The importance of hydrogen for carbon-free mobility: Opportunities, limits and perspectives

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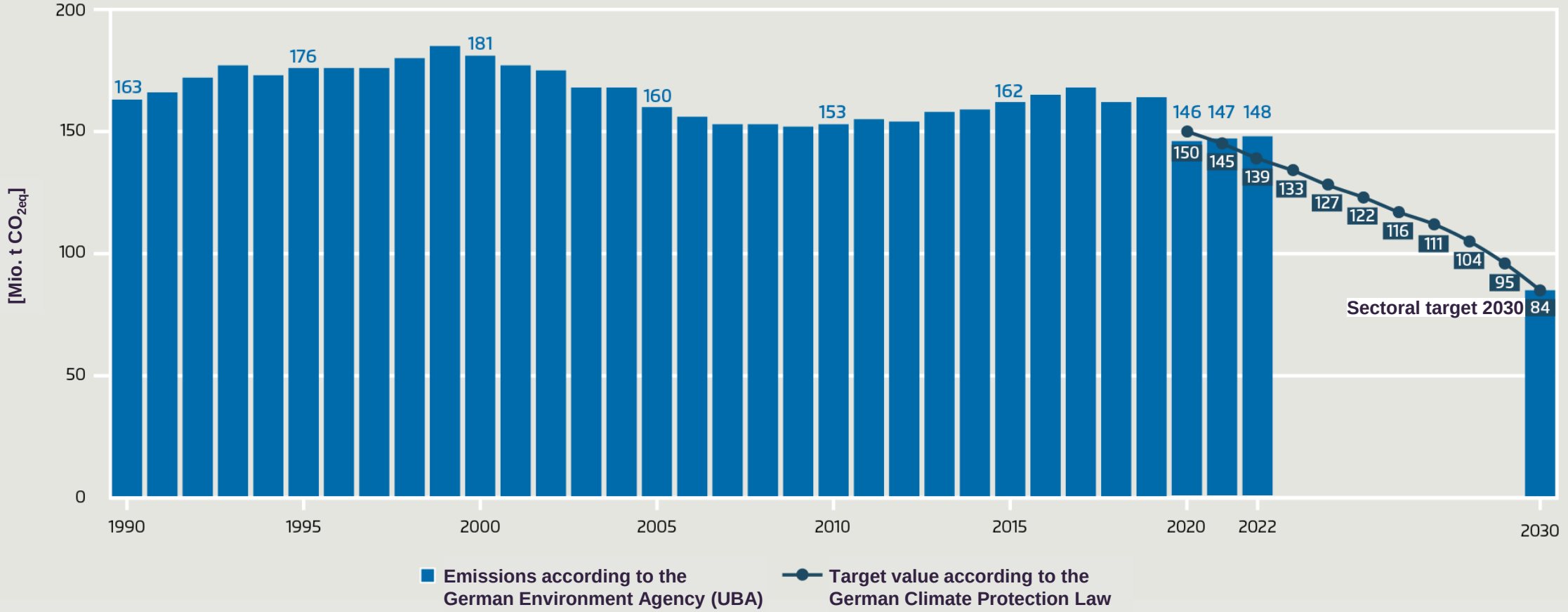
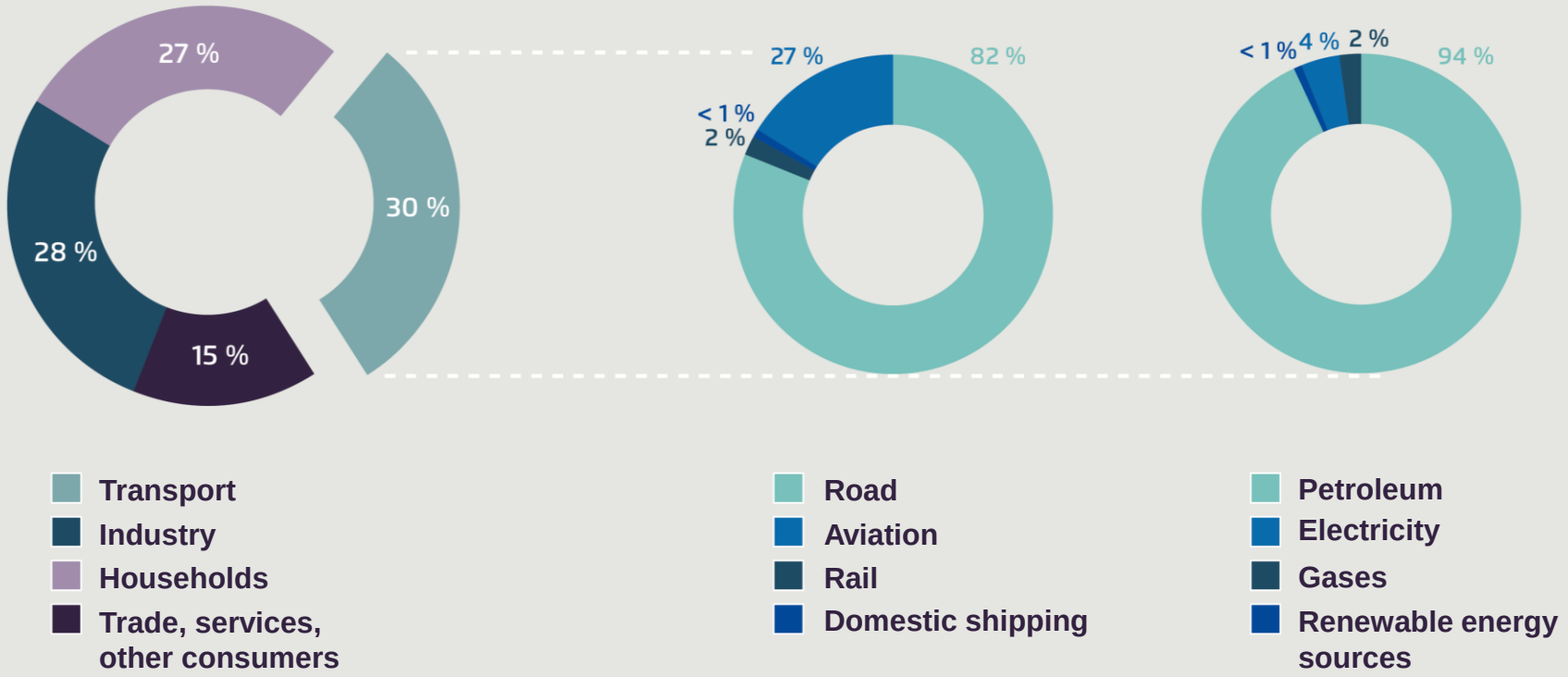
Germany is not on track to reach its climate protection targets in transport



Still more than 94 % of final energy consumption in transport is of fossil origin

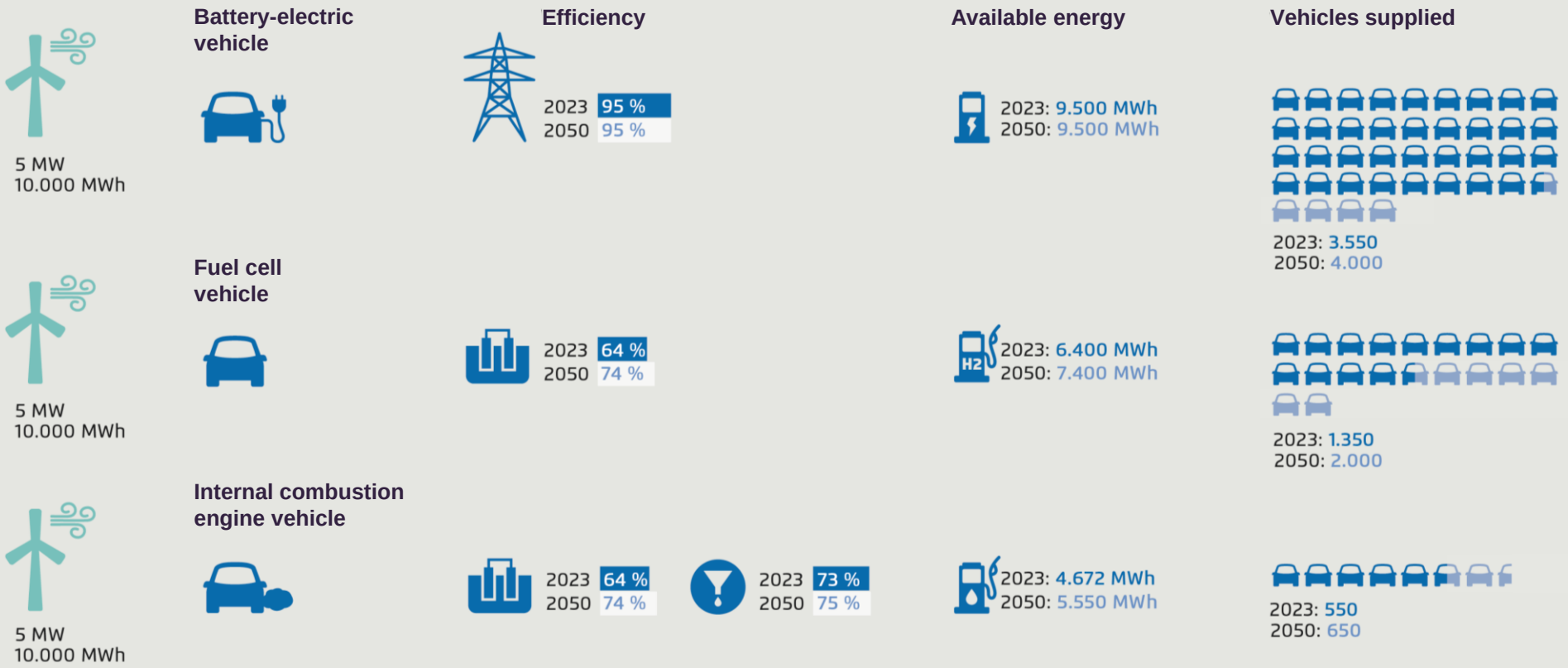
Agora Verkehrswende

Final energy consumption by sector , mode of transport and energy source in 2019



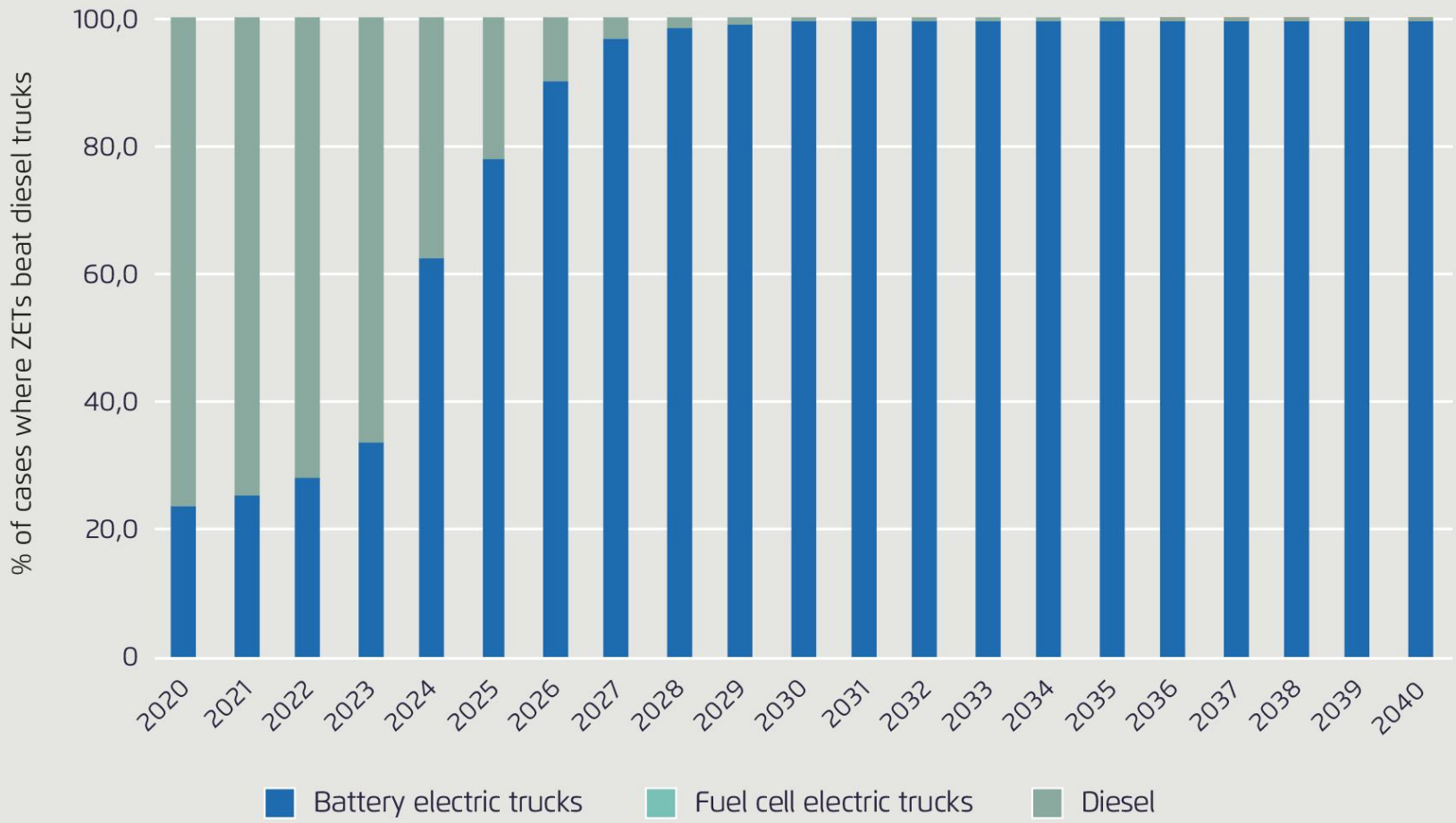
Agora Verkehrswende (2023) | Data from AG Energiebilanzen e.V. (2021)

Energy efficiency: A lot of effort, little return



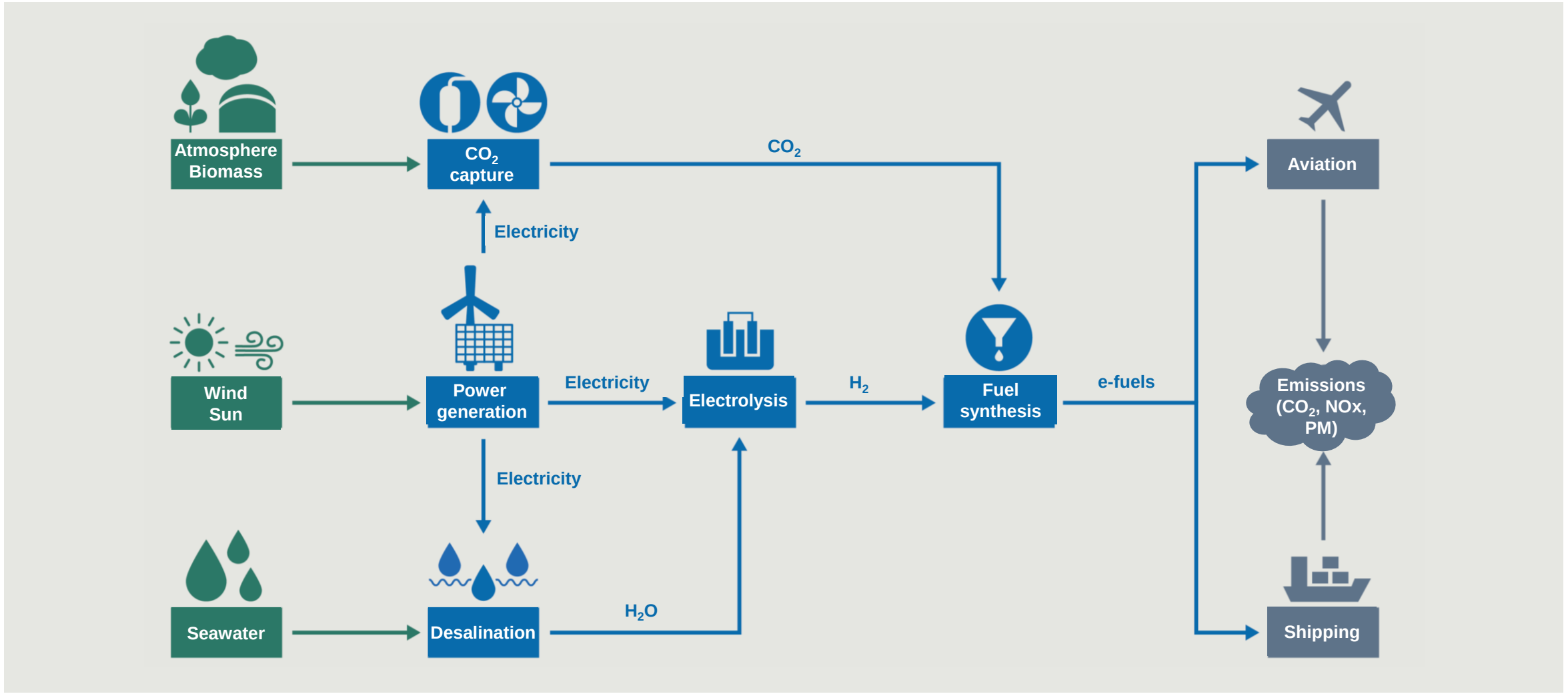
Note: The above figures are for a compact car that is driven 14,000 km/year. Future efficiency improvements result from expected efficiency gain in electrolysis and synthesis processes. Assumed average full load hours for a wind turbine in Germany: 2,000 hours/year.

TCO of battery electric trucks expected to be cheaper than conventional trucks in most cases by 2030



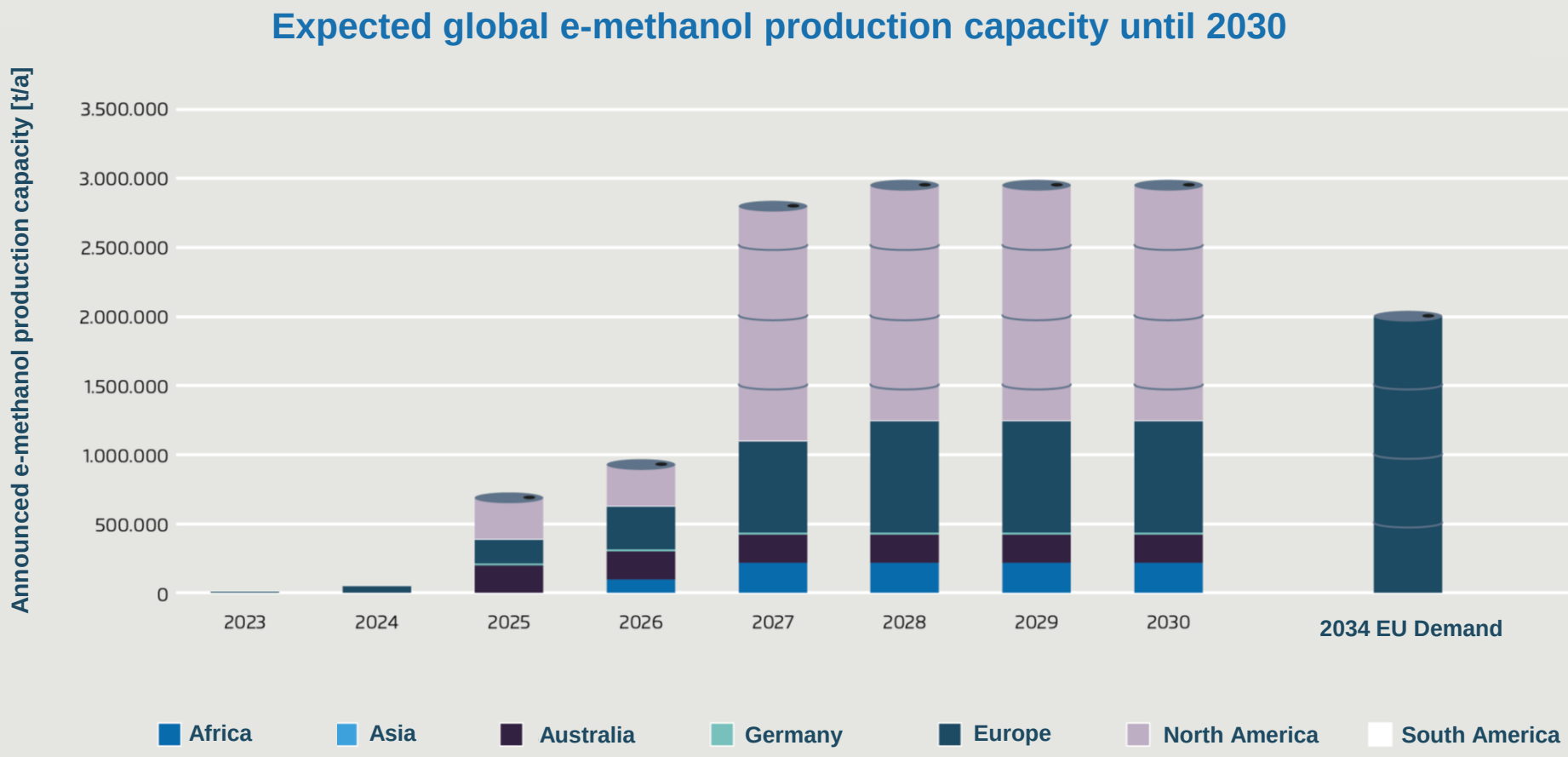
Note: Fuell cell electric trucks were included in the analysis and represent up to 0.02% of cases in 2040

E-fuels to be targeted towards hard-to-abate sectors: aviation and shipping



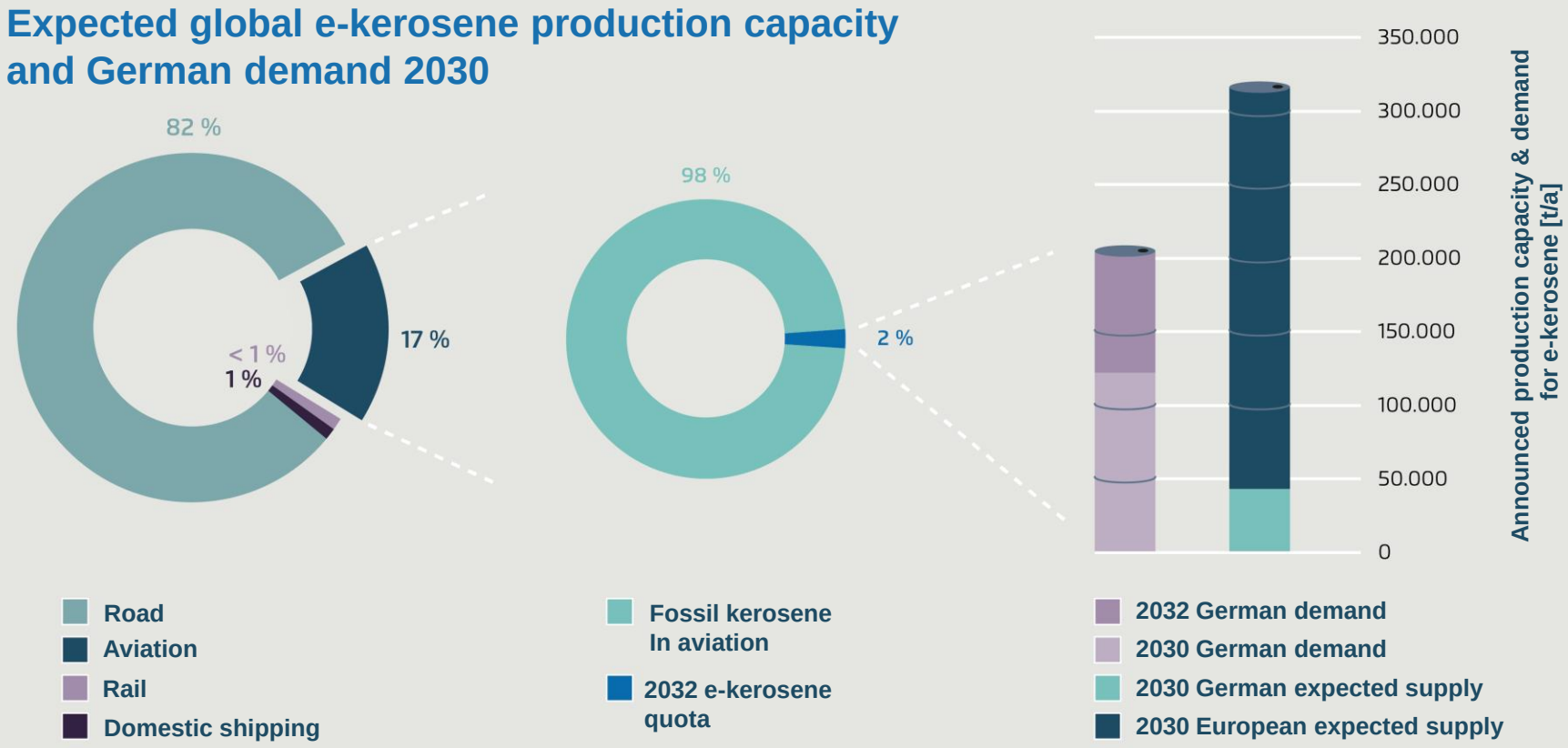
Agora Verkehrswende (2023) | PM = particulate matter

Global e-methanol production volumes still in its infancy - FuelEU Maritime target within reach



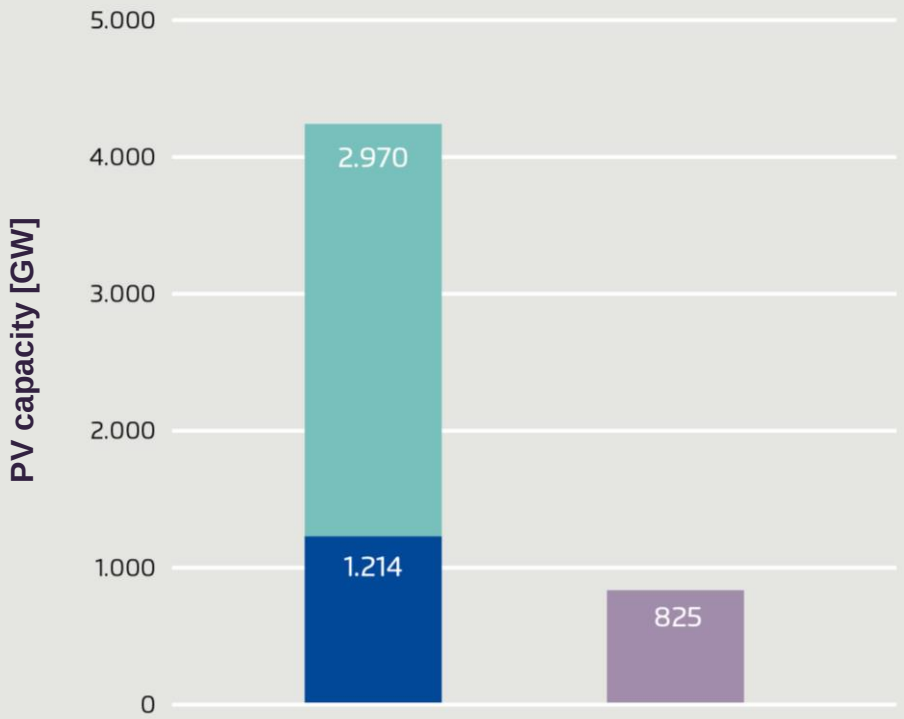
Note: Authors' projection based on public announcements; EU demand corresponding to FuelEU Maritime quota of 2% in 2034.

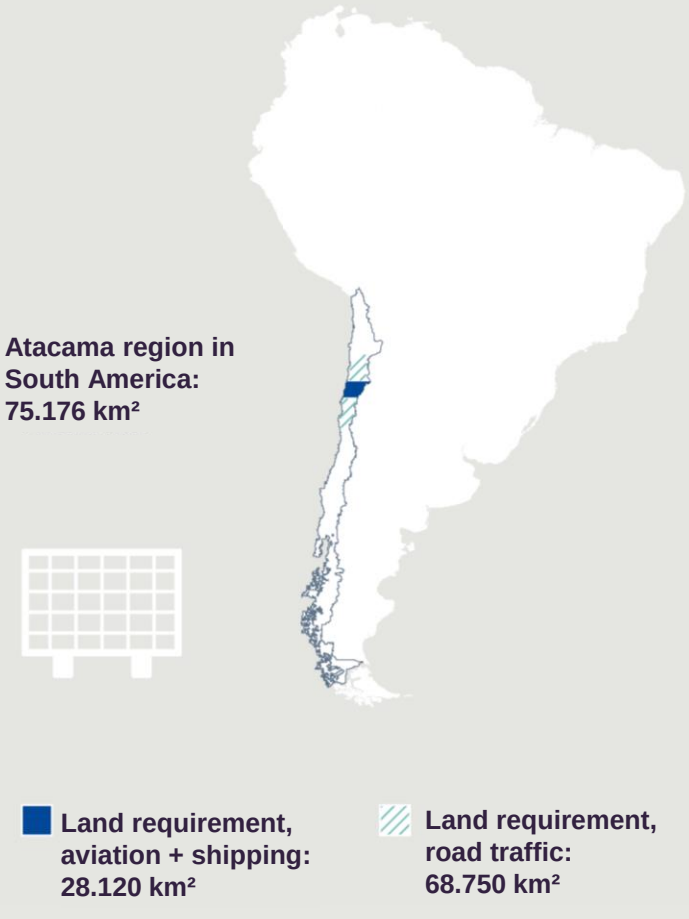
Global e-kerosene production volumes even lower – targeted ramp-up required



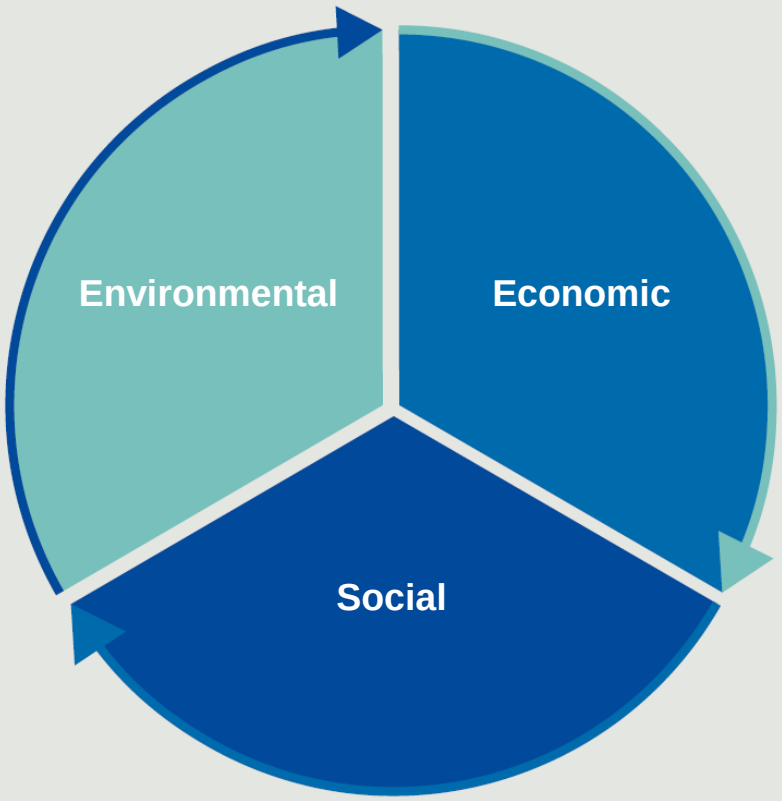
Note: Authors' projection based on public announcements; kerosene demand based on 2019 kerosene sales; where no kerosene production figures were available, a 50% product split was assumed.

Ramp-up requires significant amount of resources





E-fuel sustainability: Ccomplex and indispensable



Environmental

- Additional power generation capacities
- Closed carbon loop
- Ecological seawater desalination
- Avoid land use competition
- Circular raw material use

Economic

- Long-term economic development
- Local energy transition
- Opportunities for use in local transport

Social

- Capacity building
- Electricity and drinking water supply for the local population
- Land use rights and stakeholder participation

Results and recommendations

1. For the foreseeable future, e-fuels will be indispensable for advancing climate protection in aviation and maritime transport, as well as in parts of the chemical industry (no-regret applications).
2. Policymakers are focusing on enabling the targeted market ramp-up of e-fuels through an appropriate political and regulatory framework and to support research and development.
3. Once the political framework is in place, it is up to industry and the financial sector to expand the supply of e-fuels for essential applications as quickly as possible.
4. Investments in the development of global e-fuel production for road transport entail hardly foreseeable risks of not paying off and rapidly losing value (stranded investments).
5. In order to make the global production and use of e-fuels socially and environmentally equitable, comprehensive sustainability criteria are required.

Current eFuel discussion paper:
E-Fuels zwischen Wunsch und Wirklichkeit

www.agora-verkehrswende.de/veroeffentlichungen/e-fuels-zwischenwunsch-und-wirklichkeit/

Only available in German for now
(English version planned)

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Thank you for your attention!

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