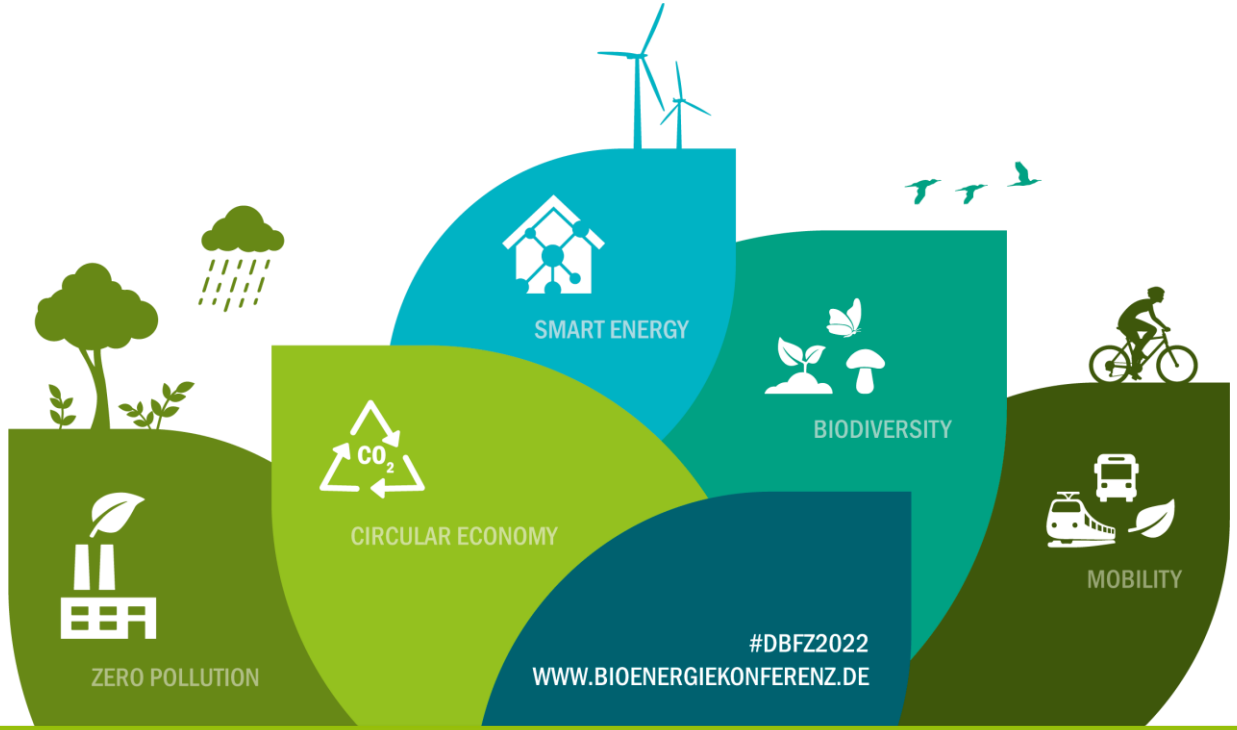
DBFZ JAHRESTAGUNG 2022

Renewable methane – megatrend in the transport sector?

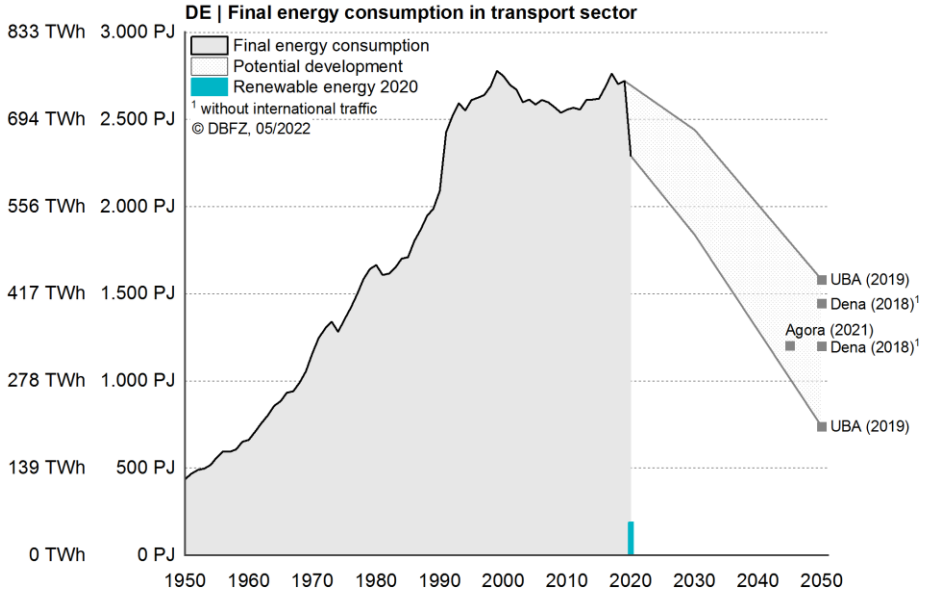


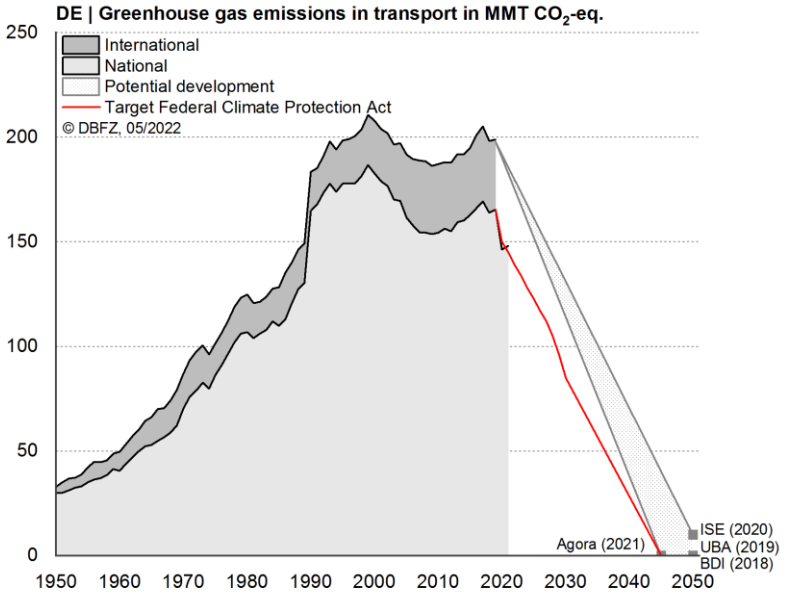
Kati Görsch, Karin Naumann, Jörg Schröder

Fotos: DBFZ, Jan Gutzeit, DREWAG/Peter Schubert (Titelfolie, rechts)

21.-23. JUNI 2022

Energy and climate transformation in transport sector





GHG quota as part of the energy transformation: 6% in 2020/21 > 7% in 2022 >> 25% (2030)

References and more detailed information in [Schröder 2022]

Discrepancy between EU and Germany

Multiple counting in road transport:

RED II

- ≡ 2fold for UCO and animal fat
- ≡ 2fold for advanced biofuels
- ≡ 4fold for renewable electric power

RED II revision (proposal)

- ≡ No multiple counting

Since 2022 Implementation of RED II

- ≡ 1fold for UCO and animal fat
- ≡ 2fold for advanced biofuels[1]
- ≡ 3fold for electric power + propulsion factor 0,4
- ≡ 2fold for H_2, although in refineries + propulsion factor 0,4 for H_2 as fuel

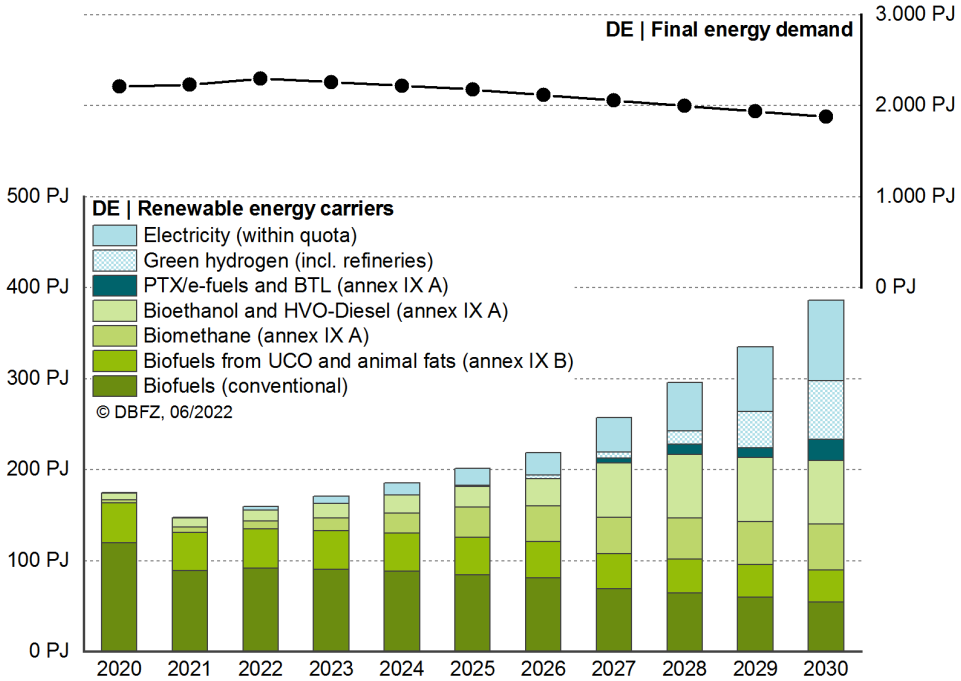
Since 2023 Possible adaptation

- ≡ 1fold for UCO and animal fat
- ≡ 2fold for advanced biofuels[1]
- ≡ 4fold for electric power + propulsion factor 0,4
- ≡ 3fold for H_2, although in refineries + propulsion factor 0,4 for H_2 as fuel

[1] for amounts above the minimum share

Impact of GHG quota until 2030

Exemplary calculation

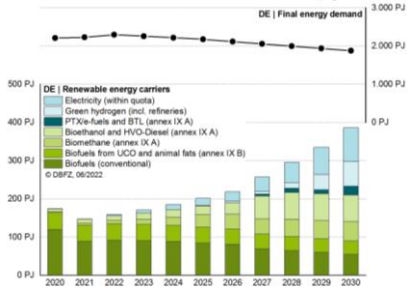


- Demand on renewable energy carriers strongly depends on demand for liquid fuels
- With decreasing demand due to e.g. electrification, modal shift, reduction in consumption and speed limit: in 2030 e.g. ~ 5.4 million t biofuels (in diesel equ.)

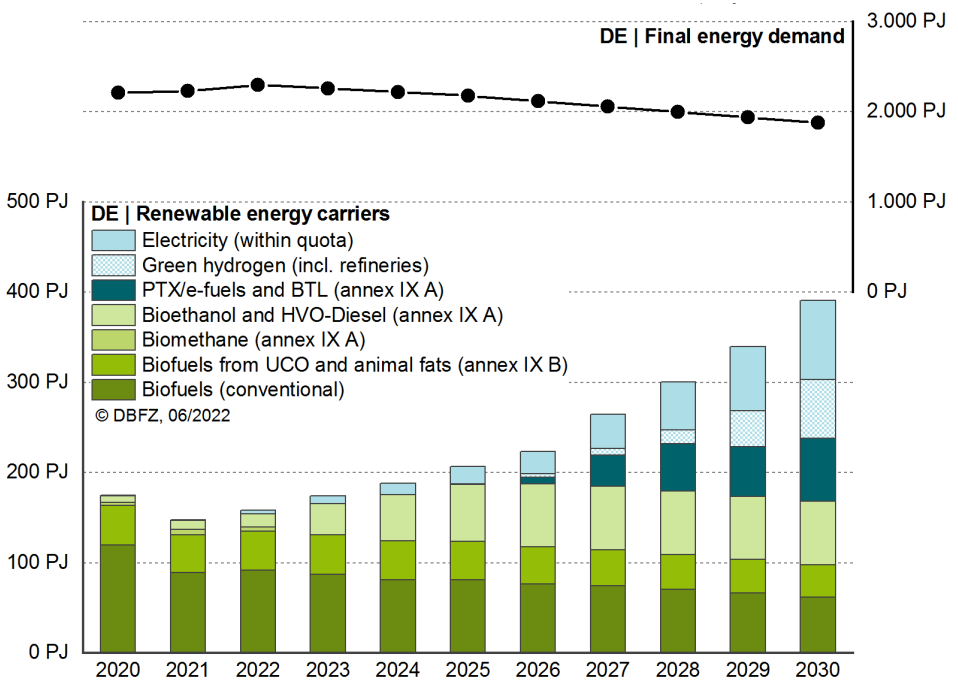
Calculation by K. Naumann
Assumptions: Electricity in electromobility according to threshold for adjustment mechanism, final energy demand 2030 at approx. 1,900 PJ (reduced by Emob (factor 2.5) plus further 12% reduction in consumption compared to 2022), maximum availability of advanced biofuels by 2030: 50 PJ HVO, 20 PJ ethanol, 50 PJ biomethane

Impact of GHG quota until 2030

Sensitivity gaseous fuels



NO gaseous fuels

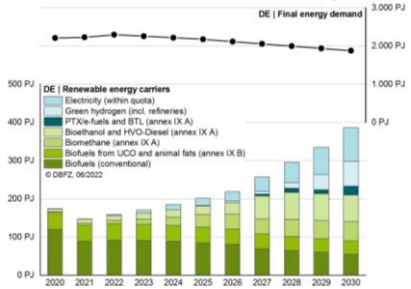


- No use of renewable methane without CNG and LNG
- No use of advantages concerning resource potentials and TRL

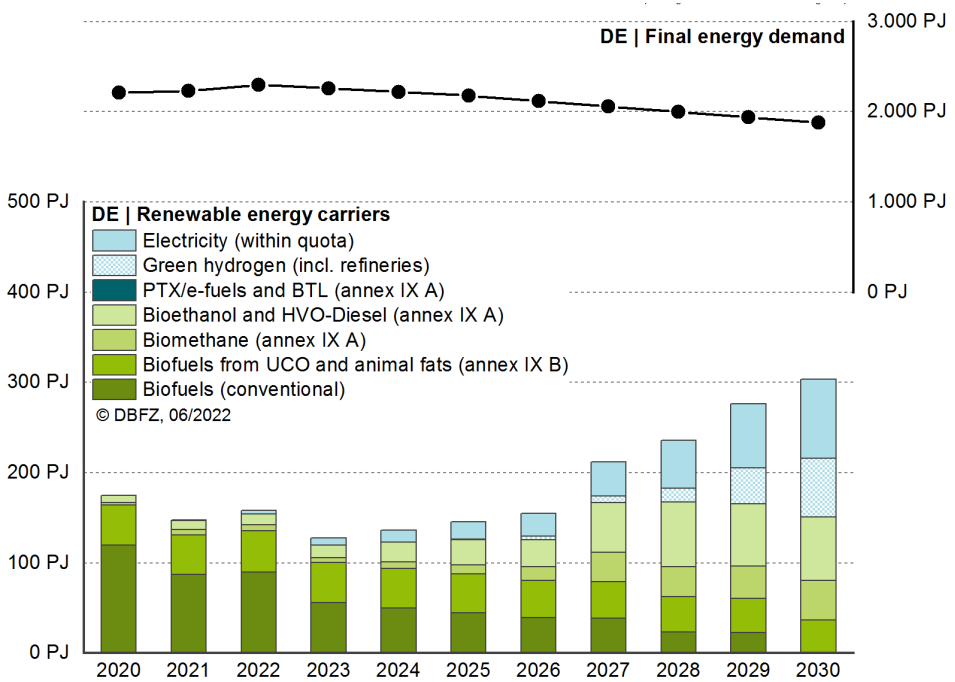
Calculation by K. Naumann
Assumptions for the right figure: Electricity in electromobility according to threshold for adjustment mechanism, final energy demand in 2030 at 1,900 PJ (reduced by Emob (factor 2.5) plus further 12% reduction in consumption compared to 2022), maximum availability of advanced biofuels in 2030: 50 PJ HVO, 20 PJ ethanol

Impact of GHG quota until 2030

Proposal for adjustment of the GHG quota



Less conventional biofuels, increase of multipliers

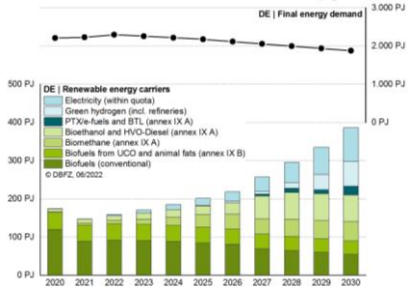


- Increase of the multipliers electric power and subsequent products leads to reduced demand on biogenic energy carriers in transport

Calculation by K. Naumann
Assumptions for the right figure: Multipliers according to BMUV working paper (10.05.2022), max. 2% UCO-based biofuels, UER until 2028, reduction of GHG quota 2023-2026 analogous to reduction of maximum share of 4.4% for conventional biofuels |Electricity in electromobility according to threshold for adaptation mechanism, final energy demand 2030 at 1,900 PJ (reduced by Emob (factor 2.5) plus further 12% reduction in consumption compared to 2022), maximum availability of advanced biofuels 2030: 50 PJ HVO, 20 PJ ethanol, 50 PJ biomethane

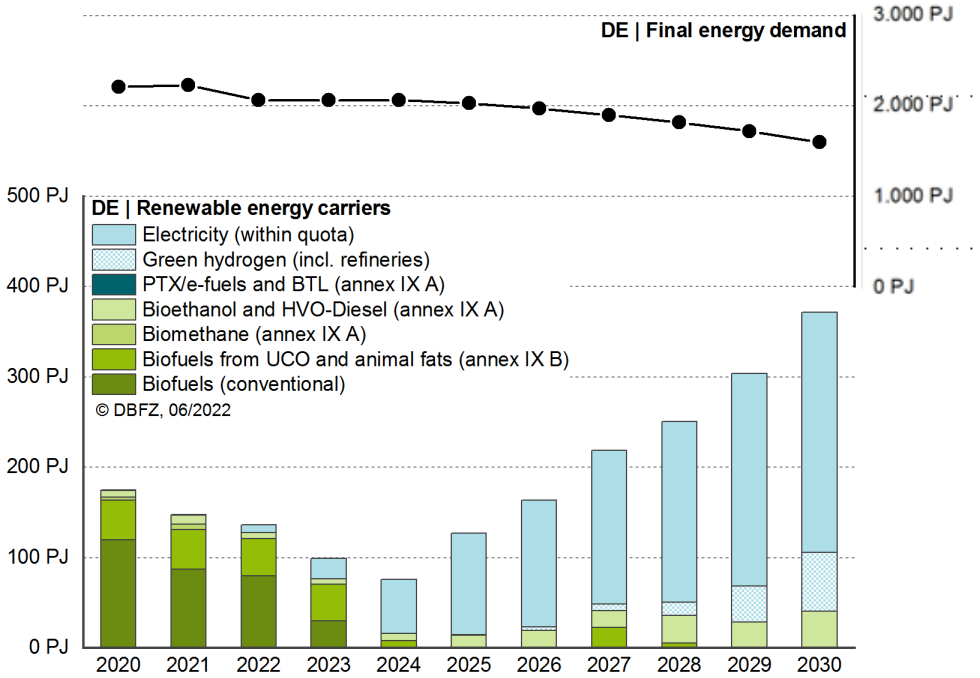
Impact of GHG quota until 2030

Ambitious exemplary scenario



Change of GHG quota & ambitious development with very extensive electrification

- Massively reduced demand on advanced biofuels and other renewable fuels
- Critical security in planning and investment activities



Calculation by K. Naumann
Assumptions for the right figure: Final energy demand by energy source according to Agora Energiewende "Climate-neutral Germany 2045" (2021), total hydrogen quantity according to the German government's hydrogen strategy, maximum availability of advanced biofuels 2030: 41 PJ HVO + bioethanol

Interim conclusion

The transport sector faces particularly great challenges in achieving the climate targets, primarily:

- (massive) Reduction of final energy demand
- Electrification where possible
- Mobilisation of suitable and unused biogenic resources
- Utilization of all existing and obvious options for emission reduction
- Exploitation of synergy effects of power-based and bio-based energy sources

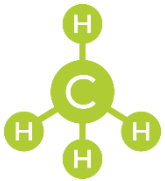
Is renewable methane a megatrend in transport?

What can be the role of advanced biomethane?

Advanced biomethane is a promising option:

- National resource potentials can be utilized
- Technology is relatively well developed in Germany (capacities and expertise)
- Some transport sectors are difficult to electrify at least in the medium term
- Methane can be widely used as fuel, combustible and resource, even in the long term
- Increasing demand for advanced liquid biofuels worldwide with limited availability

Potential for renewable methane in Germany



Biogenic residues:

- Theoretical potential
- Technical potential
- Used technical potential
- Mobilisable technical potential

10 – 24 $Mt_{dry\ mass}$

Ressourcendatenbank: https://webapp.dbfz.de/resource-database/ (17.06.2022)

Possible impact of renewable methane on transport

Substitution potential (for mobilisable potential) in the road transport:

3 – 9,5 %

Trucks

9,6 – 30,6 %

Buses

> 100 %

Passenger cars

4,4 – 14 %

Inland vessels

> 100 %

Seagoing vessels (Bunkering)

64,9 – > 100 %

Ressourcendatenbank: https://webapp.dbfz.de/resource-database/ (17.06.2022)

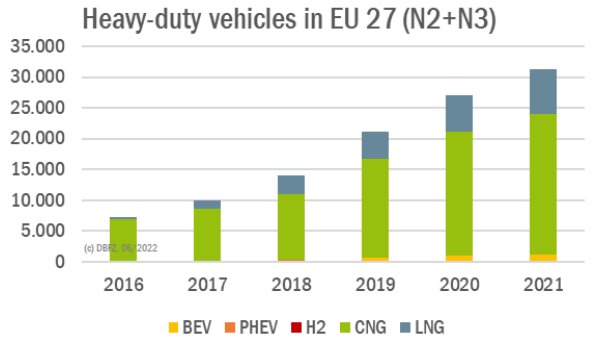
Utilisation in transport sector

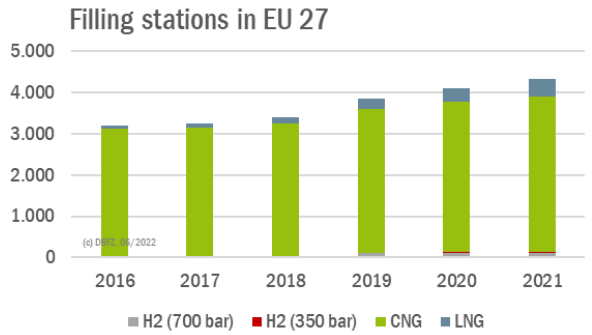
- Until now mostly utilization of fossil methane as LNG; higher renewable part for CNG
- Infrastructure DE / EU:

  785 / 3778 CNG stations in operation

  118 / 421 LNG stations in operation

  in DE: 46 LNG stations planned
- Perspective: renewable methane can be shortly available

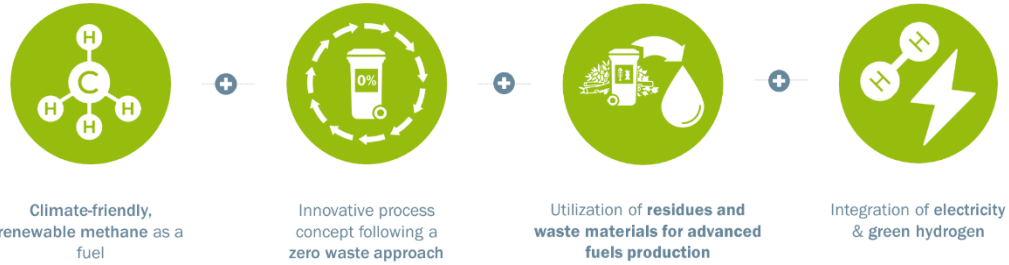


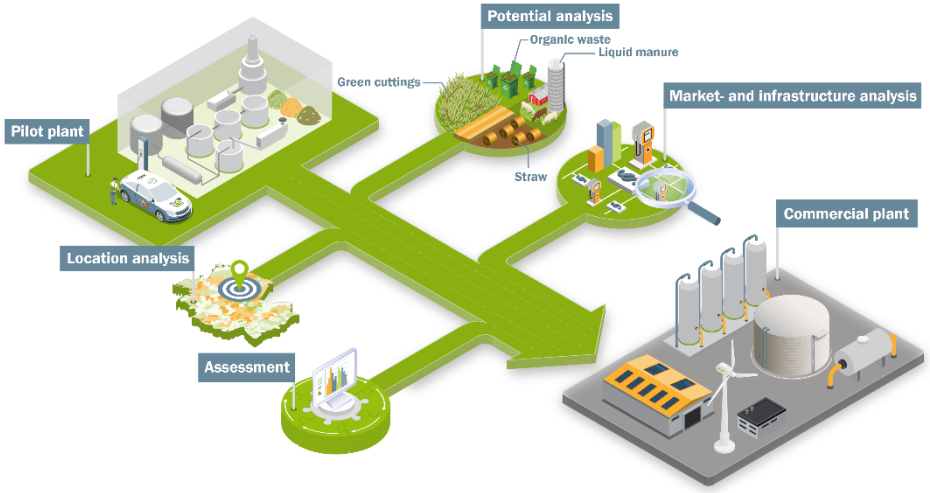


Referenzen: CNG-/LNG-Tankstellen: https://gas.info/mobil-verkehr/erdgas-cng-mobil/erdgas-tankstellen (Stand 03/2022), Infrastrukturdaten EU27: https://alternative-fuels-observatory.ec.europa.eu (abgerufen 05/2022)

Examples

Biogas Hybrid Refinery





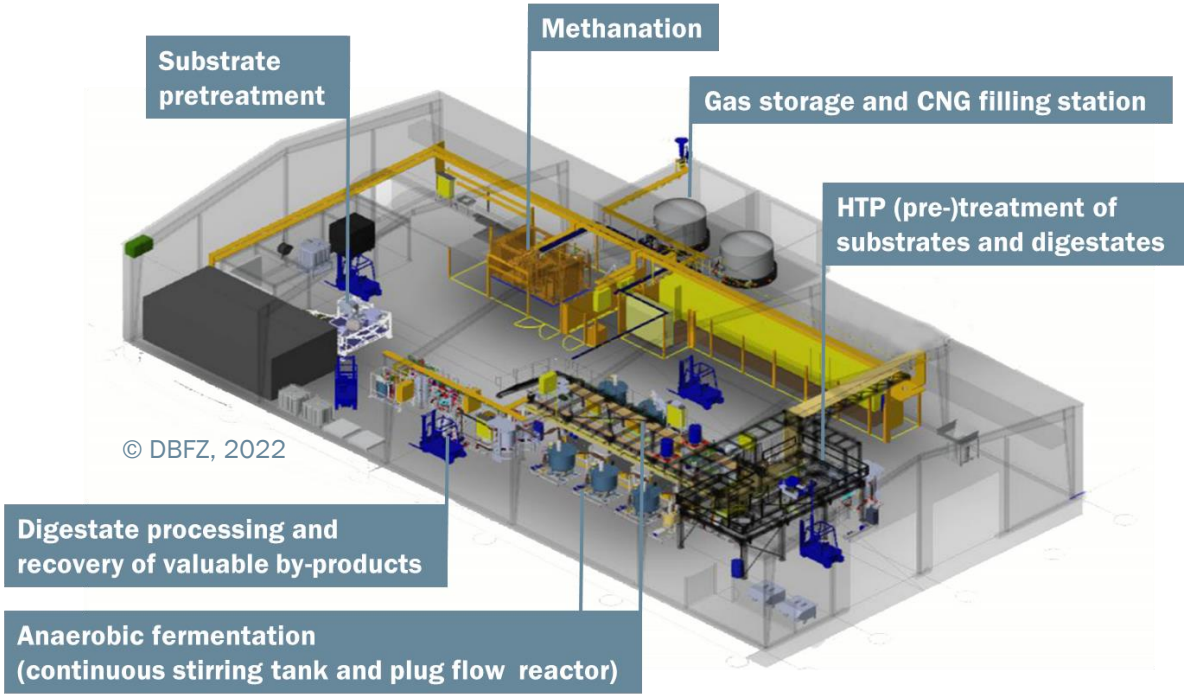
Federal Ministry for Digital and Transport

- Conceptualization and realization of a pilot plant as R&D technology platform for advanced methane as fuel for the transport sector
- SynBioPTX approach
- Feasibility study for further commercial implement-tation of the overall concept

www.dbfz.de/projektseiten/pilot-sbg

Examples

Status quo pilot plant

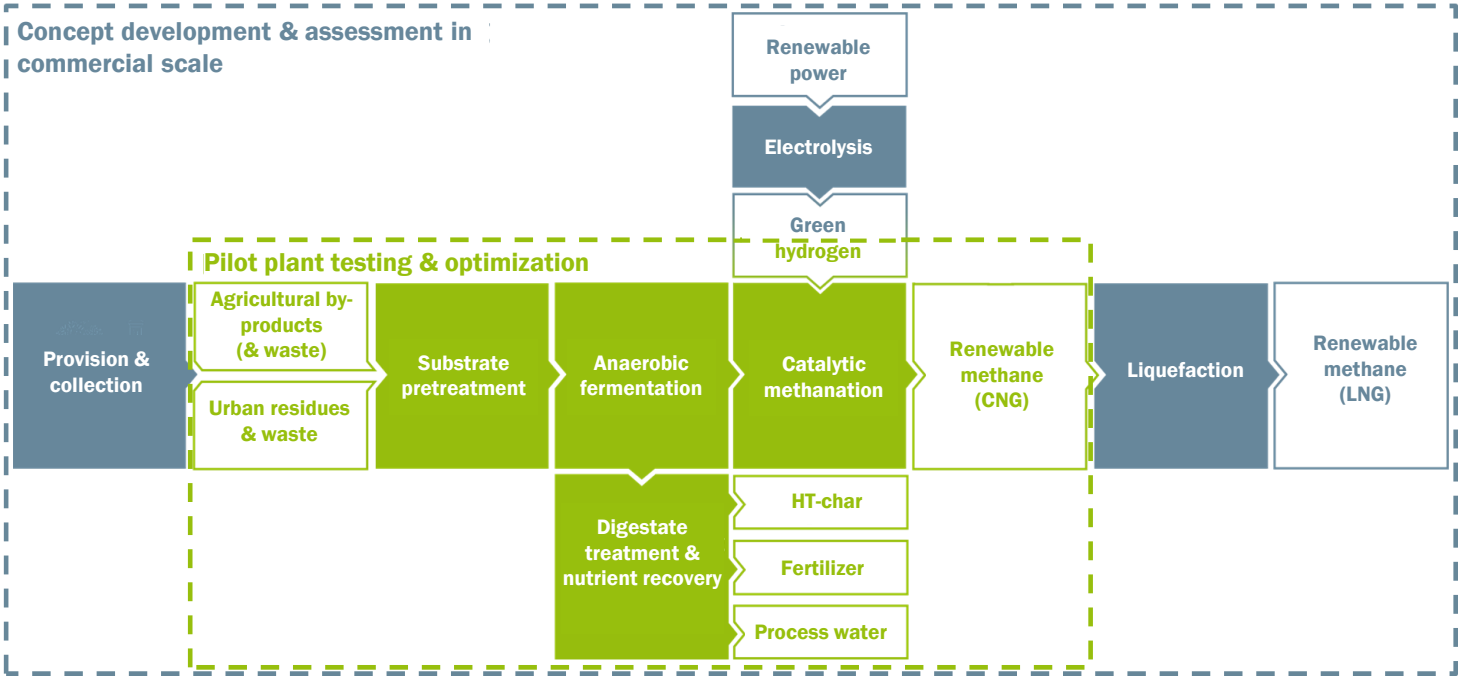


Start of installation of the pilot plant, 31.05.2022

Progress of the installation works, 15.06.2022

Pilot plant operation planned from 2023

- … with supporting research



Examples

… other players

„Erneuerbare Gase werden Schlüsselkomponenten eines globalen Energiesystems sein, das bis 2050 Netto-Null-Treibhausgasemissionen anstrebt. Es besteht Einigkeit darüber, dass unter den erneuerbaren Gasen Biomethan und Wasserstoff am wichtigsten sein werden."

International Energy Agency (IEA), März 2022

„Wir freuen uns, dass wir zukünftig in einer eigenen Anlage Biomethan zu Bio-LNG verflüssigen und in den Markt bringen können, denn nur mit CO_2-neutralem Kraftstoff kann der Nutz- und Schwerlastverkehr seinen Beitrag zur Erreichung der Klimaschutzziele leisten."

Thomas Fritsch, BALANCE Erneuerbare Energien GmbH (Pressemitteilung der BALANCE EnviTec Bio-LNG GmbH, 23.11.2021)

„Wir haben keine Zeit mehr zu verlieren! LNG kann im Transportsektor einen wesentlichen Beitrag leisten. Ab 2023 will Shell seine LNG-Tankstellen komplett mit Bio-Methan versorgen."

Fabian Ziegler, Geschäftsführer Deutsche Shell Holding GmbH, 03.05.2022

„Scania erweitert Sortiment für Biomethan-Trucks (CNG und LNG) bereits im Laufe des Jahres 2022."

Logistra, 12.05.2022

„Mit VERBIO-Technologie produzieren wir grüne Alternativen für vielfältige industrielle Anwendungen – vom Kraftstoffmarkt bis zur chemischen Industrie. Von diesem Weg lassen wir uns nicht abbringen."

Claus Sauter, VERBIO Vereinigte BioEnergie AG (Pressemitteilung, 16.05.2022)

Referenzen:
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On our own behalf

DBFZ Report 44 online

Monitoring of renewable energies in transport

- Political and legal framework
- Transport sector and its infrastructure
- Production technologies
- Mobilizing resources
- Overview market
- Ecological aspects of sustainability
- Economic aspects of sustainability

www.dbfz.de/report-44

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Green Deal & beyond - der Beitrag biomassebasierter Forschung und Innovationen

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