Towards Decarbonising Transport
Taking Stock of G20 Sectoral Ambition

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COP Side-Event
“Low-carbon Transport: G20 on track?”
Bonn, November 08, 2017
Agora Verkehrswende – Transforming Transport

Who we are.

→ 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.

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

- Road: 84%
- Road-e: 1%
- Domestic Aviation: 6%
- Rail: 2%
- Rail-e: 2%
- Pipeline-Transport: 2%
- Domestic Navigation: 3%

Source: Own illustration based on data from IEA
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

Source: Authors’ figure, historic emissions based on data from IEA (2016), projections based on data from Gota et al. (n.d.).
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 CO₂)**

<table>
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<tr>
<th>Year</th>
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Source: Agora Verkehrswende
Development of gasoline prices in G20 countries 1995–2016

Source: Authors’ figure based on data from GIZ
Transport related NDC targets and measures in the G20

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

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 ‘Verkehrswende 2050’ will be enabled by the Mobility Revolution and the Energy Transition in Transport.

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

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

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

<table>
<thead>
<tr>
<th>Country</th>
<th>National programmes to support shift to transport</th>
<th>Measures to support low-carbon transport logistics</th>
<th>National-level measures to support new mobility services</th>
<th>National measures for non-motorised transport</th>
<th>Road charges</th>
<th>Energy &amp; carbon emission standards</th>
<th>Energy &amp; carbon emissions standard NGO</th>
<th>Pricing instruments</th>
<th>Mandatory vehicle labelling</th>
<th>Support for electric vehicles and charging infrastructure</th>
<th>Mandatory bio-fuel targets</th>
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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.

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

Source: ICCT 2016.
Core options for the Energy Transition in Transportation (until 2050)

- **LDV**
  - BEV as benchmark

- **HDV**
  - Preferential technology **open**

- **Bus**
  - BEV as benchmark

- **Aviation**
  - Power-to-Liquid as alternative to Biokerosene

- **Maritime**
  - PtX indispensable

- **Rail**
  - Complete electrification

**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

Agora Verkehrswende & GIZ | COP Side Event: Low-carbon Transport: G20 on track? | Bonn, November 08, 2017
Tacking stock on G20 Sectoral Ambition

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

Note: Only G20 members with targets expressed in share of renewable electricity output (including hydro) are shown. Source: REN21 (2017), World Bank (2017)
Germany is the most populous country in Europe, with particularly dense urban clusters on its western borders. Germany lies on the 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 11th 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 0.93 tCO₂. 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.

Sources: World Development Indicators, OECD

**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
  - 74.6% G20 average
  - 53.8% world average

**Mobility**
- 685 road motor vehicles per 1000 inhabitants
  - Motorisation rate (2015)
- 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: World Development Indicators
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)

8,93
G20 Average: 8.4
Share in global emissions (2015): 2.25%

21.59%
World average: 23%
G20 average: 20%

157.54 Mt CO₂
TOTAL GHG EMISSIONS IN THE TRANSPORT SECTOR (2015)

-0.7%
Change in transport sector emissions (1990–2015)

Transport emissions by subsector

1 CO₂ per capita

Historic and projected* emissions in the transport sector

*Projected emissions under business-as-usual scenario

2015
1.93
2030
2.15
G20 Average: 1.11
G20 Average: 2.33

Sources: IEA, UNDP, STI/STI/END
**Energy Use in Transport by Fuel**

- **Fuel oil:** 0%
- **Aviation Gasoline:** 1.33%
- **Biodiesel:** 0.1%
- **LPG:** 1.1%
- **Biogas:** 1.3%
- **Electricity:** 0.14%
- **Bioethanol:** 3.2%
- **Motor Gasoline:** 3.2%
- **Gas/Diesel:** 1.93%

**Share of Biofuels Imported (2015)**

- **42%**

**Biofuel Supply and Use**

- **Production**
- **Exports**
- **Imports**
- **Use in Transport**

**Electric Vehicles**

- **Total Stock of Electric Cars (2016)**
- **New Registrations of Electric Cars (2016)**

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

- **0.73%**

**Market Share of New Registrations in Total EV Stock (2016)**

- **33.8%**

**Publicly Accessible Charge Infrastructure (2016)**

- **16,550** slow charge
- **1,403** fast charge
- **13,969** slow charge (2015 average)
- **13,295** fast charge (2015 average)

**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**

- **2020:** 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)**

**2.2%**

**Share in Total Electricity Use**

*Including hydropower*

Sources: I.EA, Convenant 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 MTCO₂.
• 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.


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: DECO

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: DECO

IMPLEMENTATION

Mobility
National programmes to support shift to public transport
No measures at national level
• 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
  No measures at national level
• 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 CO₂ efficiency targets
  Passenger cars: 95 g/km (2021)
  Light commercial: 147 g/km (2020)
• Energy/carbon emission standards HDV
  No standard
• Pricing instruments
  Circulation tax partly based on CO₂
  VAT discount for public transport
• Mandatory vehicle labelling
  National implementation of the EU Car Labelling Directive 1999/94/EC
• Support mechanisms for electric vehicles & charging infrastructure
  Purchase rebates for EVs of 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
• 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
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:

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