



## DE.CA.rbonize Transportation

# The German-Californian Conference for Zero Emission Transportation

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Executive Director, Agora Verkehrswende

Berlin, January 30, 2018



The former State Council Building already  
observed a couple of revolutions...





# „Dieselstraße“ in Berlin: A Symbol for the Transport Transformation in Germany?







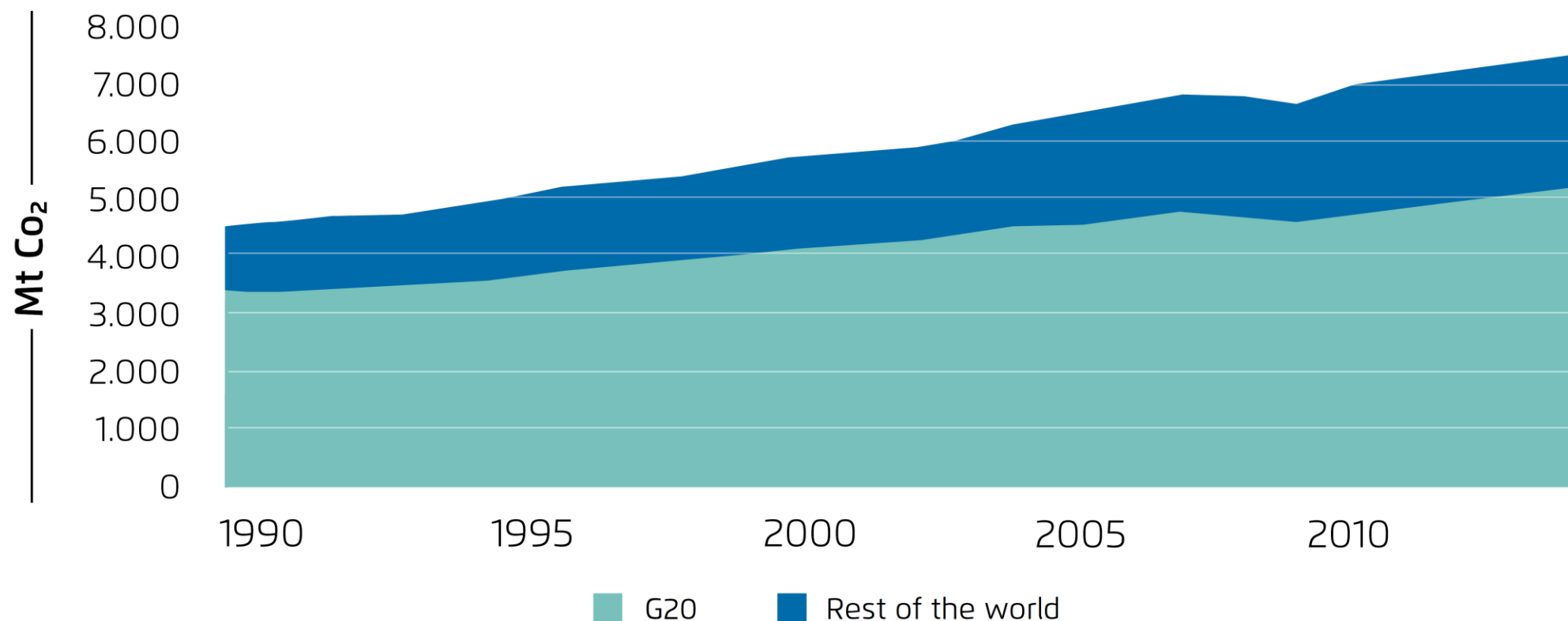
What happens,  
if nothing gets done.





# The G20 is responsible for the lion's share of energy consumption and transport related greenhouse gases

CO2 emissions from the transport sector 1990 – 2014

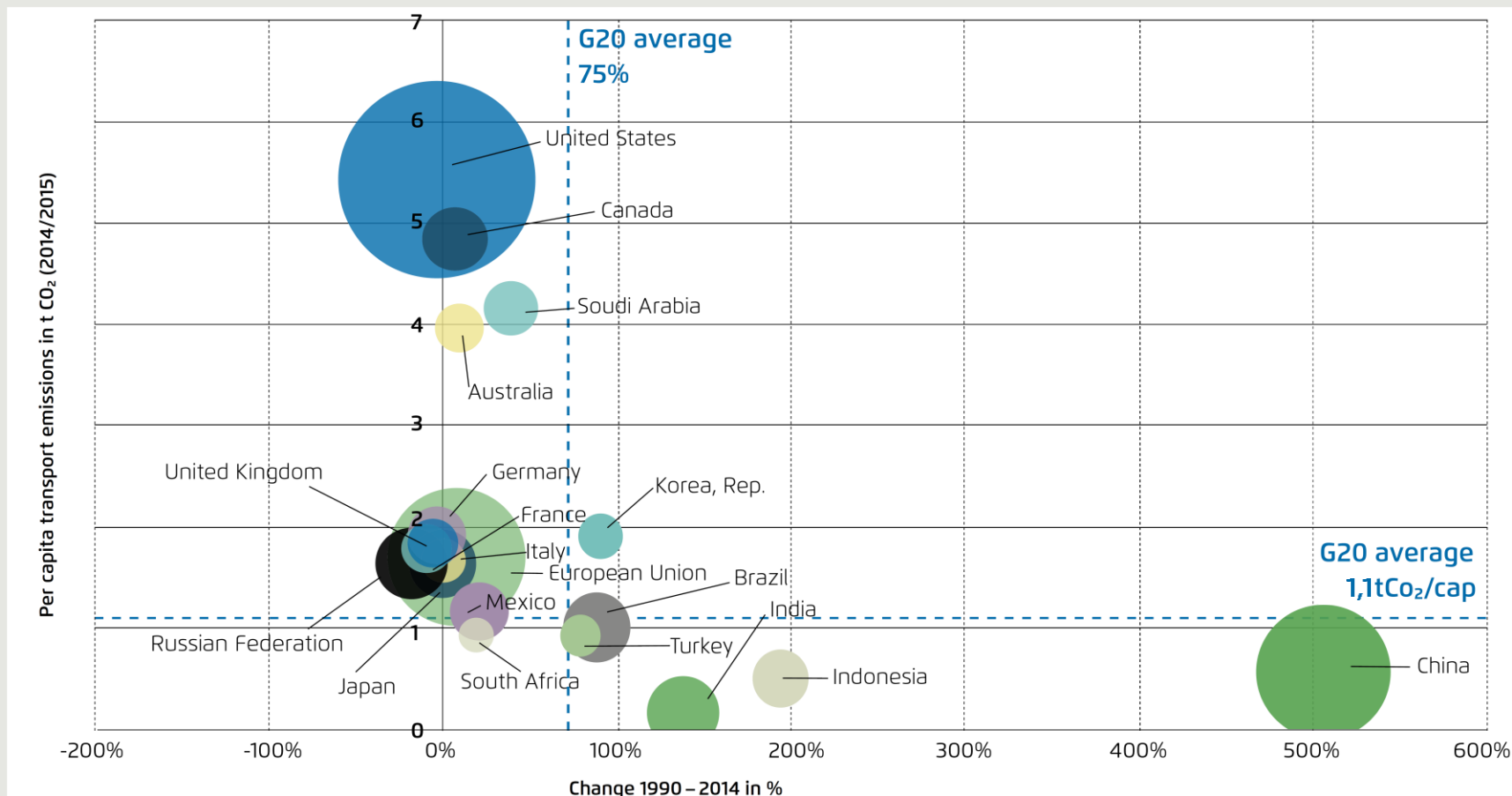


Source: Own illustration based on data from IEA



# The G20 is responsible for the lion's share of energy consumption and transport related greenhouse gases

## G20 per capita emissions and change in the transport sector



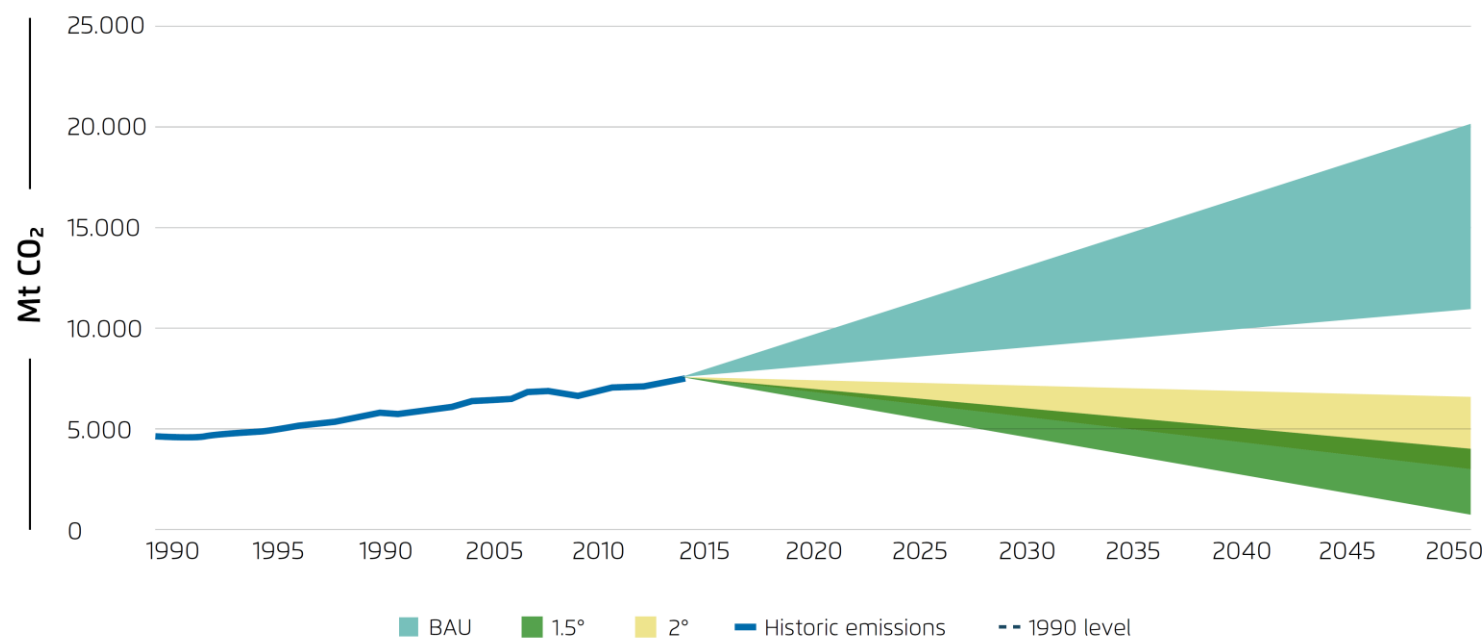
**Note:** the size of bubbles indicates total emissions from the transport sector

**Source:**  
Authors' figure based on data from IEA (2016) and World Bank (2017)

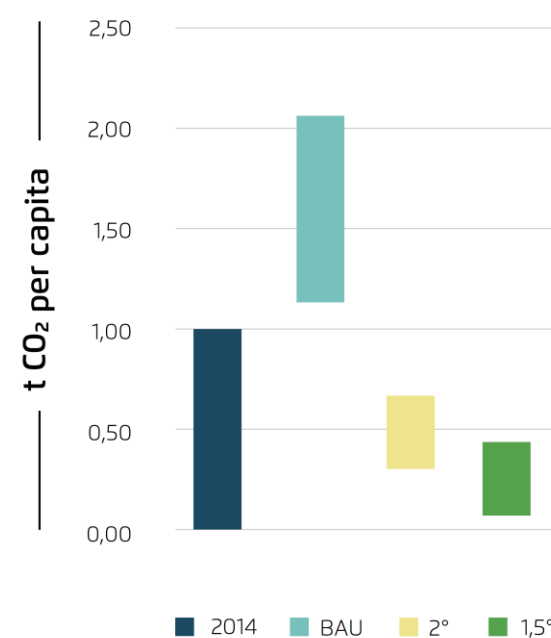


# Transforming Transport is key to delivering on the Paris Agreement

Transport sector emissions: business-as-usual and required reductions under 2°C and 1.5°C scenarios



Note: Simplified illustration based on historic levels and projected 2050 levels. Individual scenarios are likely to peak around 2020 and then decrease emissions at higher rates afterwards.



Source: Authors' figure, historic emissions based on data from IEA (2016), projections based on data from Gota et al. (n.d.).





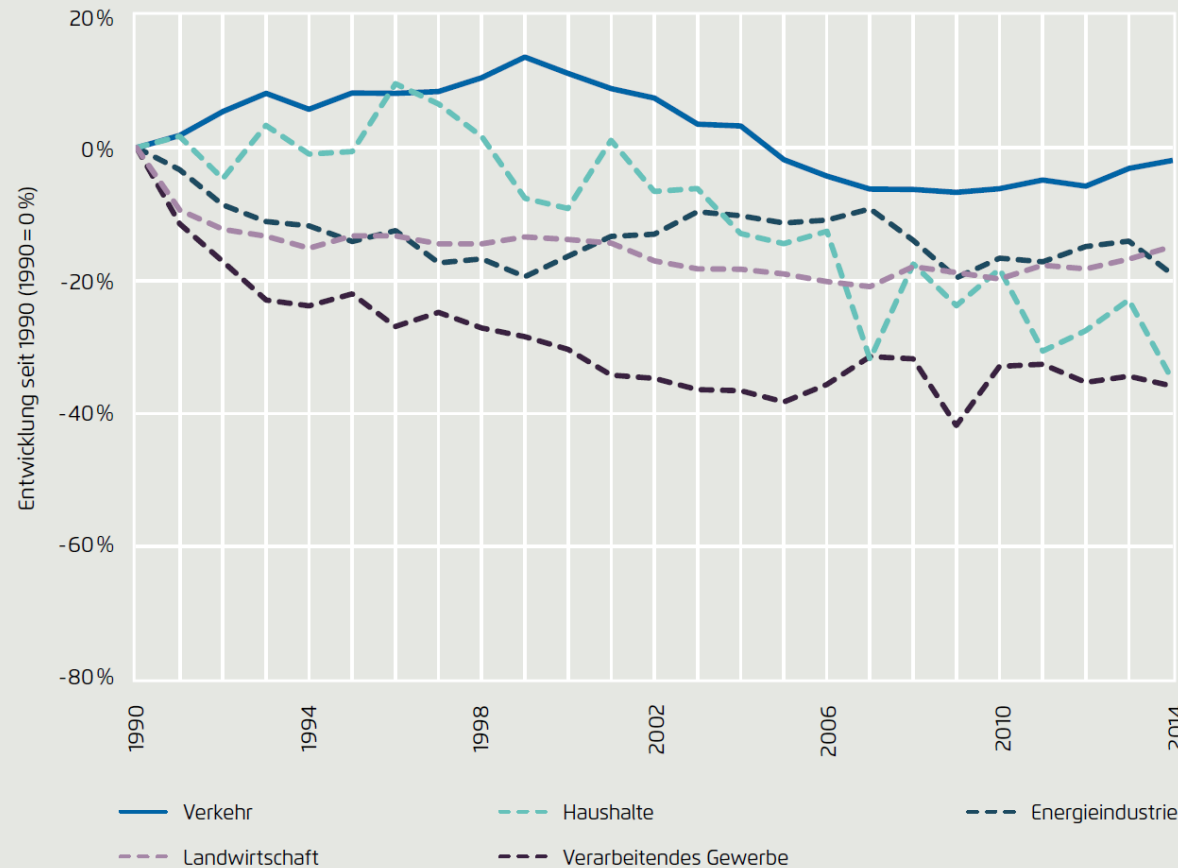
Transforming the transport sector is crucial  
for the success of the clean energy transition.





# In the past 25 years the Transport Sector in Germany could not contribute to CO<sub>2</sub> Emission Reductions.

## Relative Development of Greenhouse Gas Emissions for different Sectors since 1990



Source: Agora Verkehrswende

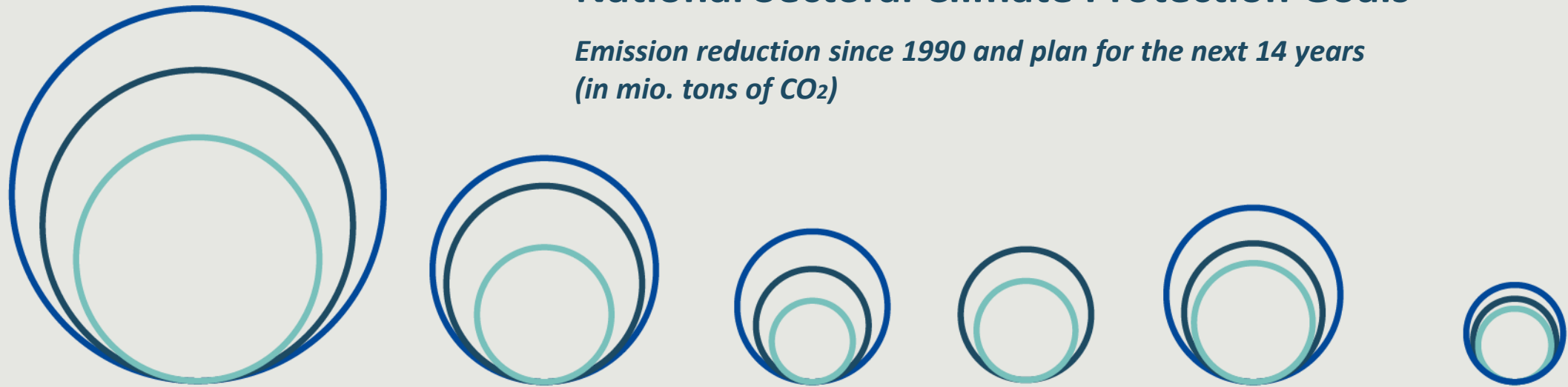


# Federal Climate Protection Plan 2050: The *Verkehrswende* is an official goal of the Government.

For the first time ever the German transport sector has an own ambitious emission reduction target.

## National Sectoral Climate Protection Goals

*Emission reduction since 1990 and plan for the next 14 years  
(in mio. tons of CO<sub>2</sub>)*



Total

Energy

Building

**Transport**

Industry

Agriculture

○ 1990	1248
○ 2014	902
○ 2030	543–562

446
358
175–183

209
119
70–72

163
160
95–98

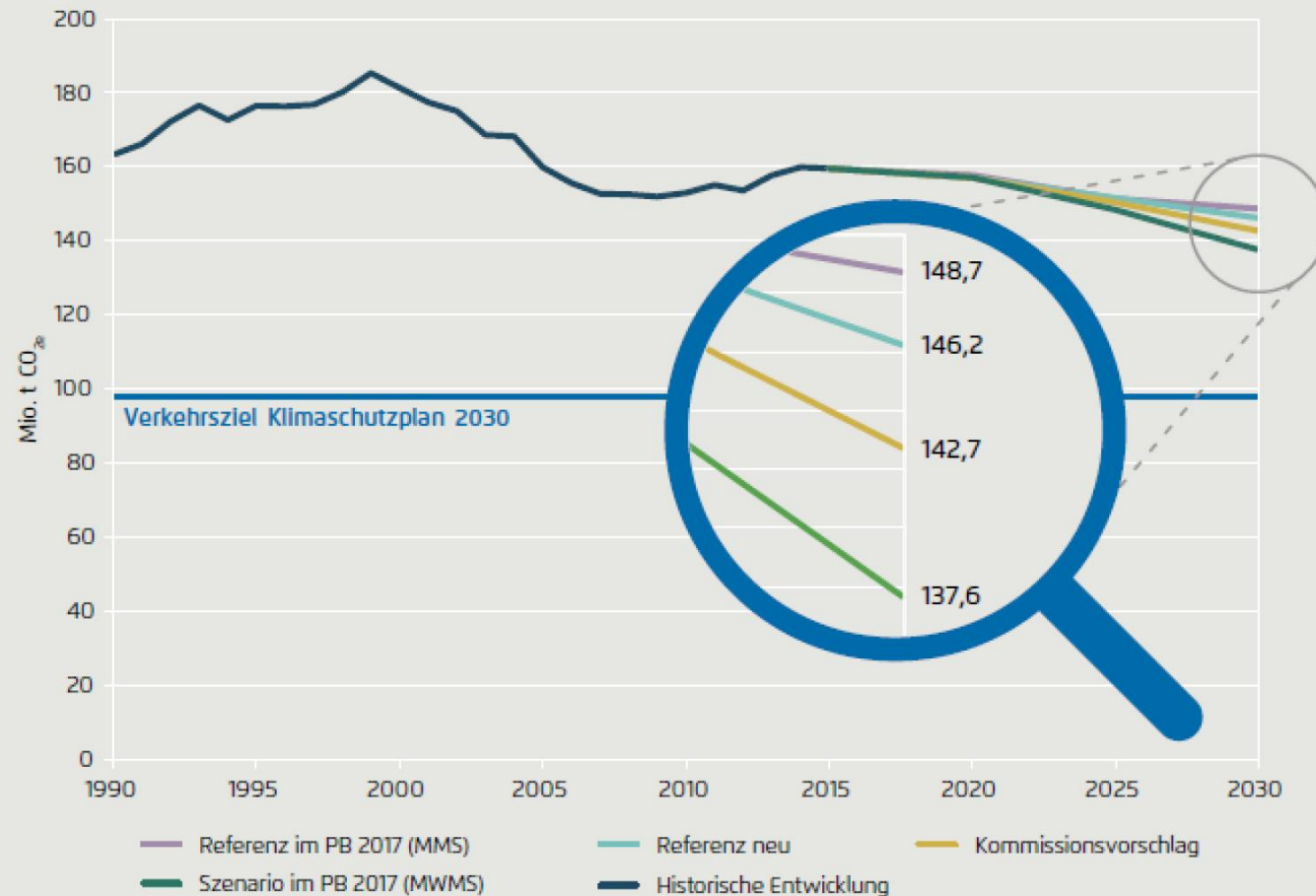
283
181
140–143

88
72
58–61

Source: Agora Verkehrswende



# The potential contribution of the EC proposal for the CO<sub>2</sub> car regulation beyond 2020.



Source: Agora Verkehrswende



# The *„Verkehrswende 2050“* will be enabled by the Mobility Transition and the Energy Transition in Transport.

## TRANSPORT TRANSFORMATION

This large-scale transformation will ensure that transport is carbon neutral by 2050.

### MOBILITY TRANSITION

The transition to sustainable mobility will reduce energy consumption without limiting mobility.



+

### ENERGY TRANSITION IN TRANSPORT

The transition to clean energy in the transport sector will cover remaining demand with carbon-neutral energy.





In cities, the mobility transition  
has already begun.



## Shanghai between 1985 and 2010. Makes you humble...

Shanghai Pudong 1985



Shanghai Pudong 2010



# The Challenges of Sustainable Urban Transport go far beyond Decarbonisation.

Traffic Tetris in Metropolis around the World.



Picture: Christian Hochfeld

- **Reduce Land Consumption.**
- Improve **Air Quality.**
- Reduce **Congestion.**
- Improve **Road Safety.**
- Reduce **Noise.**
- Secure **Energy Supply.**



# The Mobility Transition has already started in cities around the world...



Picture: iStock

- The interlinked public transport is the backbone of urban transport.
- Private transport becomes more public, public transport becomes more private.
- Fewer cars leave more space for other land use.
- Walking and cycling comes with high benefits for the city at lowest costs.
- Sustainable urban transport policy receives more political support.

# The Mobility Alliance



- Public Transport
  - Suburban train
  - Underground
  - Tram
  - Bus
  - Taxi
- Non-motorised Transport
  - Bicycle
  - Pedestrians
- Collaborative Mobility
  - Carsharing
  - Ridesharing
  - Bikesharing

Source: Agora Verkehrswende



## „What would Jesus Drive?“

It seems that he has already decided...



Source: Agora Verkehrswende





The bike is back in the  
kingdom of cars.



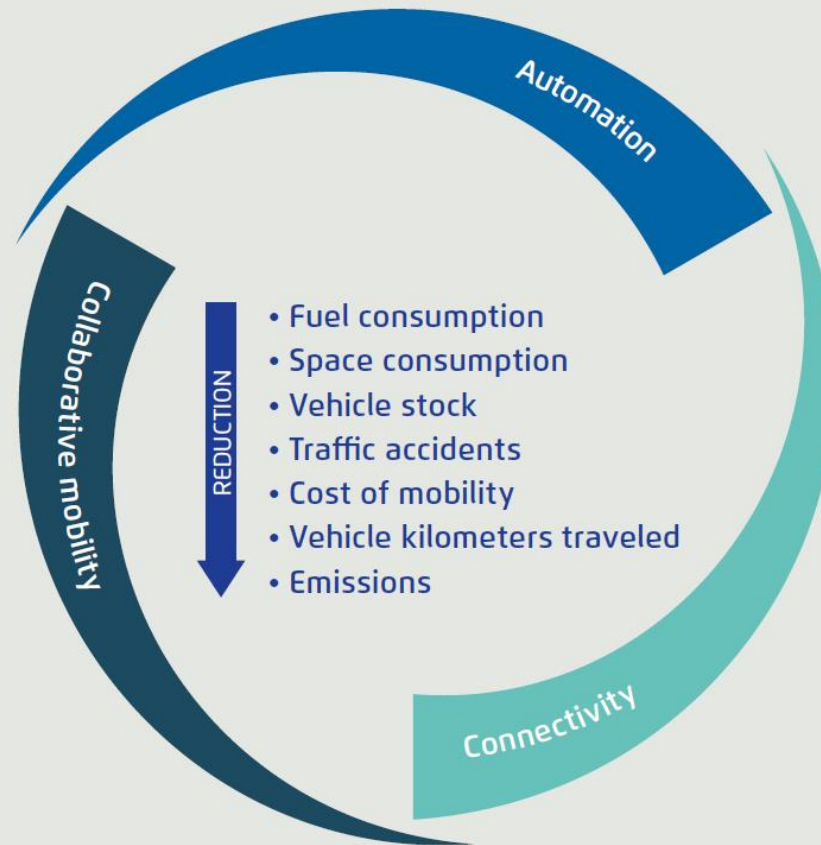




Driverless vehicles are  
ideal for shared use.

# Trends and Potentials of Digitalisation in Transport

## Optional Synergies between Automatisatisation, Collaborative Mobility and Connectivity

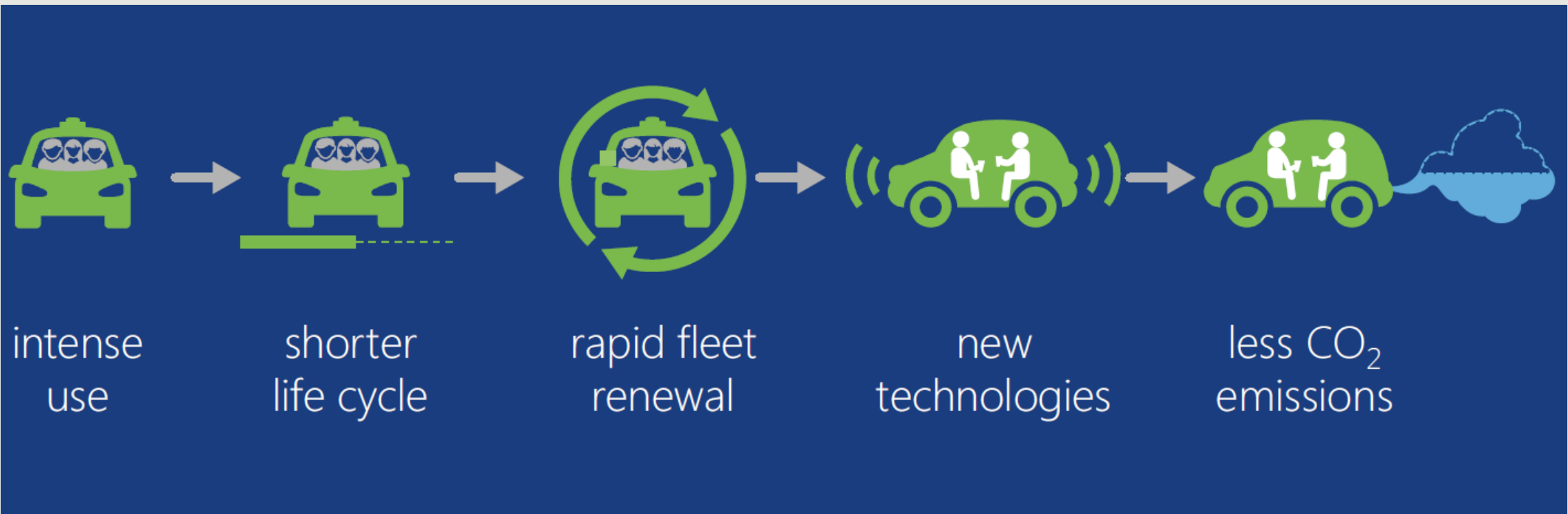


Source: Agora Verkehrswende



# Shared Mobility and Penetration of New Technologies goes hand in hand!

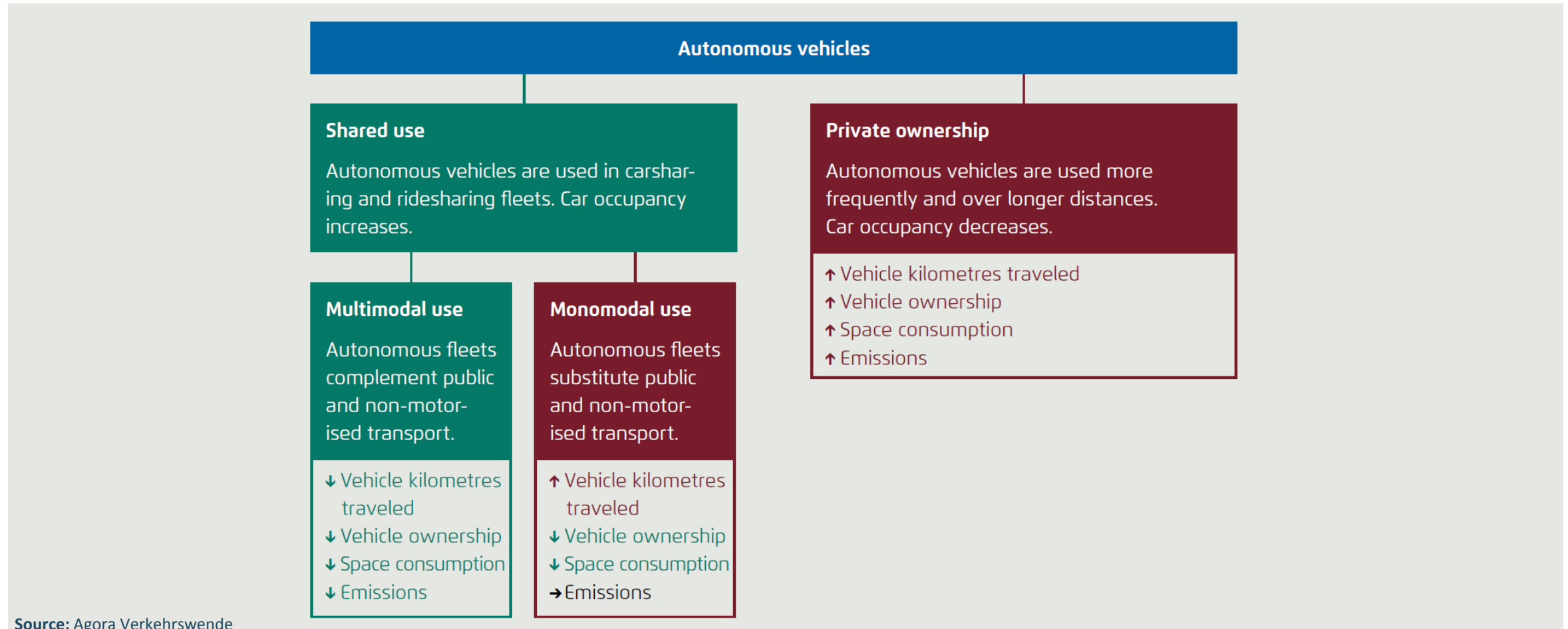
Autonomous vehicles need collaborative mobility.



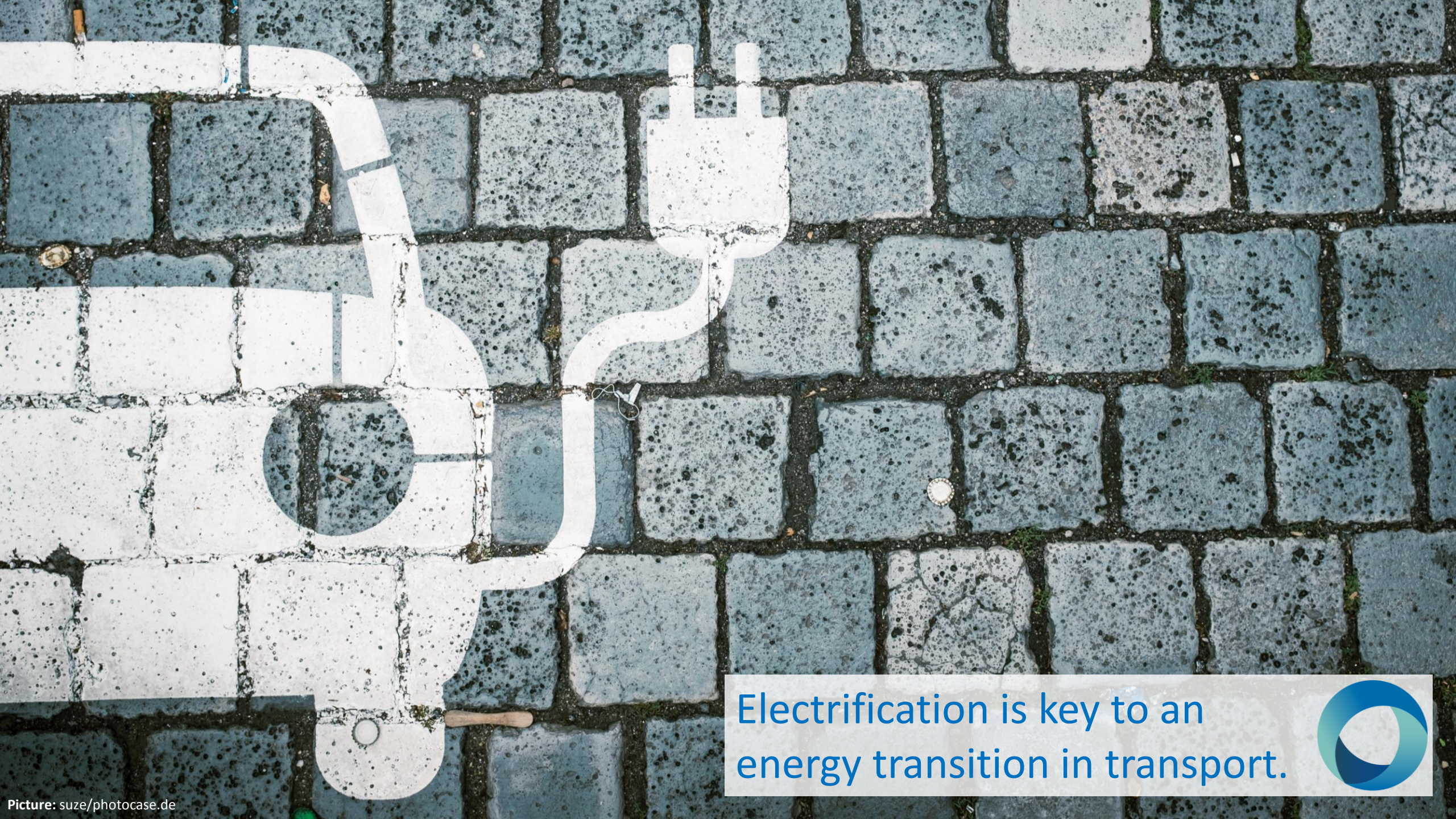
Source: OECD-ITF 2016.

# Even a Small Number of Driverless Cars Can Increase Traffic.

## Usage forms and possible effects of vehicle automatisatisation







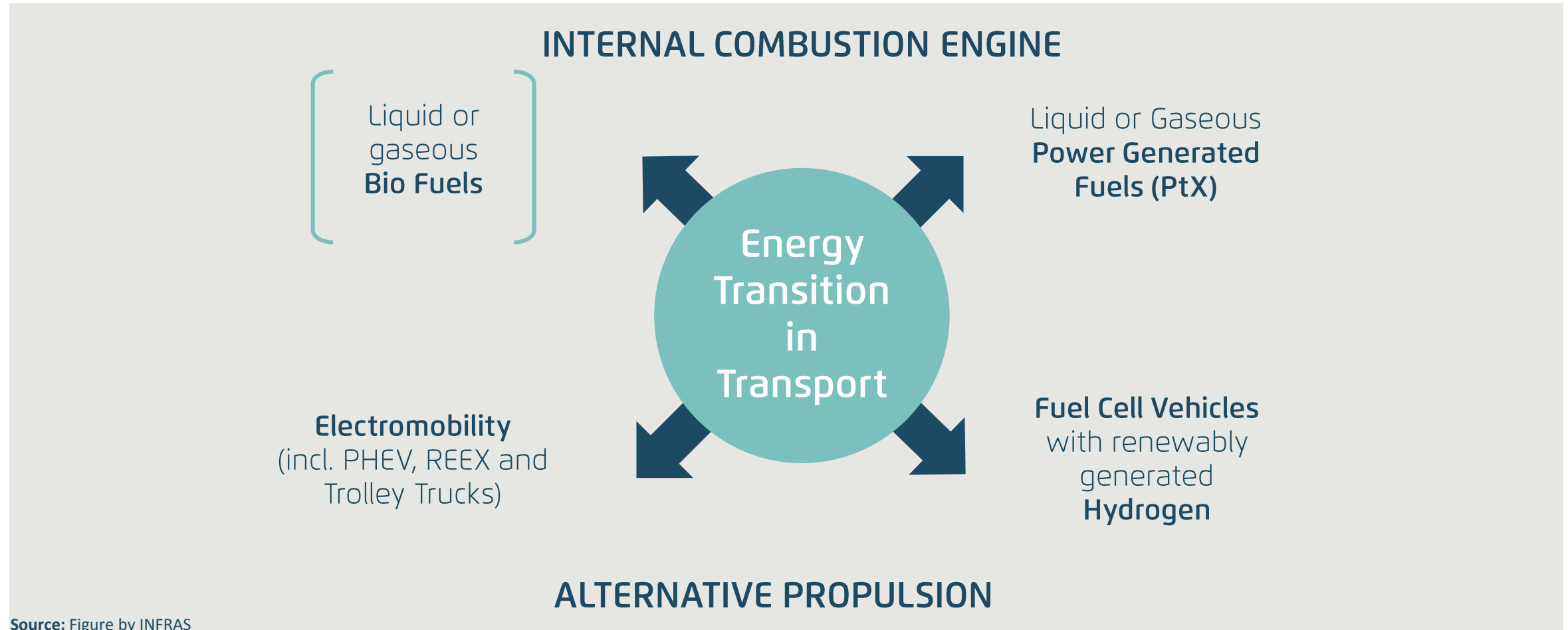
Electrification is key to an  
energy transition in transport.





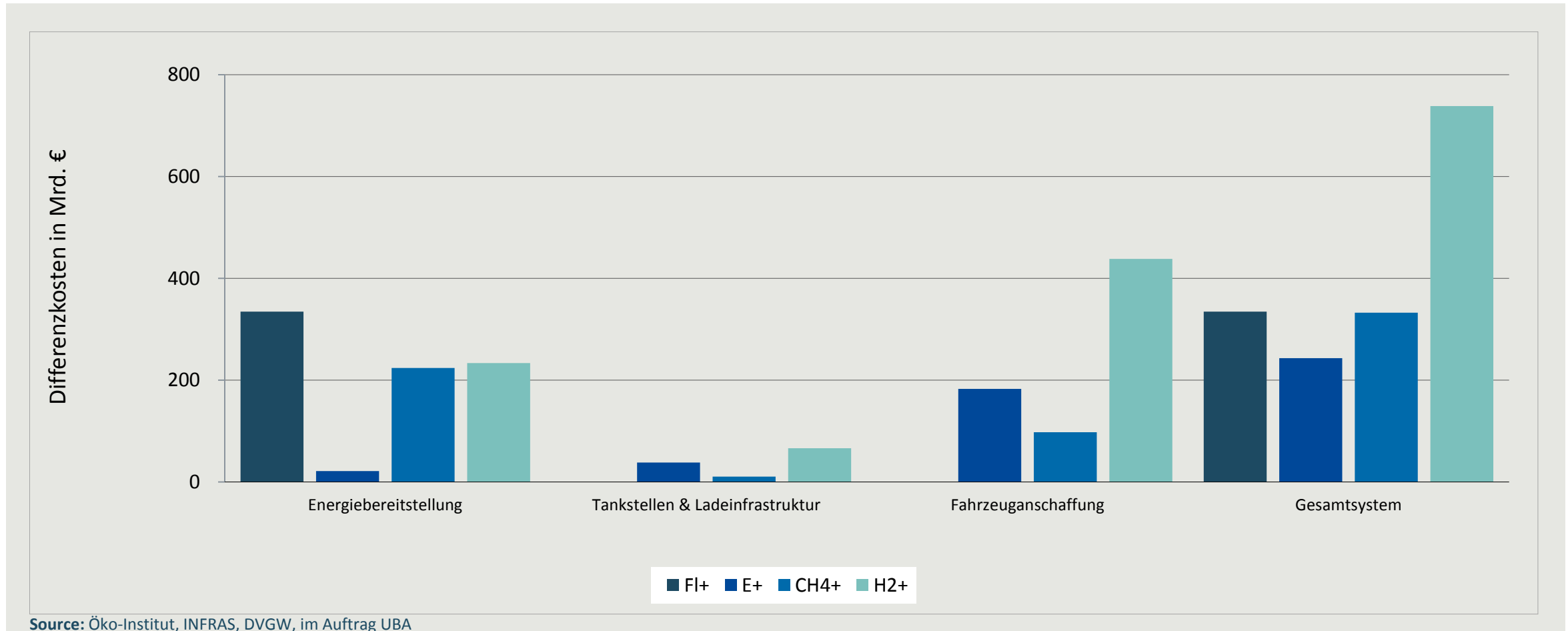
# Options for the *,post fossil‘* future of transport

Renewable energy from sun and wind replaces fossil fuels.



# The direct use of Electricity in LDV is the option with the lowest cost of decarbonisation for the national economy.

Accumulated Difference Costs for Technology Options 2050 compared to BAU.





# The uncertain future of the Internal Combustion Engine

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India to sell only electric cars by 2030

CNN, 03. JUNI 2016



Österreich will ab 2030 keine Diesel- und Benzinautos mehr neu zulassen

FOCUS MONEY ONLINE, 07. AUGUST 2017

**manager magazin**

Auch Briten wollen Diesel und Benziner ab 2040 verbieten - und was macht Deutschland?

MANAGER MAGAZIN, 26. JULI 2017

**SPIEGEL ONLINE**

Norwegen will Benzin- und Dieselaautos verbieten

SPIEGEL ONLINE, 16. AUGUST 2016



**INDEPENDENT**

Scotland to 'phase out' new petrol and diesel cars by 2032

THE INDEPENDENT, 05. SEPTEMBER 2017



China schickt Benziner und Diesel auf den Schrott - offen ist nur noch der Zeitpunkt

STERN, 11. SEPTEMBER 2017



Ab 2025 nur noch Elektroautos

Niederlande wollen Verkauf von Diesel- und Benzinautos verbieten

FOCUS ONLINE, 15. APRIL 2016

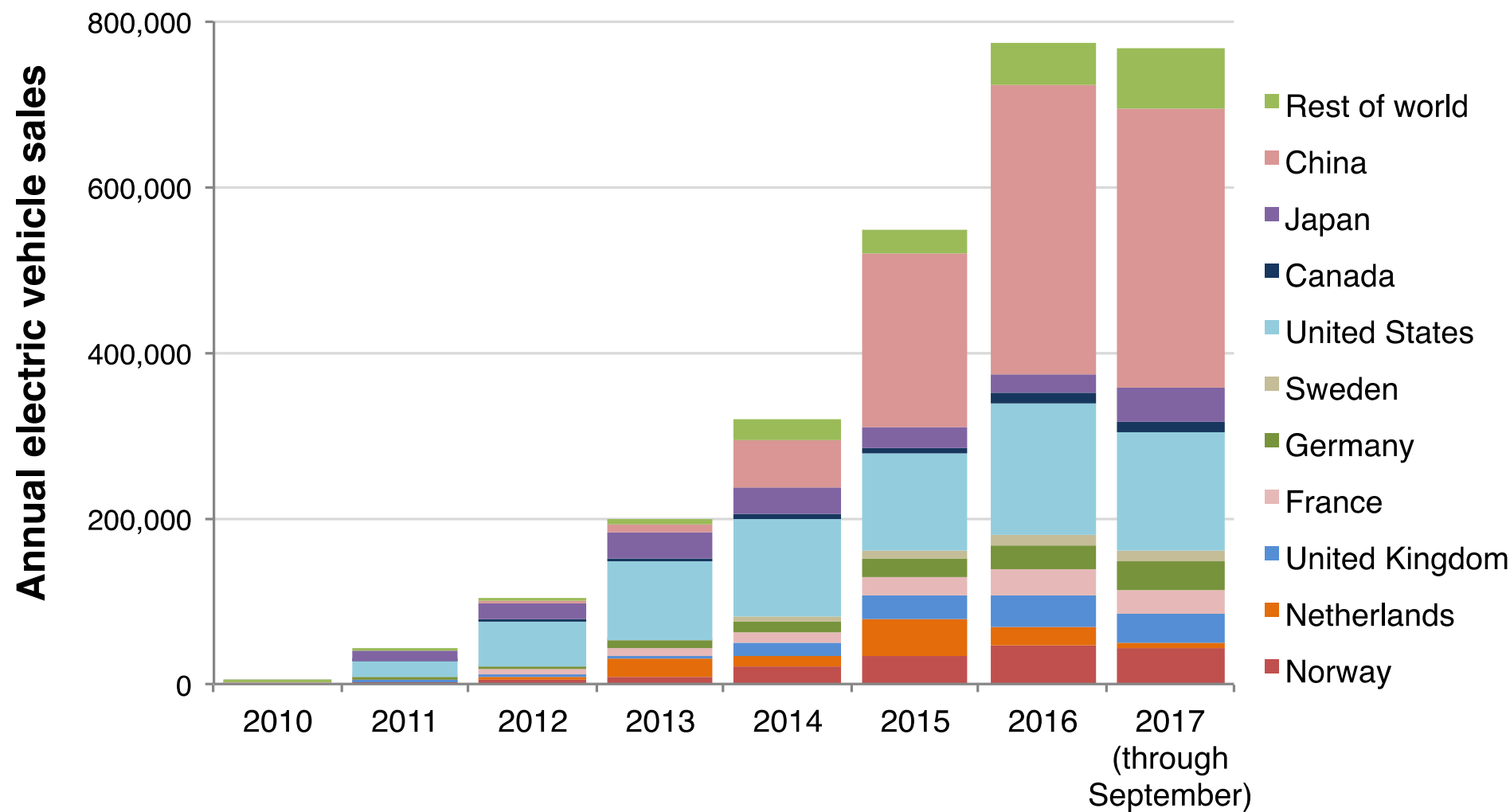
**ZEIT ONLINE**

Frankreich will bis 2040 weg vom Verbrennungsmotor

ZEIT ONLINE, 06. JULI 2017

# Annual Electric Vehicles (EV) Sales by Country/Region.

*In comparison:* In total in 2016 ca. 81,5 Mio. LDV were sold. In China more than 250 Mio. E-Scooter are on the road.



Source: ICCT 2017.



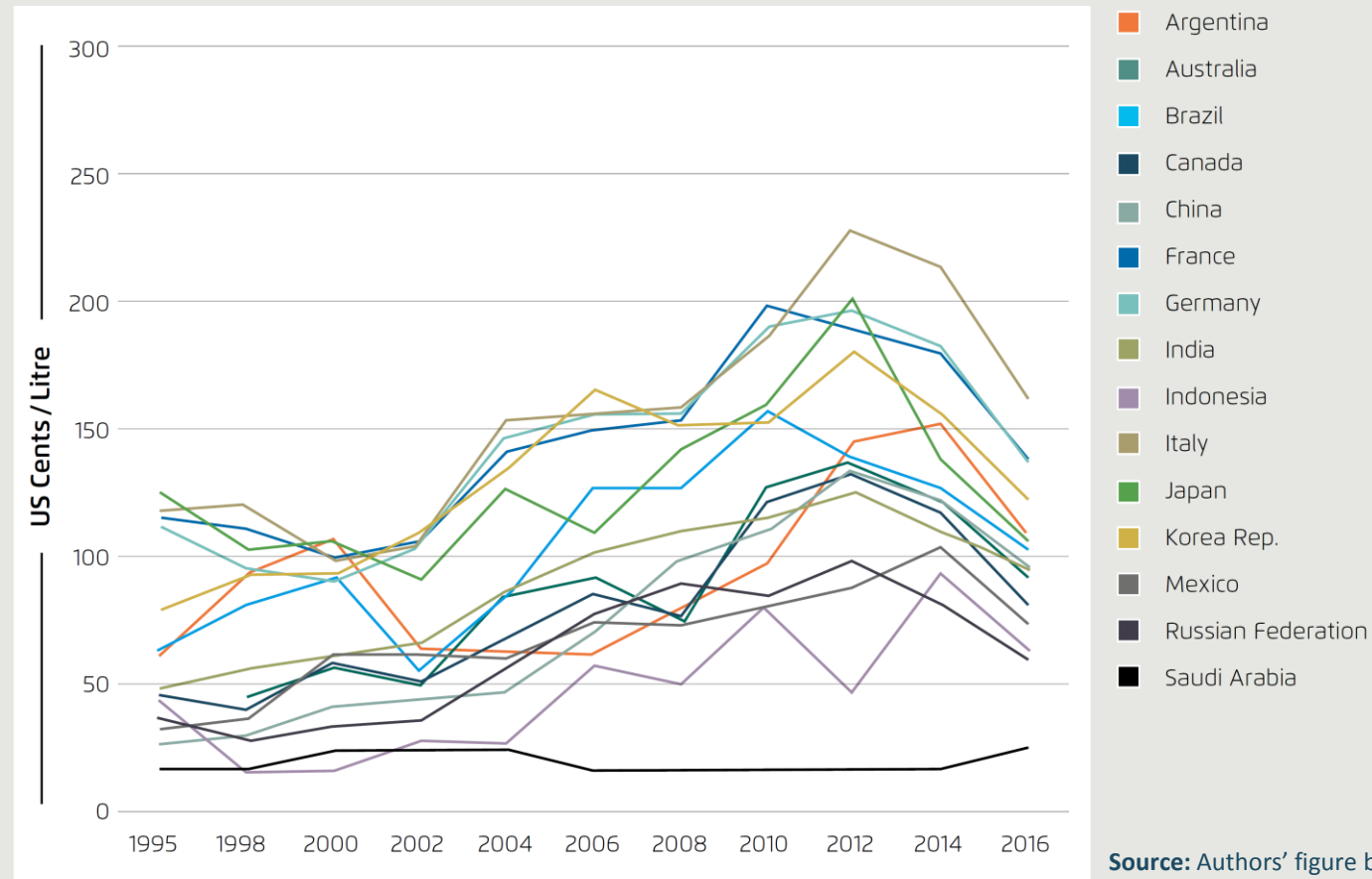
## 20 Cities only account for 40% of the EV Sales worldwide.

These Cities represent 3% of the population and 8% of annual vehicles sales.



# Tacking stock on G20 Sectoral Ambition

## Development of gasoline prices in G20 countries 1995–2016

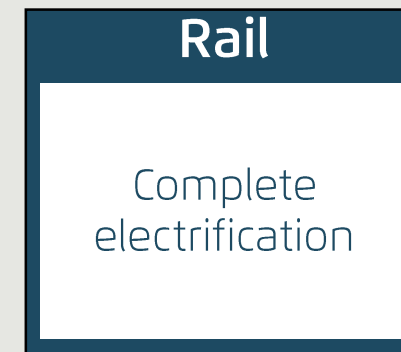
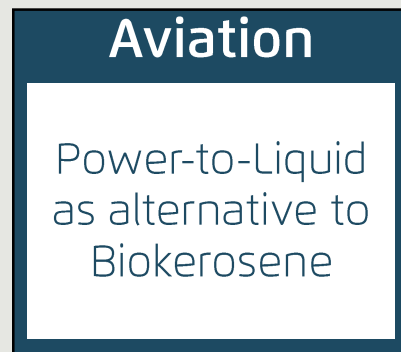
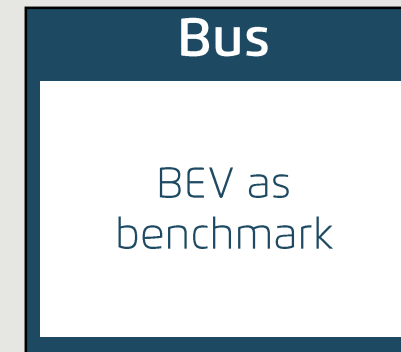
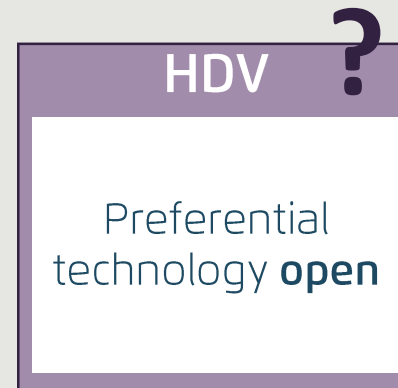


Source: Authors' figure based on data from GIZ



# Core options for the Energy Transition in Transportation (until 2050)

## Core options for the Energy Transition in Transport by mode (until 2050)



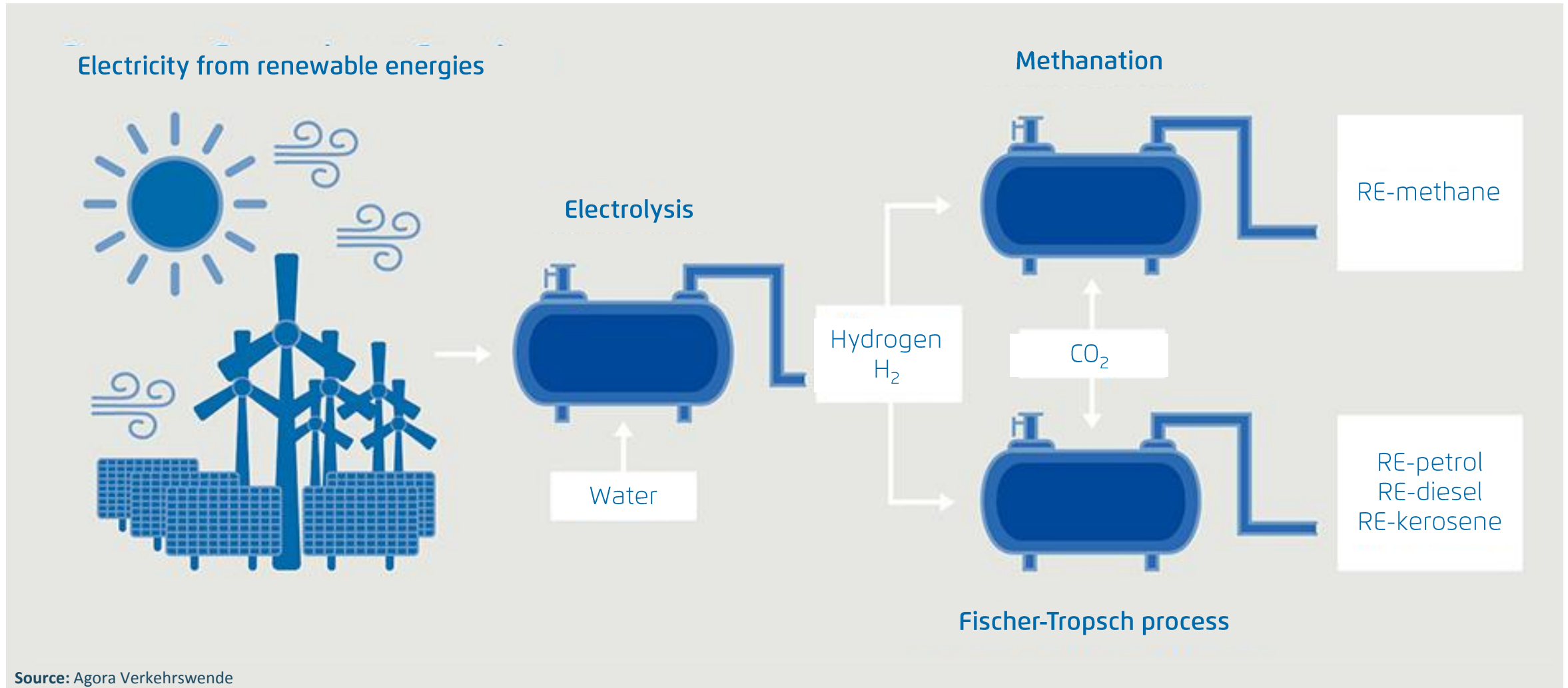
Source: INFRAS/Quantis 2015.



Carbon-neutral fuels can supplement electricity from solar and wind.

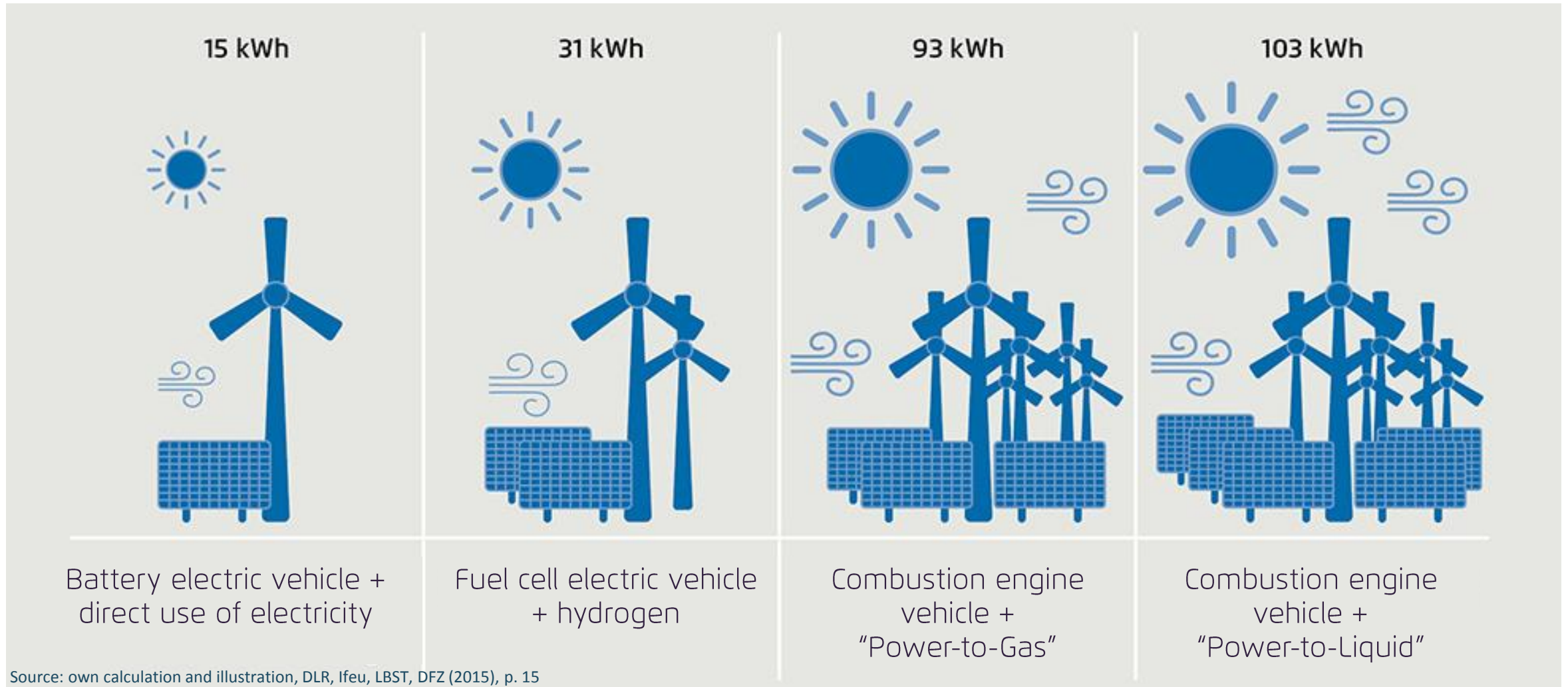


# Process steps for the production of hydrogen, PtG-methane and PtL-fuels from renewable energies



Source: Agora Verkehrswende

# Electricity demand from renewable energies for different propulsion and fuel combinations (per 100 km/passenger car)



Source: own calculation and illustration, DLR, Ifeu, LBST, DFZ (2015), p. 15



Sustainable Logistics:  
Means more than clean vehicles!





# Food for thought: How to decarbonize aviation?







## Thank you very much for your attention!

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Comments or Questions? – Please do not hesitate to contact me:

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