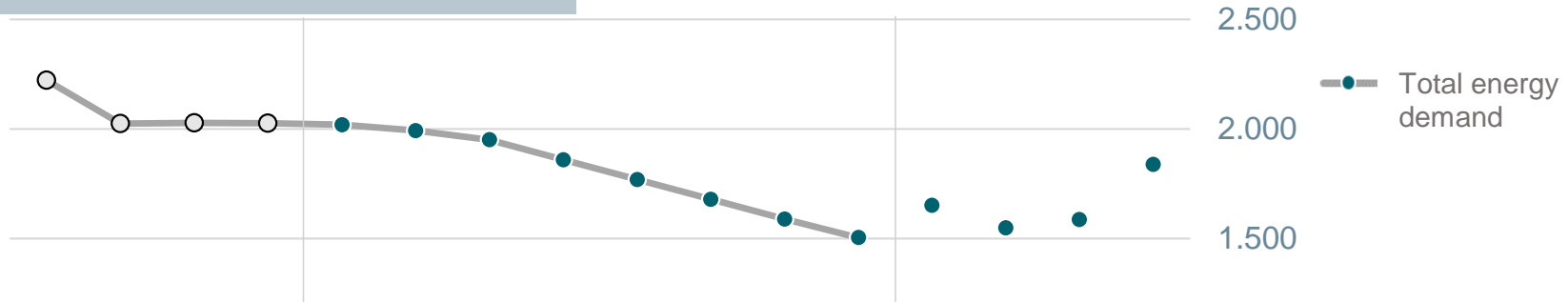
The price of LNG



- GHG quota revenues have a high (positive) impact on the business case
- Currently highly volatile and therefore difficult to assume
- GHG-quota is currently low and rising fast
- Assumption: more stable market with increasing volume

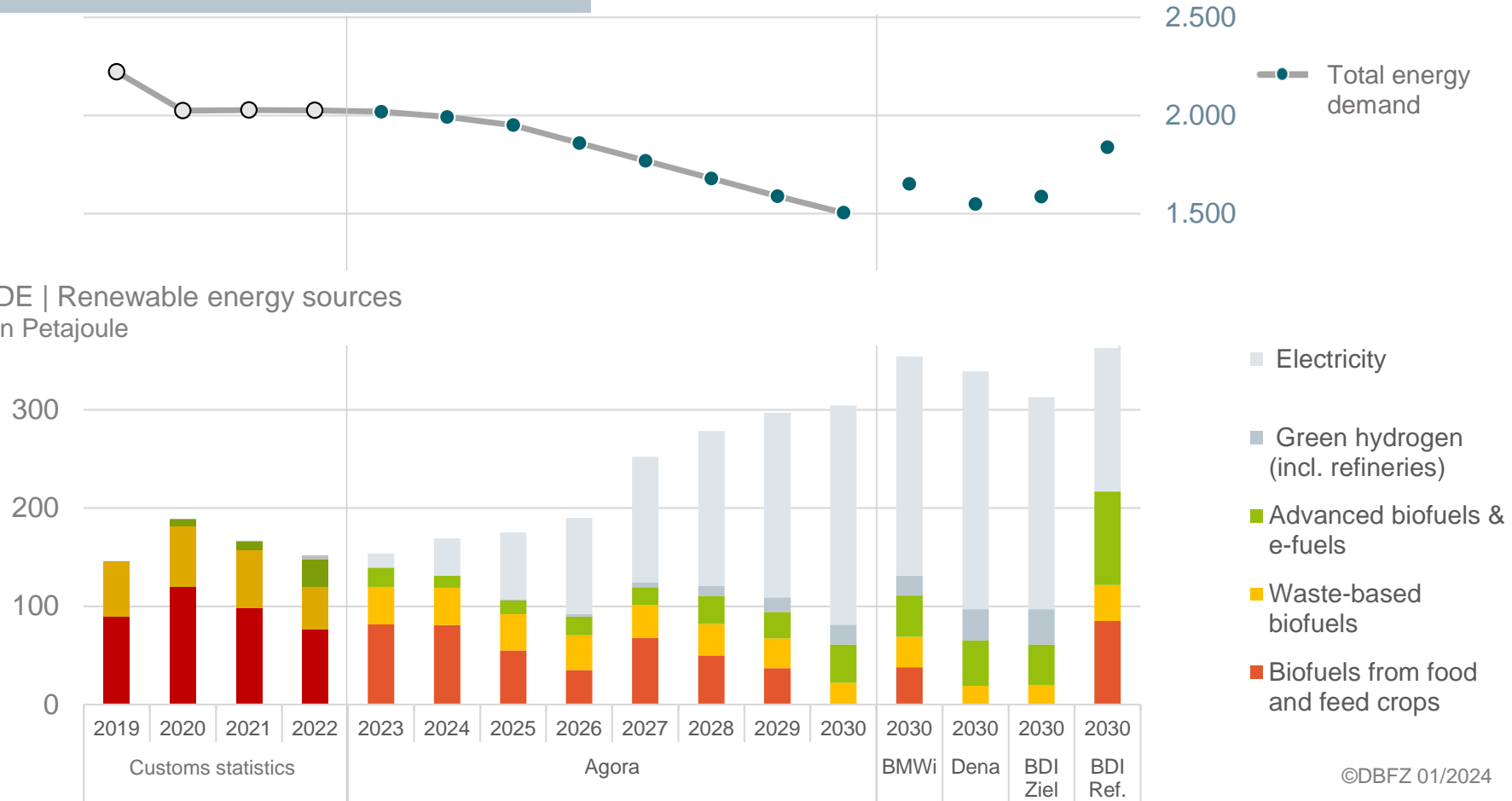
Energy demand and quota development

GHG-quota in the transport sector
Status quo and perspective



DE | Energy consumption in Petajoule

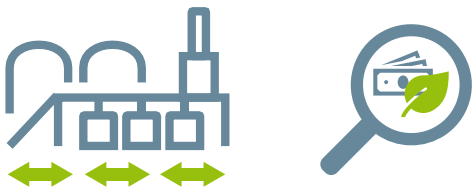
DE | Renewable energy sources in Petajoule



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Conclusions | GHG-quota as a driver for renewable methane from regional biogenic residues and waste materials

- Resource potentials offer a great opportunity for high value use and more climate protection in the transport sector
- Revenues from GHG-quota are high → economic incentive
- Revenues from GHG-quota are highly volatile → high risk
- GHG-quota rises ambitiously fast in the coming years → high need for (advanced) fuels
- Renewable methane has a good opportunity to be part of the GHG-quota



Fokusheft im Projekt Pilot-SBG

Marktanalyse und Treibhausgasquote für erneuerbares Methan im Verkehr

Overview of greenhouse gas avoidance quota

Merit order within the GHG quota

Mechanisms in the GHG-quota market

Market prospects for biomethane



Download:



www.dbfz.de/pilot-sbg

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