



Towards Decarbonising Transport

Taking Stock of G20 Sectoral Ambition

Christian Hochfeld

Executive Director, Agora Verkehrswende

COP Side-Event

“Low-carbon Transport: G20 on track?”

Bonn, November 08, 2017

Agora Verkehrswende – Transforming Transport

Who we are.



Picture: Greenpeace

- Initiative by **Stiftung Mercator** and **European Climate Foundation**
- Independent **Think Tank** and high-level **Council of Agora**
- **Mission:** Scenarios, Discourse and Strategies for the **Decarbonisation of Transport** until 2050
- **Focus:** starting with national land-based transport in **Germany** in an European context

The Council of Agora Verkehrswende

The Council is chaired by Achim Steiner, former UN Under Secretary General and UNEP Executive Director.



Picture: Achim Steiner at the Launch of Agora Verkehrswende

Policy:

- EU-COM; 5 national ministries; main parliamentary groups; 2 federal states; 2 city mayors; 2 Governmental agencies

Economy:

- BMW; DB; DP-DHL; innogy; Robert Bosch; Siemens; VW; VDV

Civil Society & Science:

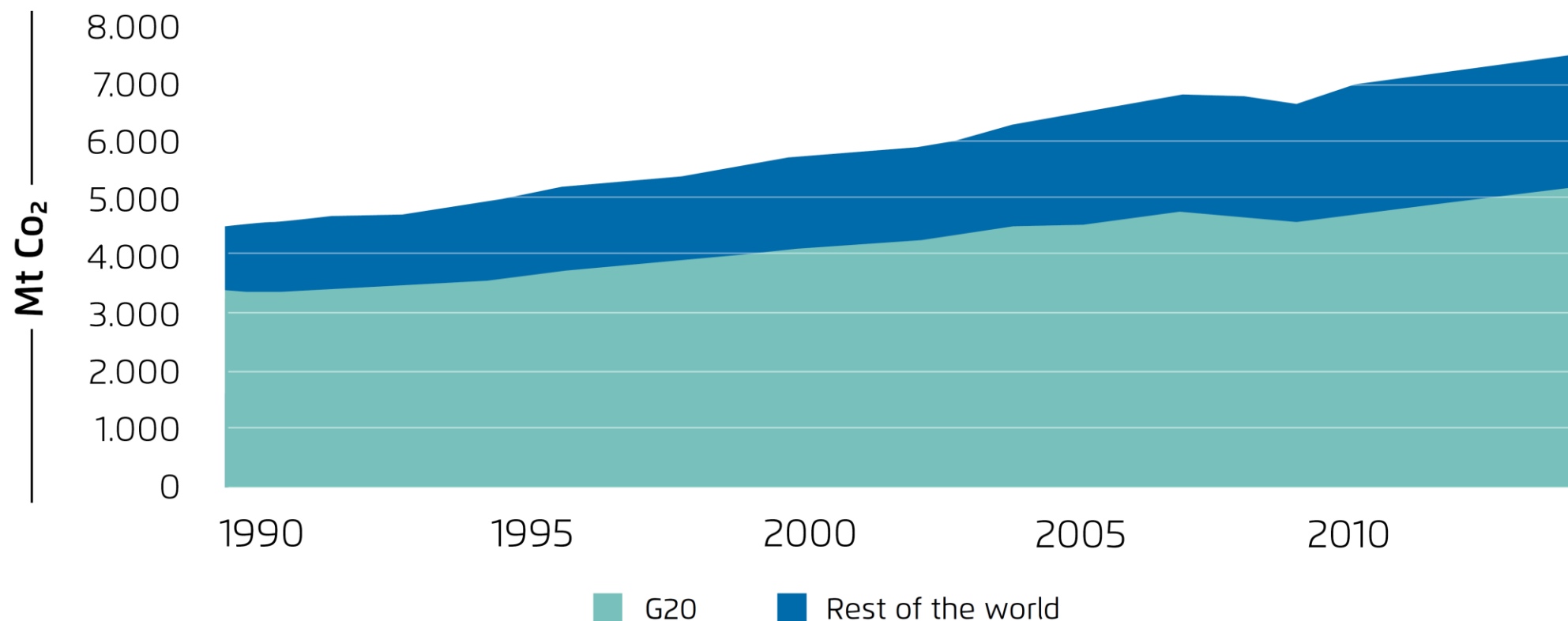
- German Automobile Association; Consumer Association; 3 environmental NGOs; Labor Union; 3 academics

The full list of the council members under:

www.agora-verkehrswende.de

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

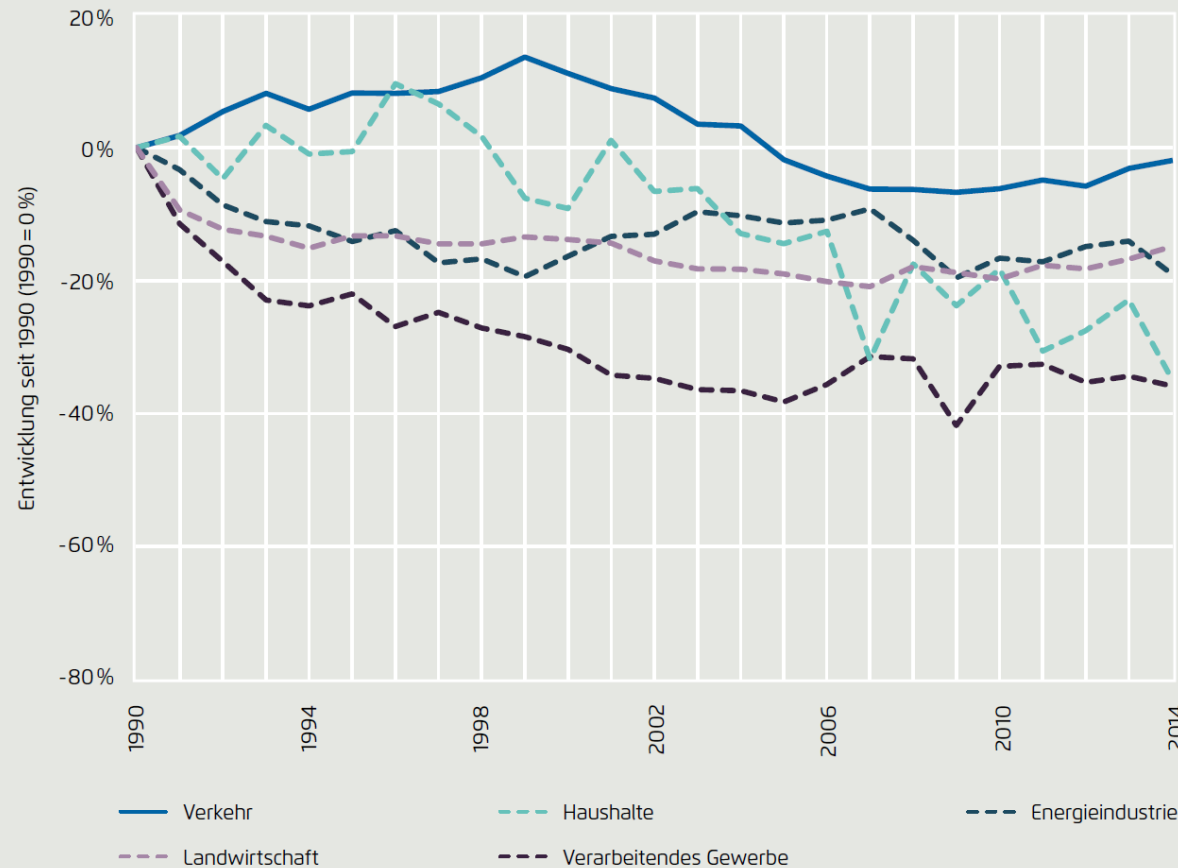
CO2 emissions from the transport sector 1990 – 2014



Source: Own illustration based on data from IEA

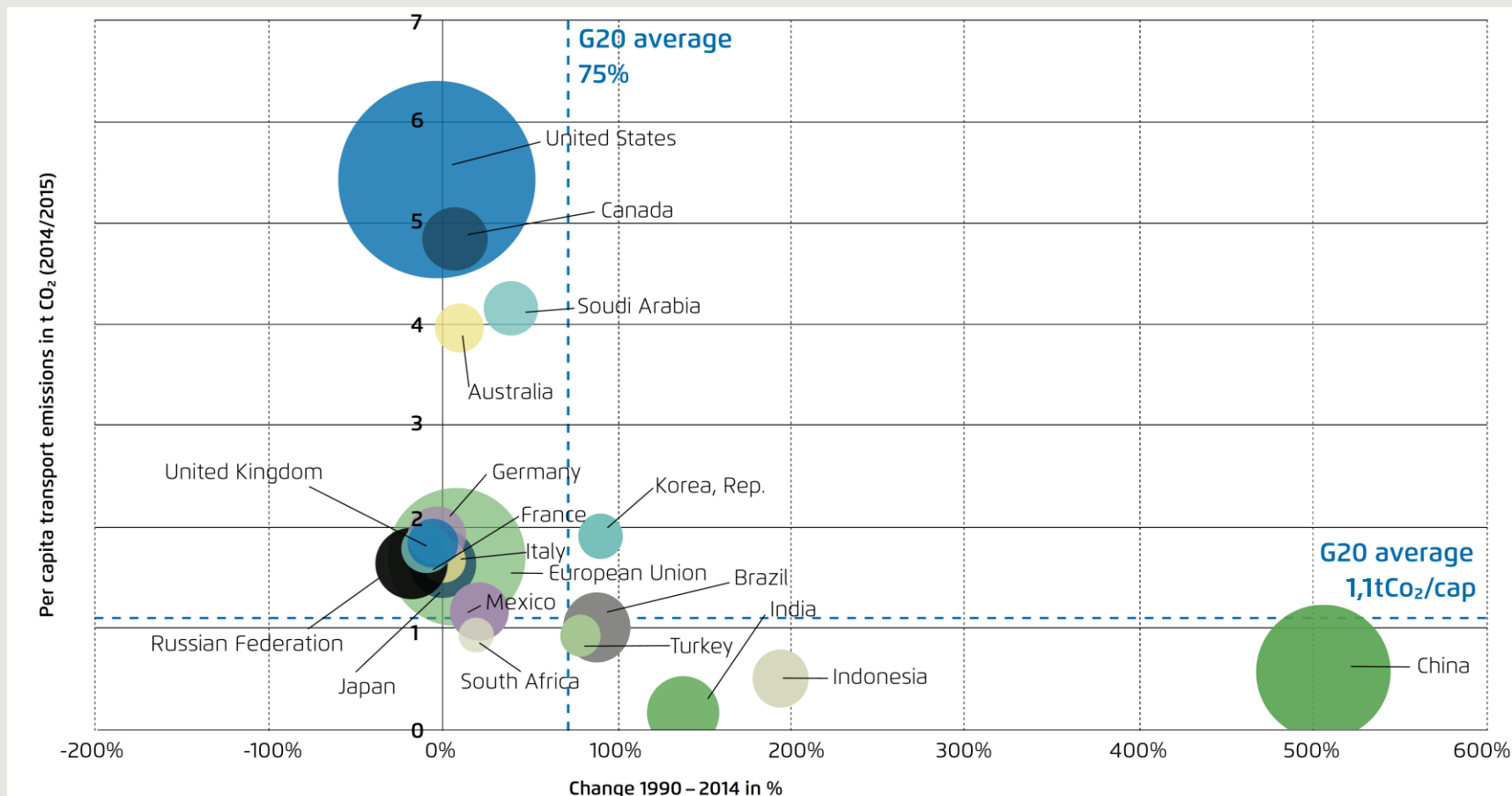
In the past 25 years the Transport Sector in Germany could not contribute to CO₂ Emission Reductions.

Relative Development of Greenhouse Gas Emissions for different Sectors since 1990



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

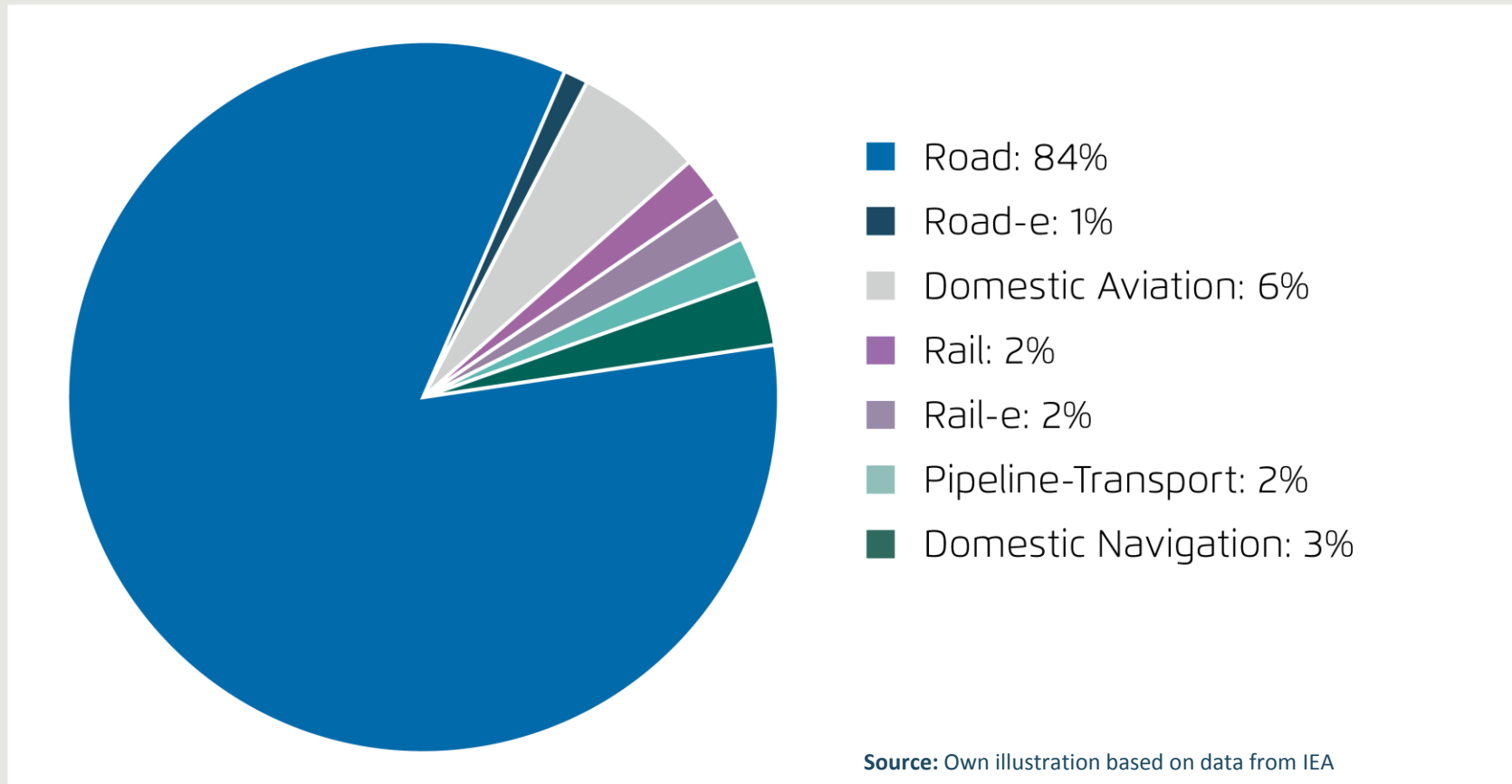


Note: the size of bubbles indicates total emissions from the transport sector

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

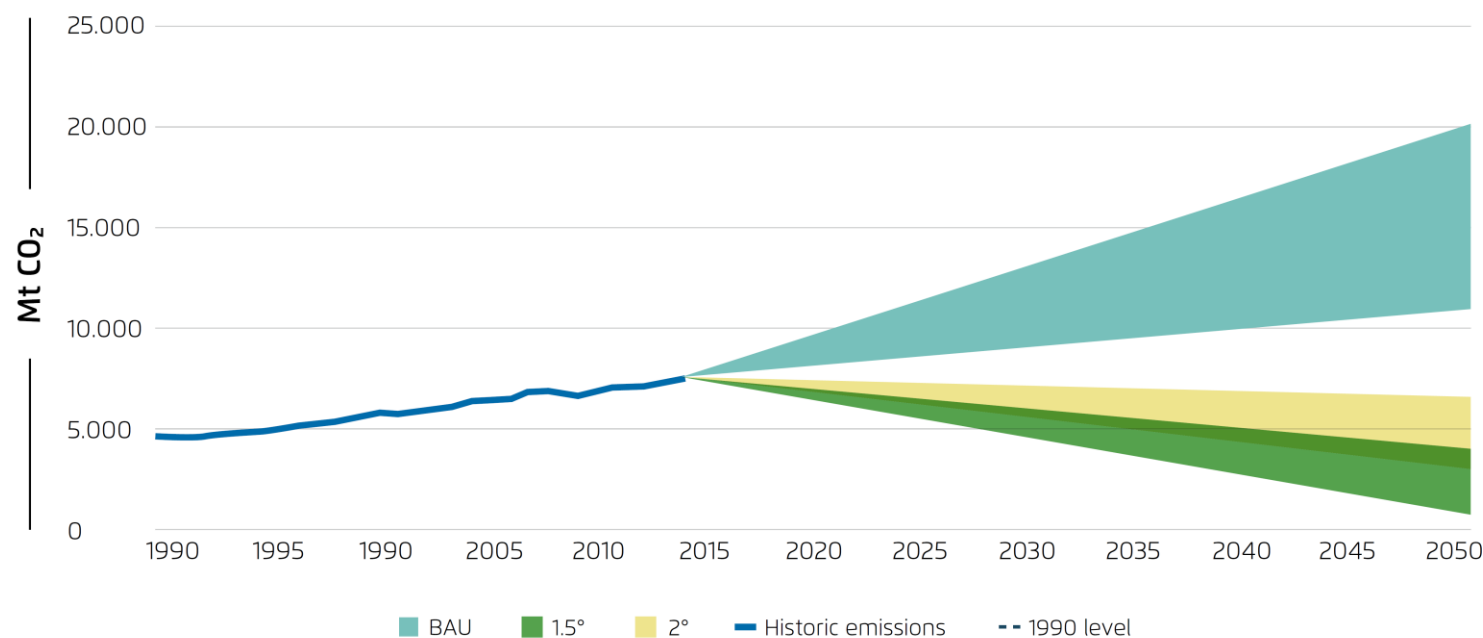
Most CO₂ emissions in the sector stem from road transport

Share of transport subsectors in emissions in the G20 in 2014

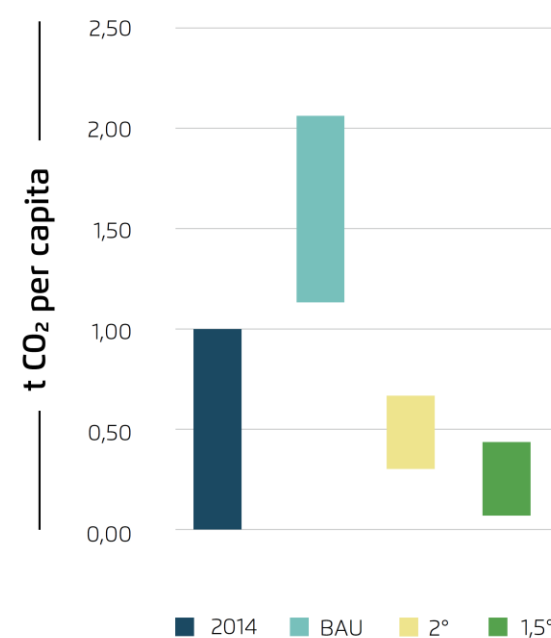


Transforming Transport is key to delivering on the Paris Agreement

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



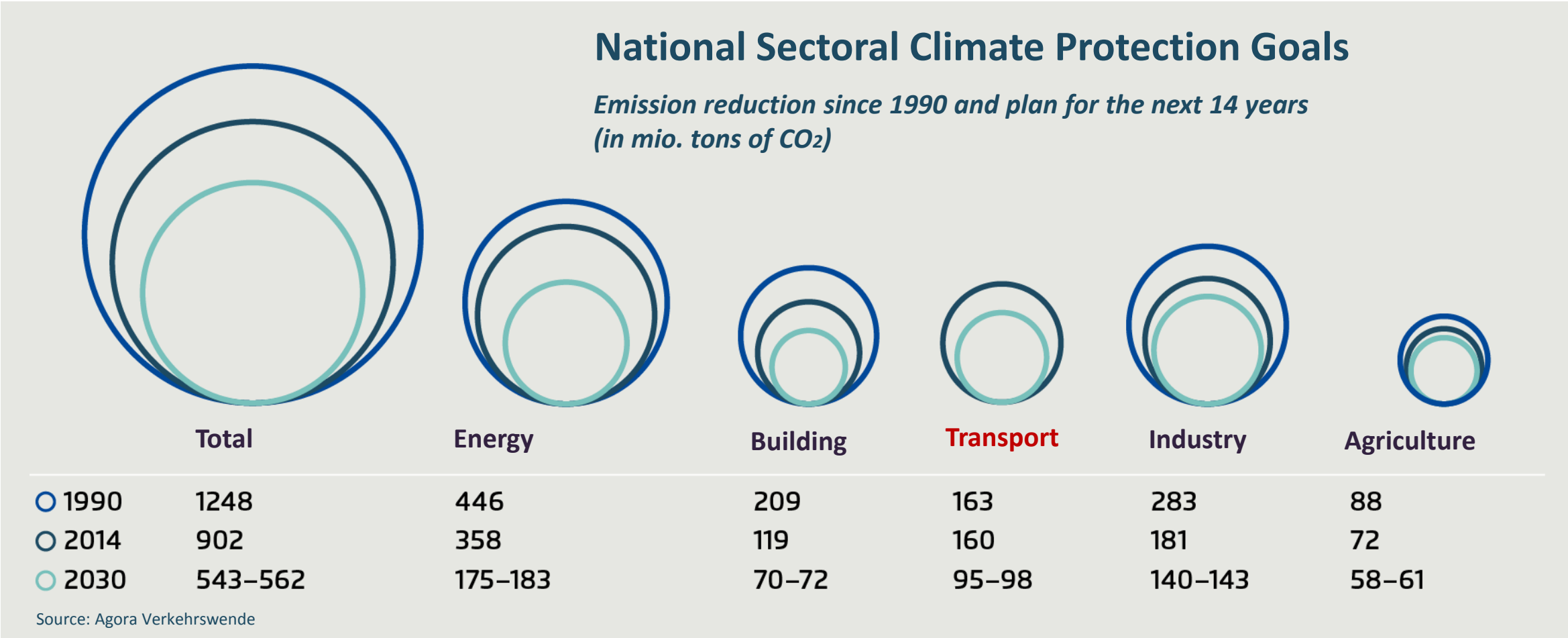
Note: Simplified illustration based on historic levels and projected 2050 levels. Individual scenarios are likely to peak around 2020 and then decrease emissions at higher rates afterwards.



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

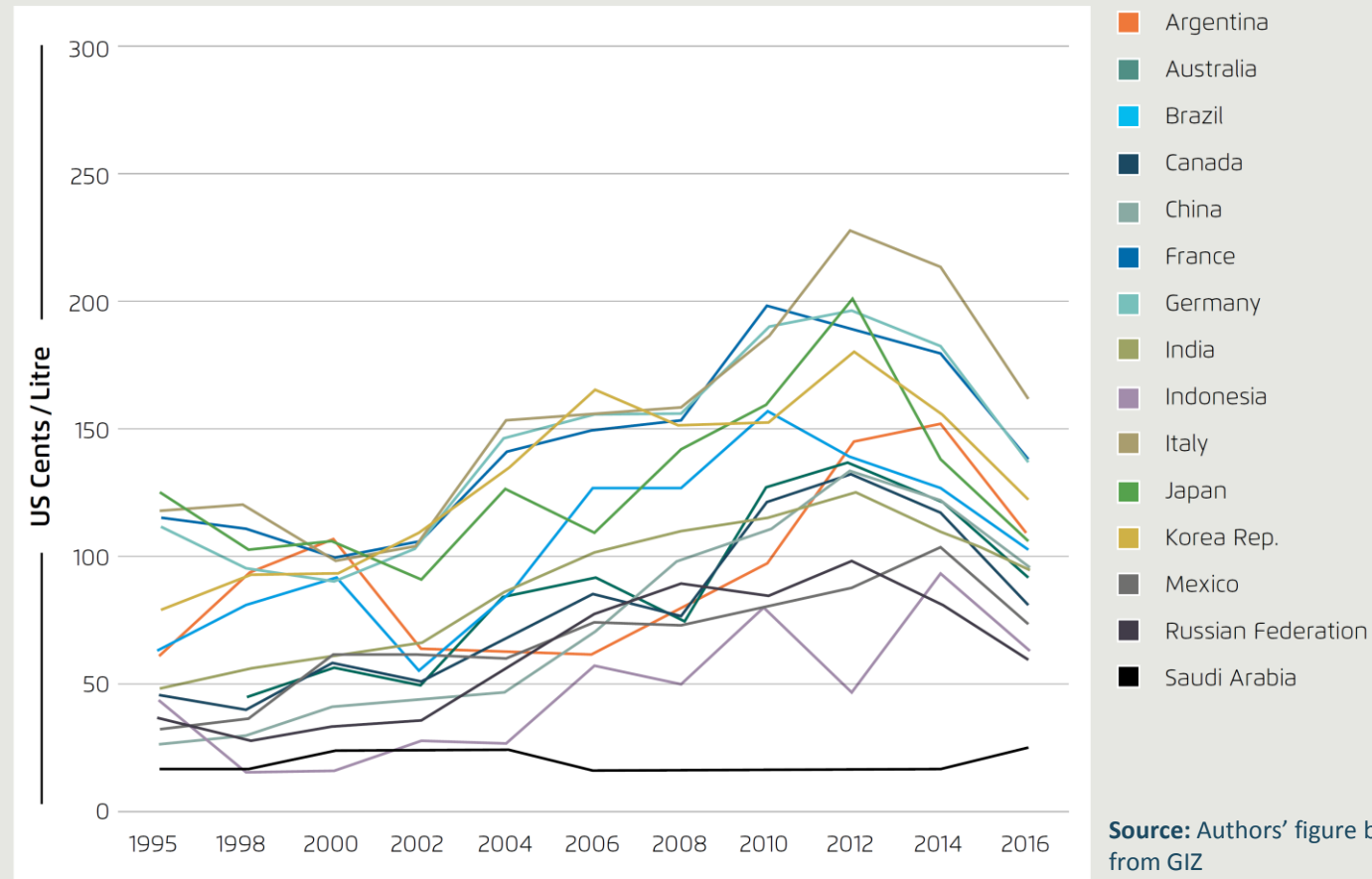
Federal Climate Protection Plan 2050: The *Verkehrswende* is an official goal of the Government.

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



Tacking stock on G20 Sectoral Ambition

Development of gasoline prices in G20 countries 1995–2016

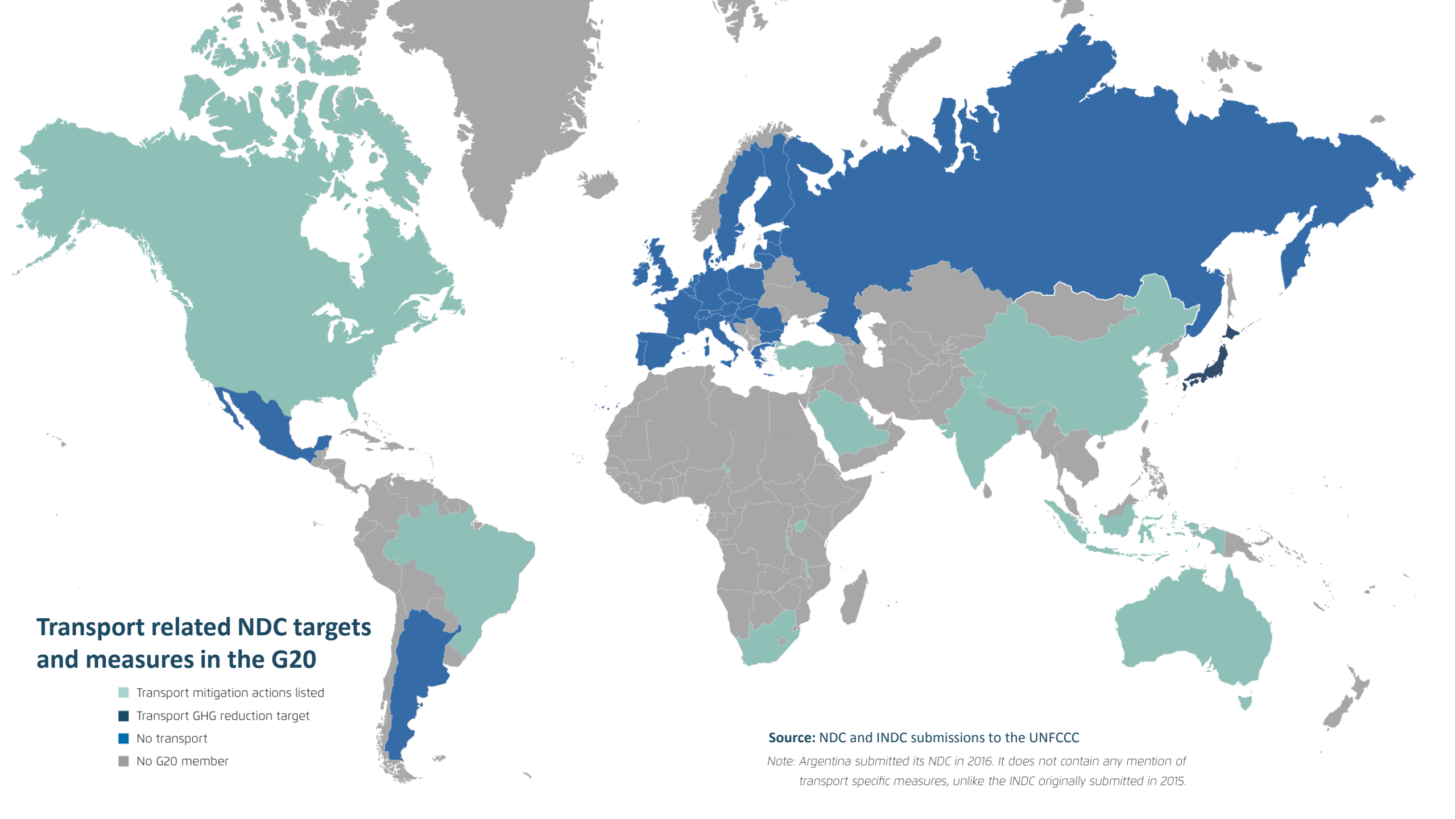


Transport related NDC targets and measures in the G20

- Transport mitigation actions listed
- Transport GHG reduction target
- No transport
- No G20 member

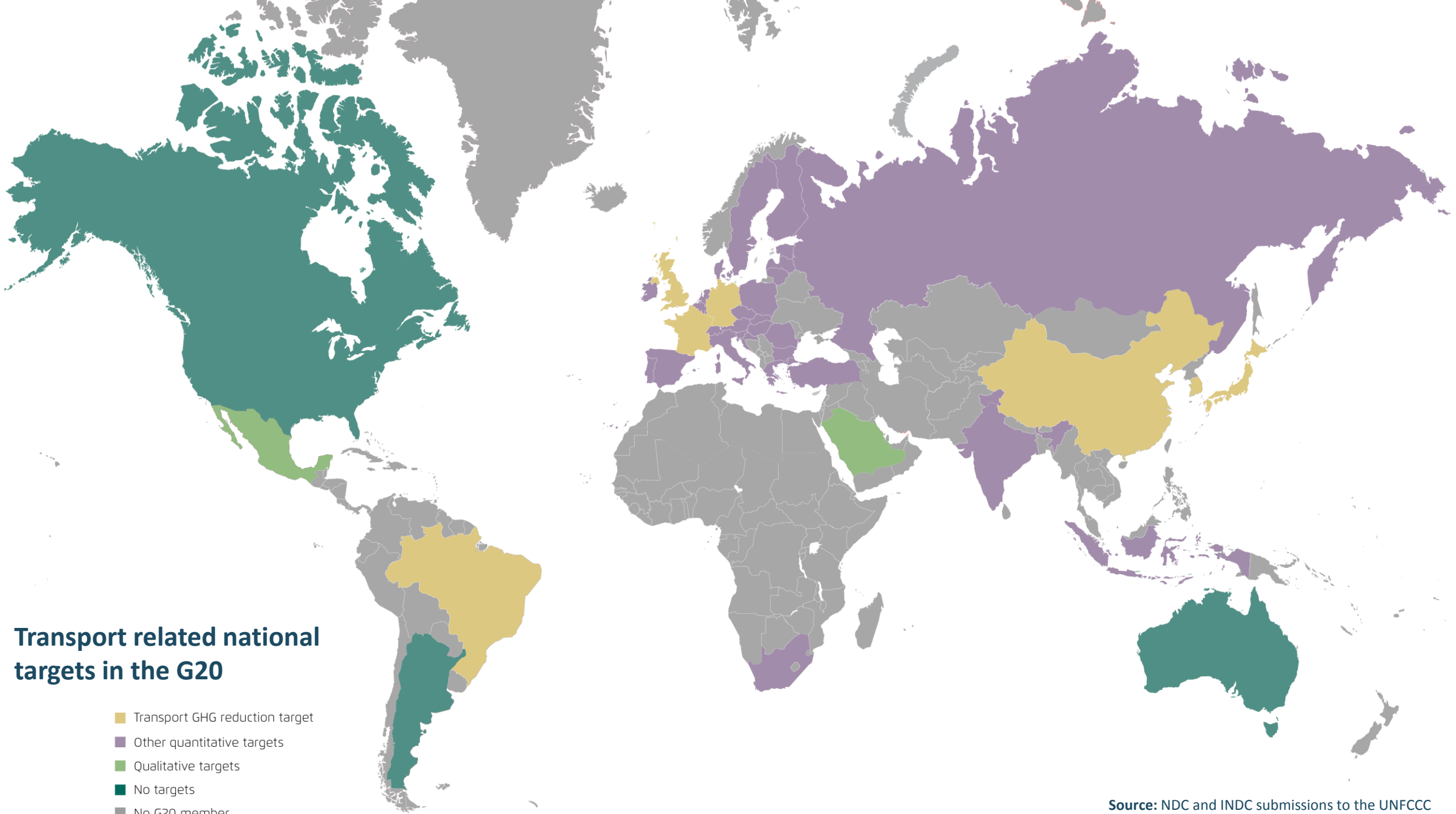
Source: NDC and INDC submissions to the UNFCCC

Note: Argentina submitted its NDC in 2016. It does not contain any mention of transport specific measures, unlike the INDC originally submitted in 2015.



Transport related national targets in the G20

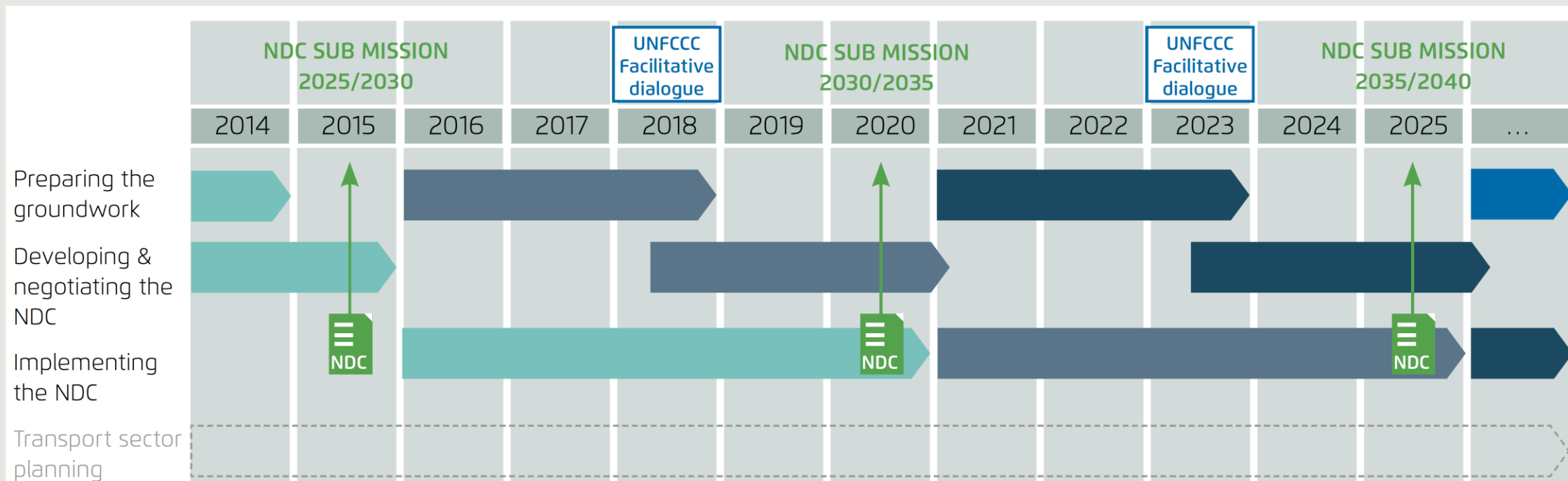
- Transport GHG reduction target
- Other quantitative targets
- Qualitative targets
- No targets
- No G20 member



Source: NDC and INDC submissions to the UNFCCC

G20 will need to significantly step up its ambition for the transport sector in the next round of NDC submissions

The NDC submission cycle



Source: GIZ

The *„Verkehrswende 2050“* will be enabled by the Mobility Revolution 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.

Source: Agora Verkehrswende.

Greater ambition also needed at the national level

Overview of existing mobility and energy measures across G20 countries

	NATIONAL PROGRAMMES TO SUPPORT SHIFT TO PUBLIC TRANSPORT	MEASURES TO SUPPORT LOW-CARBON FREIGHT LOGISTICS	NATIONAL-LEVEL MEASURES TO SUPPORT NEW MOBILITY SERVICES	NATIONAL MEASURES TO SUPPORT NON-MOTORIZED TRANSPORT	ROAD CHARGES
Argentina	existing	existing	no	no	existing
Australia	no	existing	no	existing	no
Brazil	existing	existing	no	no	no
Canada	no	existing	no	no	no
China	existing	existing	no	no	existing
EU	existing	existing	no	existing	no
France	existing	existing	no	existing	existing
Germany	no	existing	existing	existing	existing
India	existing	existing	no	existing	no
Indonesia	existing	no	no	existing	existing
Italy	no	no	no	no	existing
Japan	existing	existing	no	no	existing
Korea, Rep.	existing	existing	existing	existing	no
Mexico	existing	existing	no	no	existing
Russian Fed.	existing	existing	no	no	existing
Saudi Arabia	existing	existing	no	no	no
South Africa	existing	no	no	no	existing
Turkey	existing	existing	no	existing	existing
UK	existing	no	no	existing	existing
United States	existing	existing	existing	existing	no

	ENERGY/ CARBON EMISSION STANDARDS LDV	ENERGY/ CARBON EMISSION STANDARDS HDV	PRICING INSTRUMENTS	MANDATORY VEHICLE LABELLING	SUPPORT MECHANISM FOR ELECTRIC VEHICLES AND CHARGING INFRASTRUCTURE	MANDATORY BIO-FUEL TARGETS	SUPPORT FOR OTHER LOW-CARBON FUELS & PROPULSION SYSTEMS
Argentina	no	no	no	no	no	existing	existing
Australia	no	no	no	existing	existing	no	existing
Brazil	existing	no	no	no	existing	existing	existing
Canada	existing	existing	existing	existing	no	existing	existing
China	existing	existing	no	existing	existing	no	existing
EU	existing	no	existing	existing	no	existing	existing
France	existing	no	existing	existing	existing	existing	existing
Germany	existing	no	existing	existing	existing	existing	existing
India	existing	no	existing	existing	existing	existing	existing
Indonesia	no	no	existing	no	no	no	existing
Italy	existing	no	no	existing	existing	existing	existing
Japan	existing	existing	existing	existing	existing	no	existing
Korea, Rep.	existing	no	existing	existing	existing	existing	existing
Mexico	existing	no	existing	no	existing	existing	existing
Russian Fed.	no	no	existing	no	no	no	existing
Saudi Arabia	existing	no	no	existing	no	no	no
South Africa	no	no	no	existing	no	existing	no
Turkey	no	no	no	existing	existing	existing	no
UK	existing	no	existing	existing	existing	existing	existing
United States	existing	existing	existing	existing	existing	existing	existing

Note: The existence of measures does not imply their adequacy./ **Source:** Agora Verkehrswende & GIZ

The Challenges of Sustainable Urban Transport go far beyond Decarbonisation.

Traffic Tetris in Metropolis around the World.



Foto: Christian Hochfeld

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

The Mobility Alliance

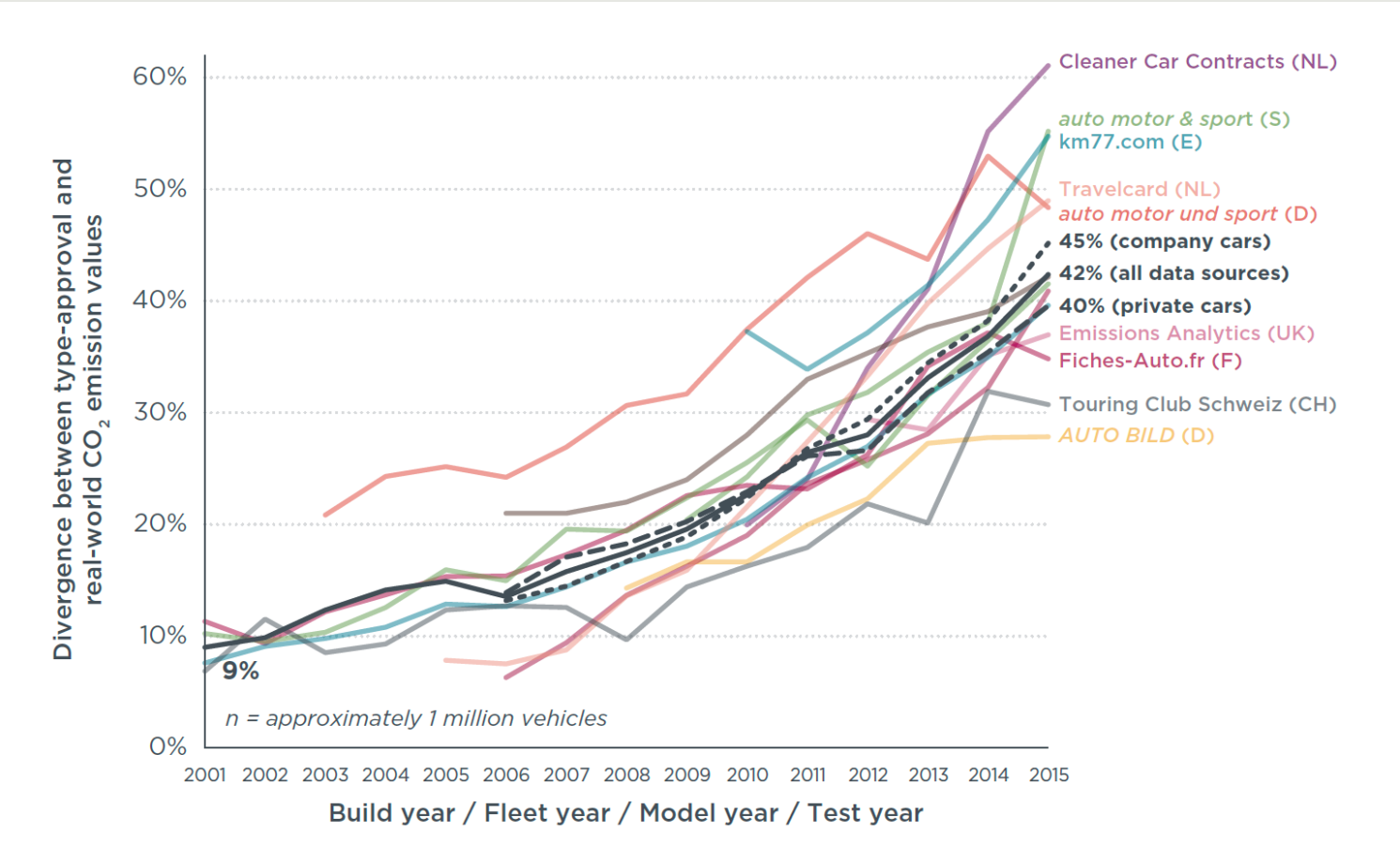


- Public Transport
 - Suburban train
 - Underground
 - Tram
 - Bus
 - Taxi
- Non-motorised Transport
 - Bicycle
 - Pedestrians
- Collaborative Mobility
 - Carsharing
 - Ridesharing
 - Bikesharing

Source: Agora Verkehrswende

From Laboratory to Road: Missing Link for Climate Protection in Road Transport

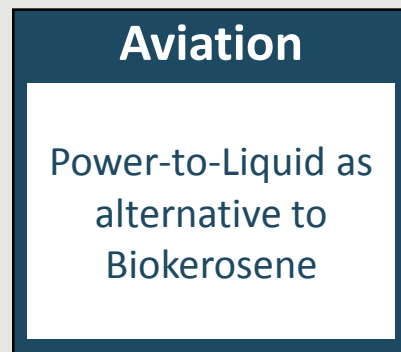
Divergence between real-world and manufacturers# type approval CO2 emissions values



Source: ICCT 2016.

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

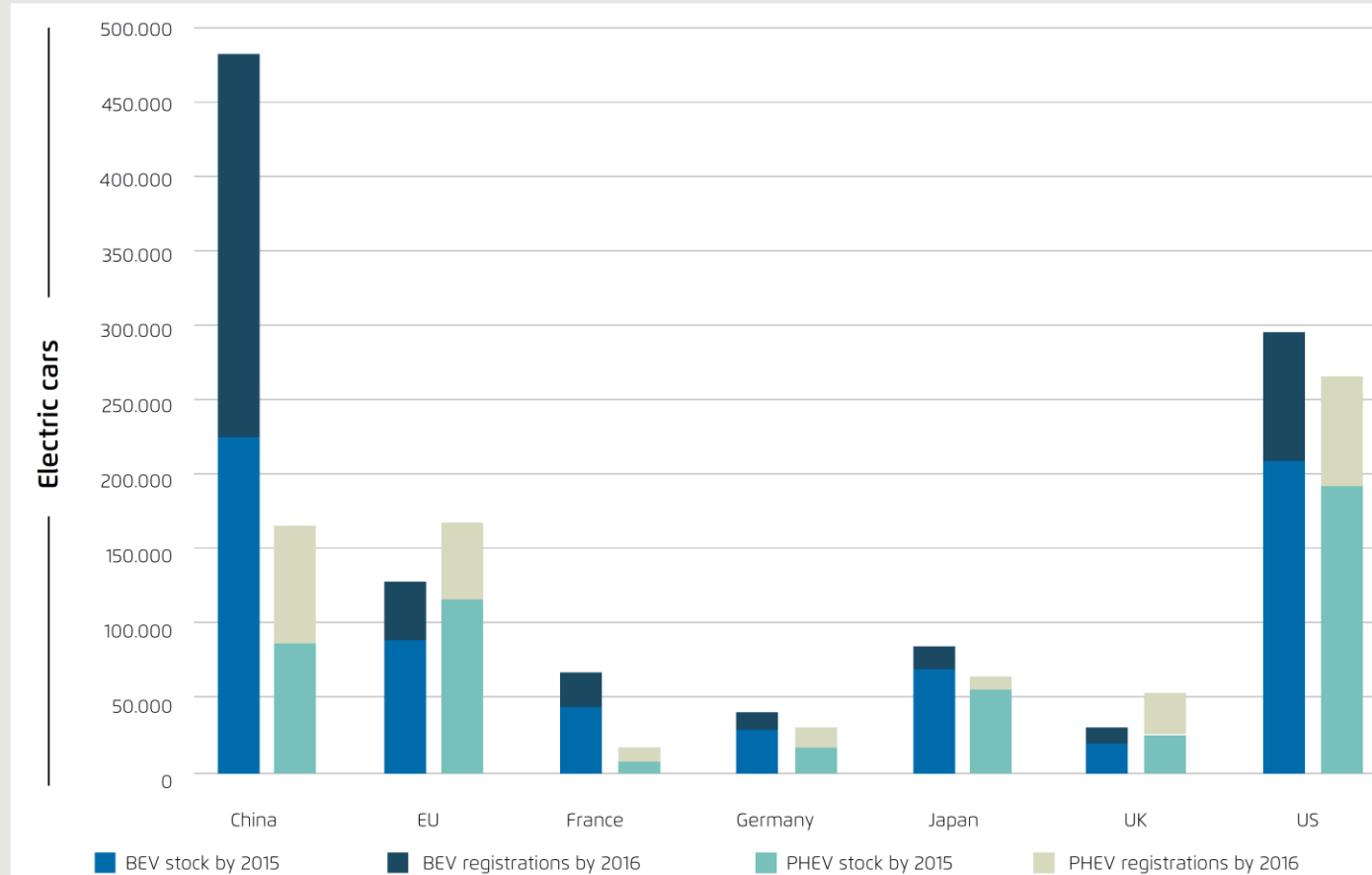
Core options for the Energy Transition in Transport by mode (until 2050)



Source: INFRAS/Quantis 2015.

Tacking stock on G20 Sectoral Ambition

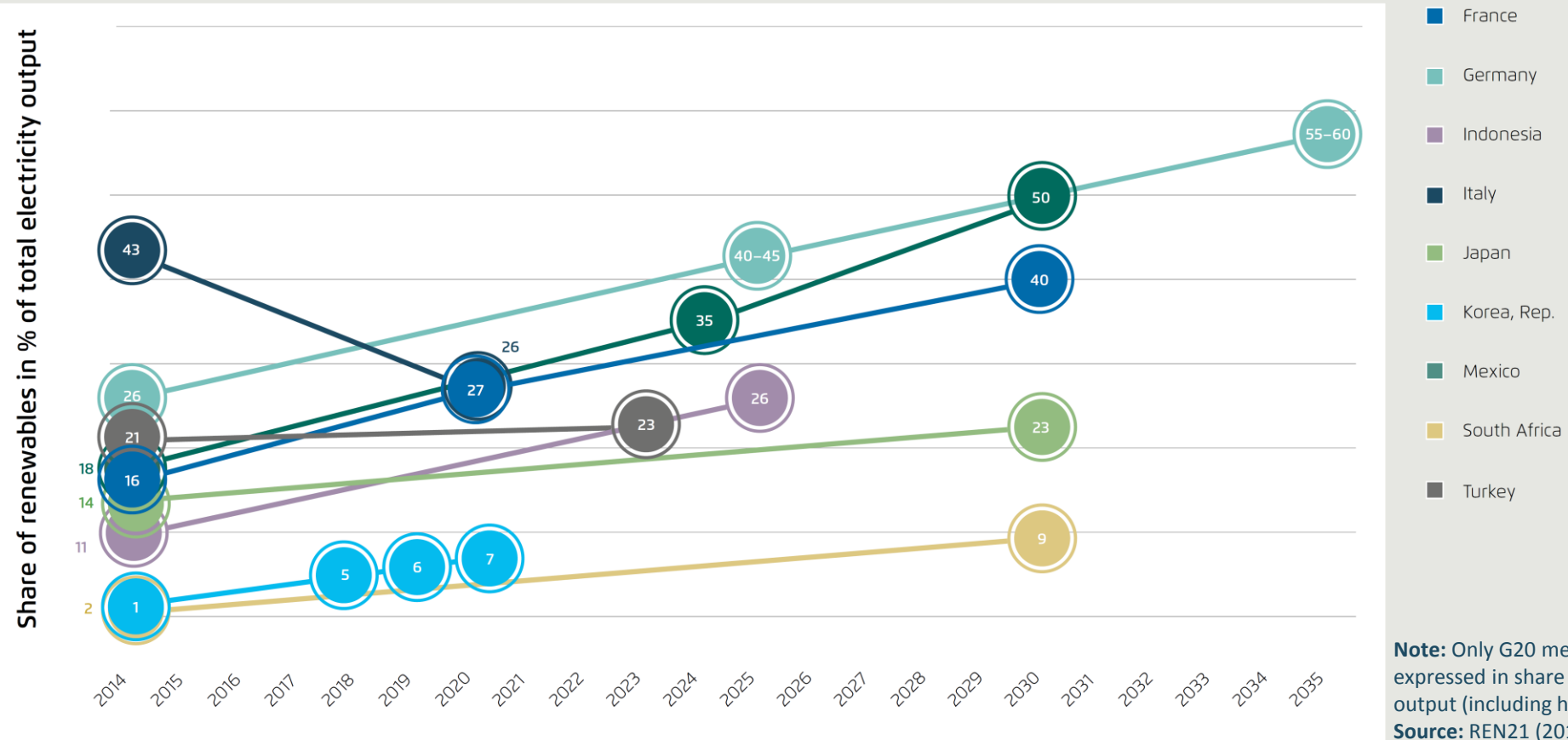
Electric vehicle stock in selected G20 countries



Source: Authors' figure based on data from IEA

Tacking stock on G20 Sectoral Ambition

Share of renewables in electricity output and targets for selected G20 members

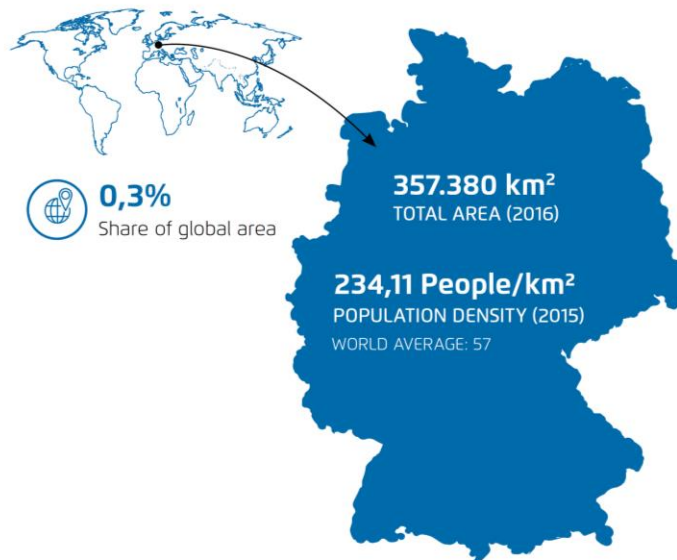


GERMANY

Germany is the most populous country in Europe, with particularly dense urban clusters on its western borders. Germany lies on Baltic and North Seas, and has a well established network of navigable waterways. Despite its comparatively small size, the country has the 12th largest railway network and the 18th largest waterway system worldwide. Nevertheless, road transport is by far the most important mode of transport for passengers and freight, and its importance has increased in recent decades. High levels of local congestion and air pollution are an issue, particularly in select urban centres. Numerous cities have continuously failed to meet EU caps on airborne particulates.

Germany has set an absolute target for domestic transport sector emissions in 2030 of 95–98 Mt CO₂. Germany has implemented a number of measures to enhance energy efficiency and reduce the carbon content of fuels, but has done less to promote alternative modes of transport.

Source: 6th National Communication; CIA World Factbook



Sources: World Development Indicators, OECD



0,93 HDI*

HUMAN DEVELOPMENT INDEX* IN 2015



Source: UNDP

* The human development index is a value from zero to 1, with 1 representing the highest possible development according to the covered indicators



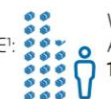
43,788 constant 2011 international \$ (PPP)

GDP PER CAPITA (2015)

€ = 1000 \$



G20
AVERAGE:
18,379



WORLD
AVERAGE:
14,725



3,31%

SHARE IN GLOBAL GDP (2015)



POPULATION

81,7 mio people

POPULATION CURRENT
IN 2015

1,1%

SHARE IN GLOBAL
POPULATION IN 2015



URBANISATION

75,3% of total

URBAN POPULATION
IN 2015

74,86%

G20 AVERAGE¹

53,86%

WORLD AVERAGE



7.868.538 people

POPULATION IN URBAN
AREAS OF > 1 MIO (2015)

SHARE IN TOTAL
POPULATION 2015



Source: World Development Indicators

Source: World Development Indicators



MOBILITY

**685 road motor
vehicles per 1000
inhabitants**

MOTORISATION RATE
(2015)

👤 = 100 Inhabitants
🚗 = 100 Motor Vehicles



**1.090.566 mio
passenger-km**

PASSENGER TRANSPORT
VOLUME* (2014)



**506.589 mio
tonne-km**

FREIGHT TRANSPORT
VOLUME** (2014)



* Includes road and rail transport, not non-motorised transport modes

** Includes road, rail and inland waterways, does not include pipelines or air transport

Sources: ITF/OECD, World Development Indicators

Passenger-km per mode



■ Road, Car: 85%
■ Road, Bus: 7%
■ Rail: 8%

Year: 2014

Tonne-km per mode



■ Road: 61%
■ Inland waterways: 12%
■ Rail: 22%
■ Pipeline: 4%
■ Domestic Air: 1%

Year: 2014

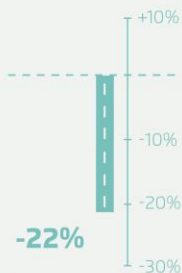
¹ G20 average includes the EU and excludes individual EU member states (France, Germany, Italy, UK) to avoid double counting



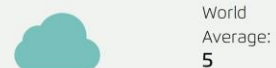
TOTAL EMISSIONS

Germany's total CO₂ emissions from fuel combustion have decreased by 22% since 1990. Emissions in the transport sector increased up to 1999, decreased until 2009 and have been slowly growing since then. In 2015, emissions from transport were just below 1990 levels. Per capita emissions of the transport sector are almost exactly at the G20 average. Given current trends, transport sector emissions are projected to grow by as much as 44% by 2030 while also capturing a larger share of overall emissions. Road transport is by far the largest source of German transport-sector emissions, with a 94% share, followed by rail, representing just 4% of emissions.

729,77 Mt CO₂
TOTAL CO₂ EMISSIONS FROM FUEL COMBUSTION (2015)



TOTAL CO₂ EMISSIONS FROM FUEL COMBUSTION PER CAPITA (2013)



t CO₂ per capita

CHANGE IN TOTAL EMISSIONS (1990-2015)



SHARE IN GLOBAL EMISSIONS (2015)

2,25%

Sources: UNFCCC, UNDESA, ITF/OECD

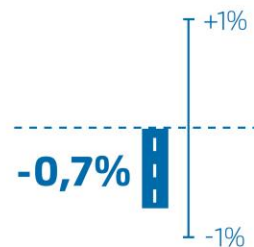


TRANSPORT SECTOR EMISSIONS

157,54 Mt CO₂

TOTAL GHG EMISSIONS IN THE TRANSPORT SECTOR (2015)

CHANGE IN TRANSPORT SECTOR EMISSIONS (1990-2015)



SHARE OF TRANSPORT EMISSIONS IN TOTAL CO₂ EMISSIONS (2015)



• World Average: 23%
= G20 Average¹: 20%

TOTAL CO₂ EMISSIONS PER CAPITA IN TRANSPORT SECTOR (2015/2030)



2015



2030

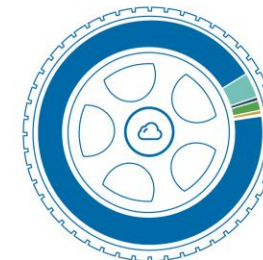


t CO₂ per capita



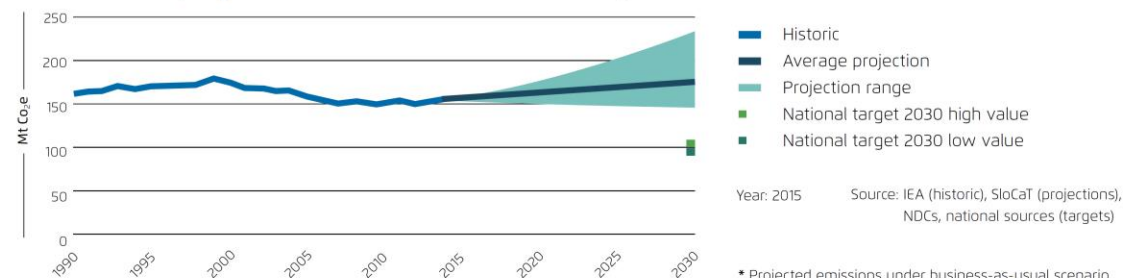
Sources: IEA, UNDESA, SloCaT

Transport emissions by subsector



Year: 2015 Source: IEA

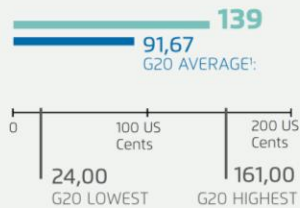
Historic and projected* emissions in the transport sector





ENERGY

US Cents/Litre GASOLINE PRICE (2016)

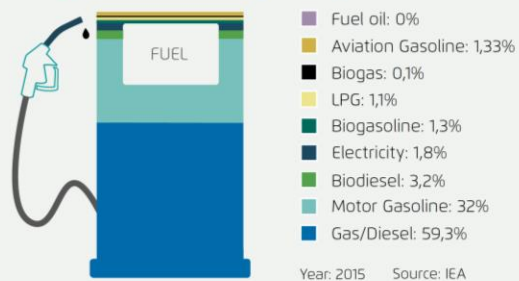


US Cents/Litre DIESEL PRICE (2016)



Source: GIZ SUTP

Energy use in transport by fuel

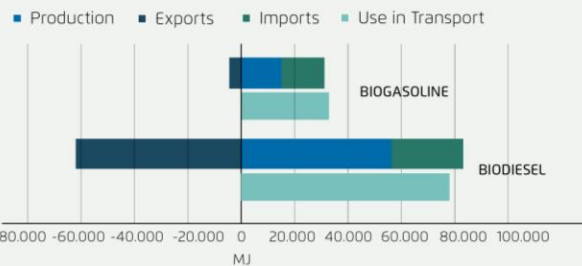


Year: 2015 Source: IEA

SHARE OF BIOFUELS IMPORTED (2015)



Biofuel supply and use*



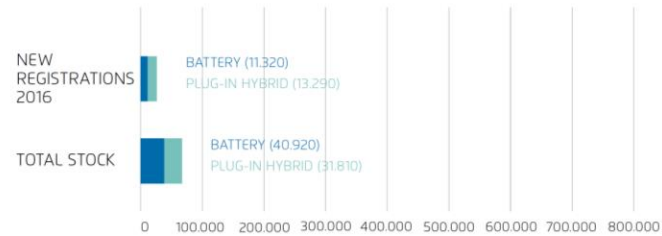
* Excluding biogas, as this is mostly used in other sectors

Year: 2015 Source: IEA



ELECTRIC VEHICLES

TOTAL STOCK OF ELECTRIC CARS (2016)



Year: 2016

NEW REGISTRATIONS OF ELECTRIC CARS (2016)

MARKET SHARE OF ELECTRIC CARS IN THE NATIONAL MARKET (2016)

0,73%

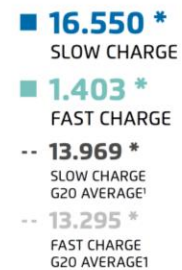
SHARE OF NEW REGISTRATIONS IN TOTAL EV STOCK (2016)



SHARE OF ELECTRIC CARS IN TOTAL PASSENGER CAR STOCK (2016)



PUBLICLY ACCE- SSIBLE CHARGE INFRASTRUCTURE (2016)



* number of units

Source: IEA EV Outlook 2017



LINKAGES TO THE ENERGY SECTOR

Coal is still the dominant fuel source for power generation in Germany, representing 44% of the power mix (global average: 39%). Germany has a renewable energy law (EEG) that regulates access for renewables and provides incentives. The law used to set fixed feed-in tariffs for individual technologies over a 20-year period. In 2017 an auction system was rolled out for wind and biomass. Rooftop PV installations below 750 kW still receive a fixed feed-in tariff.

Existing targets for renewable electricity generation

Share of electricity generation from renewable sources

- 2025: 40–45%
- 2035: 55–60%
- 2050: 80%



450,100 gCO₂/kWh

GRID EMISSION FACTOR (2015)

% of total electricity output

SHARE OF RENEWABLES IN
ELECTRICITY PRODUCTION* (2014)

11279 GWh

ELECTRICITY USE IN TRANSPORT
(2015)

SHARE IN TOTAL ELECTRICITY USE

* Including hydropower

Sources: IEA, Covenant of Mayors, World Development Indicators, RES LEGAL Europe



AMBITION

NDC target

See EU: committed to a 40% reduction in GHG emissions in 2030 compared to 1990.

Transport related target *no mention*

Transport related measures *no mention*

Targets at national level

- The National Climate Plan 2050 sets an absolute target for 2030 at 95–98 MtCO₂e.
- The Energy Strategy from 2010 sets the target to reduce primary energy consumption in the transport sector by 10% by 2020 and 40% by 2050.
- The National Sustainability Strategy 2016 set targets to reduce primary energy consumption for passenger transport and freight by 15-20% by 2030 compared to 2005.
- The German government has also set the target of 1 million electric vehicles by 2020.

Source: NDC, National Climate Plan 2050; Energy Strategy 2010; National Sustainability Strategy 2016



TRADE-OFF'S

Sustainability of biofuels

The EU Renewable Energy Directive establishes two sets of criteria to promote the sustainability of biofuels production:

- GHG emissions savings and land use requirements must be at least 50% (60% for new installations in 2018), and
- biodiesel may not be produced on land that was converted from high carbon density conditions such as rainforests.

To demonstrate compliance with the EU sustainability criteria, biofuels need to be validated by national verification systems or by one of 20 voluntary schemes approved by the EC.

Source: OECD

Subsidies

1 Billion euros

LEVEL OF FOSSIL FUEL SUBSIDIES IN THE TRANSPORT SECTOR (2014)

Kerosene for aviation and fuel used for domestic navigation are exempt from fuel tax and international flights are additionally exempt from VAT. Tax deductions for commuting and for company fleets incentivise the use of cars at the expense of more climate friendly modes of transport.

Source: OECD



IMPLEMENTATION

Mobility

National programmes to support shift to public transport	<i>No measures at national level</i>
✓ Measures to support low-carbon freight logistics	Public grants for transport hubs to support modal shift from road to rail and waterways Subsidies for the expansion and re-activation of unused rail infrastructure
National-level measures to support new mobility services	<i>No measures at national level</i>
✓ National measures to support non-motorized transport	National Cycling Plan 2020 National competition for measures to increase cycling, including delivery services
✓ Road charges	Toll for heavy goods vehicles (Federal Trunk Road Toll Act), depending on the pollutant class

Energy

✓ Energy/carbon emission standards LDV	EU CO ₂ efficiency targets Passenger cars: 95 g/km (2021) Light commercial: 147 g/km (2020)
Energy/carbon emission standards HDV	<i>No standard</i>
✓ Pricing instruments	Circulation tax partly based on CO ₂ . VAT discount for public transport
✓ Mandatory vehicle labelling	National implementation of the EU Car Labelling Directive 1999/94/EC
✓ Support mechanism for electric vehicles & charging infrastructure	Purchase rebates for EVs at the limit of 400,000 cars until 2020 or EUR 600 million. Ten-year circulation tax exemption, reduced to five years from 2021. Tax deduction for company cars. Differentiated plates for EVs, allowing for differentiated measures. 300 mio Euro Investment subsidy programme for charging infrastructure
✓ Support for other low-carbon fuels and propulsion systems	Renewable energy targets 2020: 10% of transport fuels from renewable sources. Fuel Quality Directive (2009/30/EC) requires member states to reduce the GHG intensity of fuel by 6% by 2020. Clean aVehicles Directive 2009/33/EC. Subsidies for LNG use in shipping
✓ Mandatory biofuel targets	The EU has a mandatory requirement of 10% renewable energy in transport by 2020, with a cap of 7% for first generation biofuels. This also applies to Germany, which moved from mandated shares of biofuels to a mandatory reduction in GHG emissions of 4%, compared to the fossil fuel equivalent, which is scheduled to increase to 6% by 2020

Source: See national sources Germany

How to proceed from here?



Generally, G20 countries show more ambition in national policy than at the international level, but even the national targets remain insufficient for limiting global warming well below 2°C.

- More ambition and action needed at the national level
- Collaboration between G20 members should be expanded
- Transport needs to move up on the international agenda

Publication: „Towards Decarbonising Transport – Taking Stock on G20 Sectoral Ambition“



Download the **full report** and
executive summary at

www.agora-verkehrswende.de



Thank you very much for your attention!

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

christian.hochfeld@agora-verkehrswende.de

Anna-Louisa-Karsch Str. 2 | D-10178 Berlin

T +49 (0)30 700 1435 300 | **F** +49 (0)30 700 1435 129

M info@agora-verkehrswende.de

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the European Climate Foundation (ECF).