E-Mobility: Role in Climate change mitigation in a balanced Avoid, Shift, Improve Scenario

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This project is funded by the Seventh Framework Programme (FP7) of the European Commission.

Content

- Transport and climate change
- Electric vehicles around the world
- Pathways for low-carbon mobility
- E-mobility in the context of sustainable urban mobility
- Different forms of e-mobility

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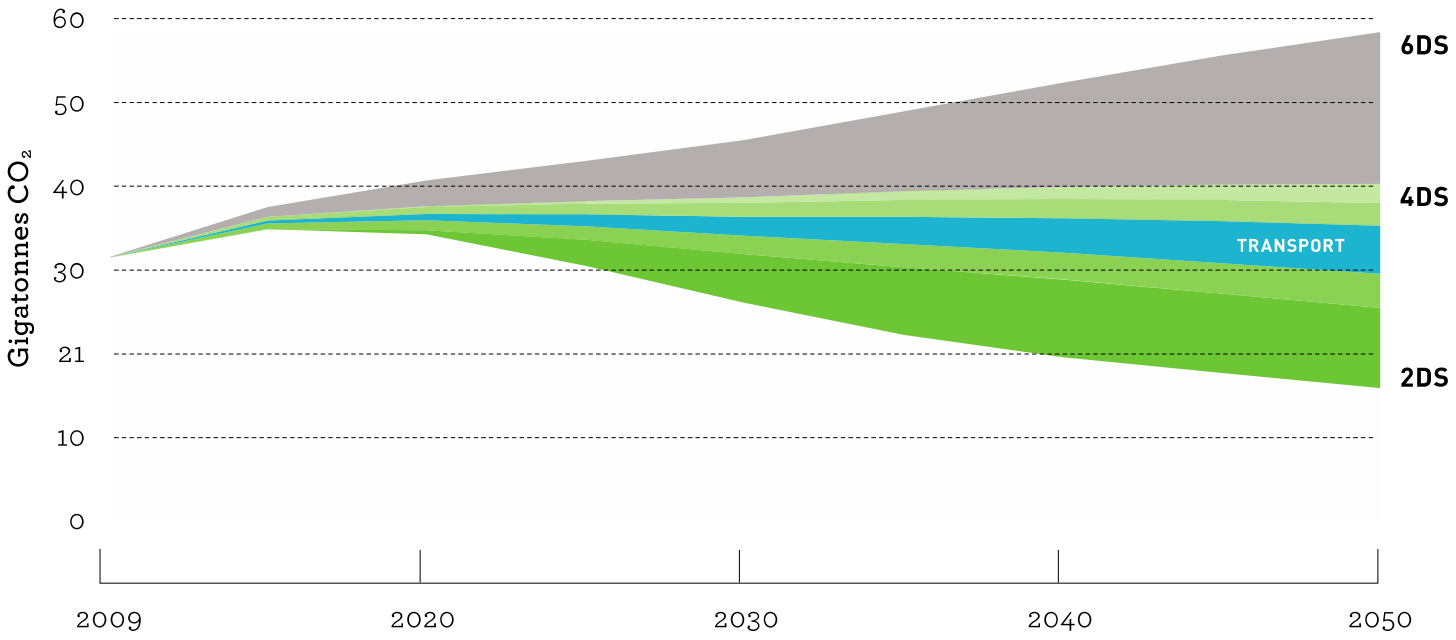
Transport and climate change



SECTORS

- Power Generation **42%**
- Transport **21%**
- Industry **18%**
- Buildings **12%**
- Other Transformation **7%**
- Additional Emissions **6DS** (6°C Baseline Scenario)

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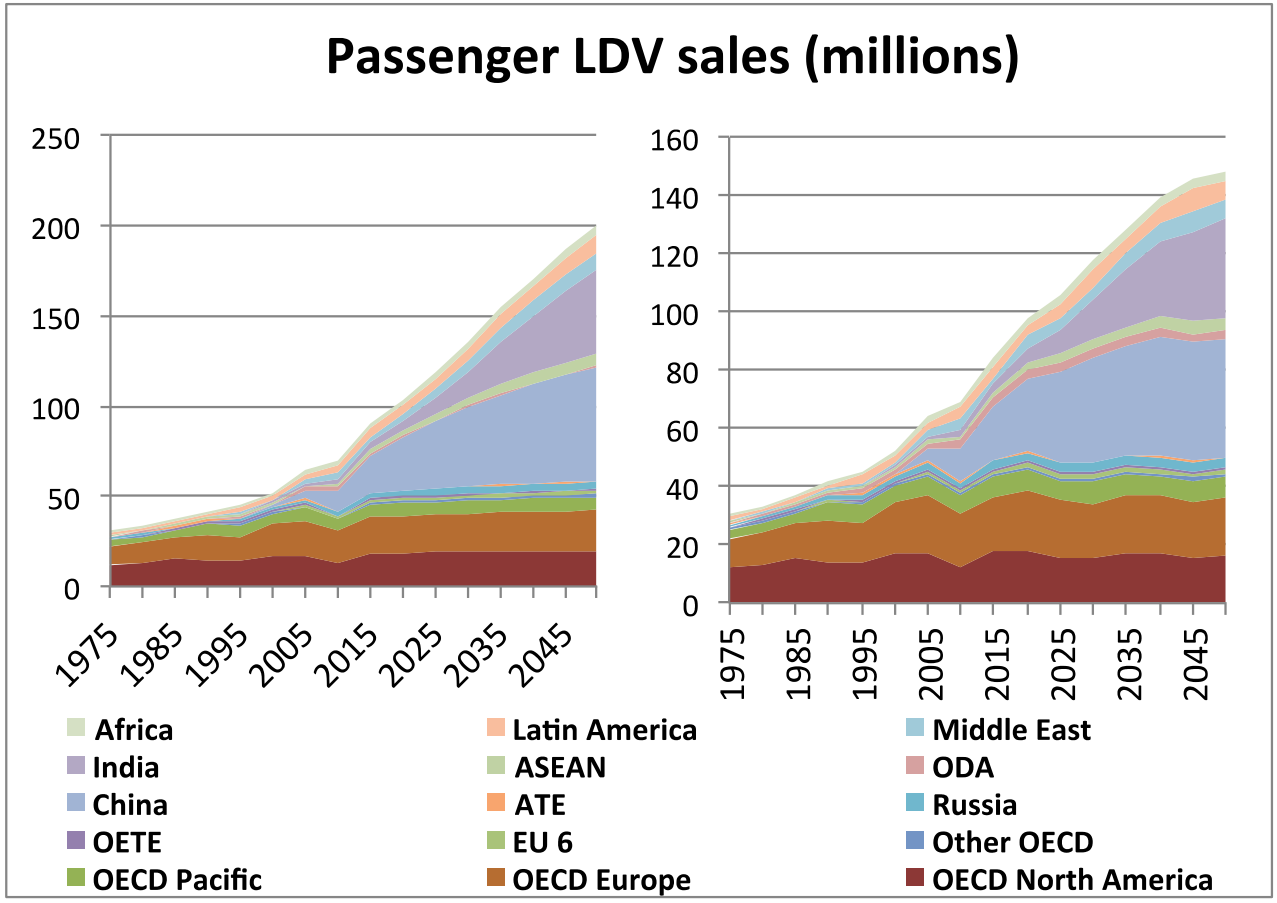
The challenge ahead



CO_2 emissions are likely to double by 2050 if current trends persist

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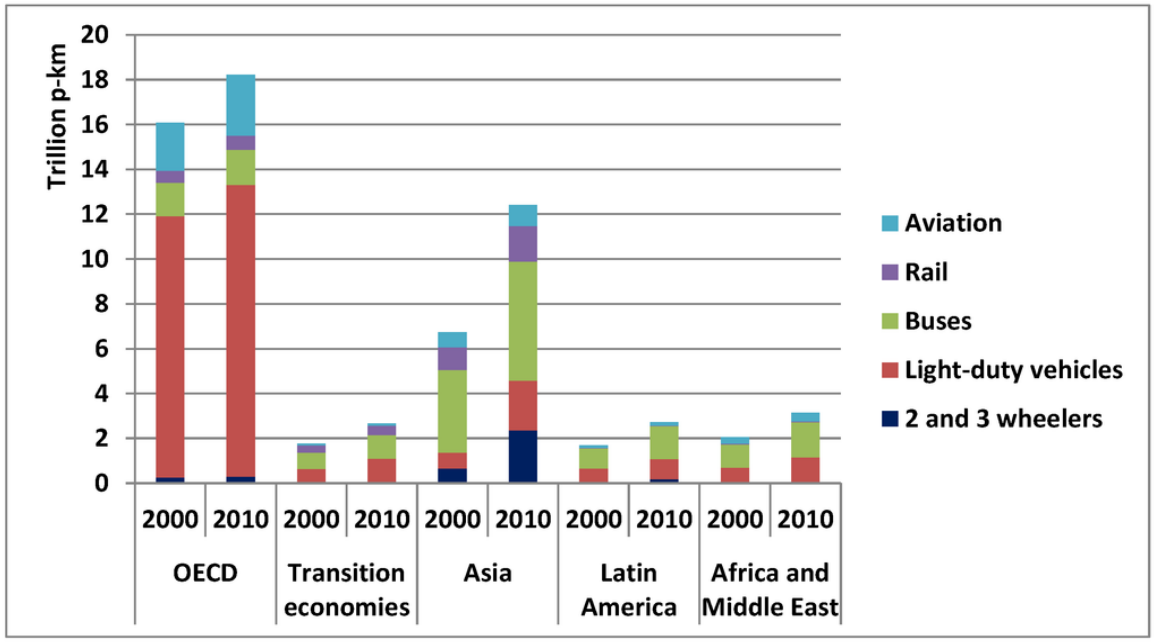
Transport in different parts of the world

Transport currently accounts for 21% of global energy related greenhouse gas emissions – the majority is still in OECD countries, but emerging countries are catching up



IEA, 2012, Mobility Model (MoMo) database.

Modal distribution of total motorized passenger transport by region in 2000 and 2010.

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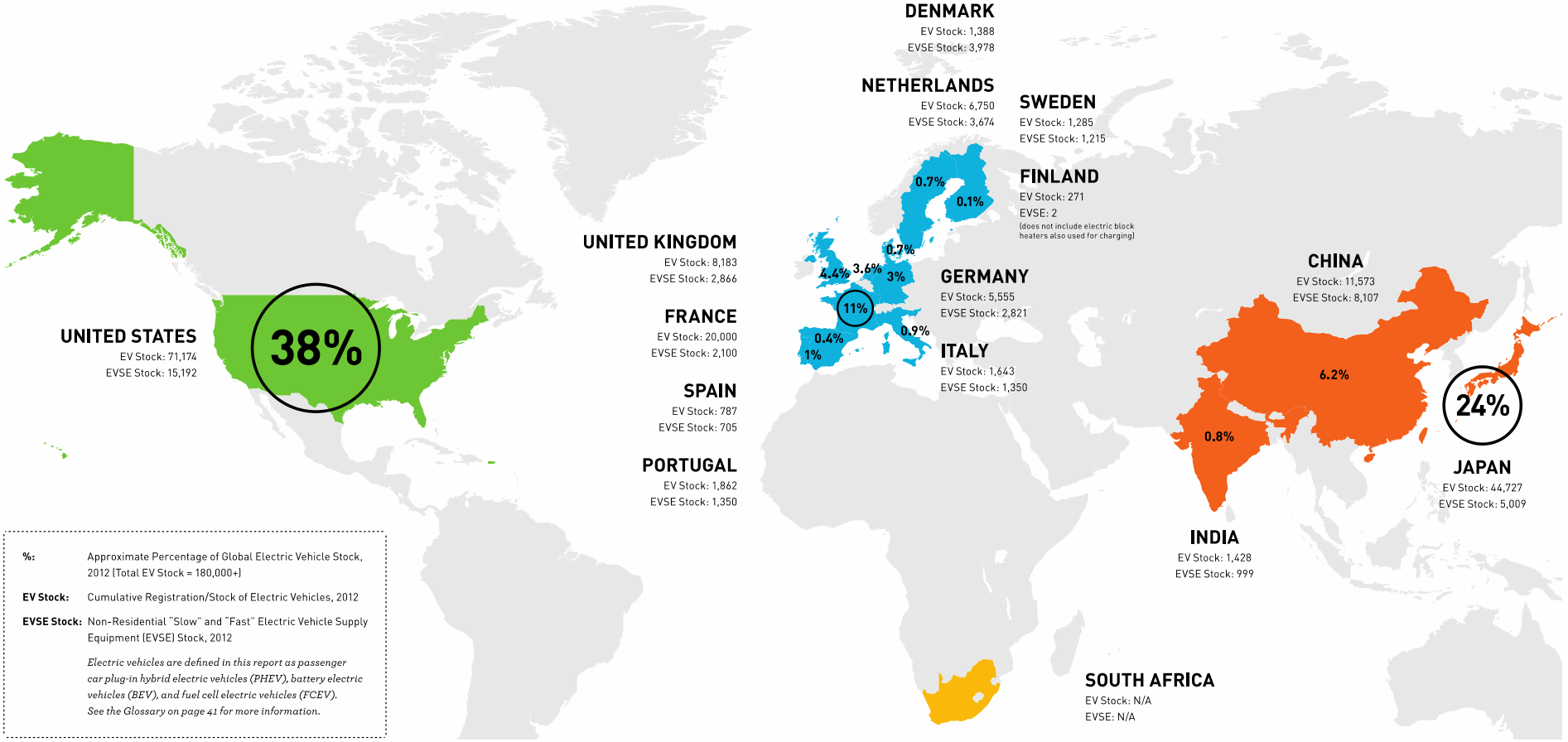
180.000+ EVs on the road...



%: Approximate Percentage of Global Electric Vehicle Stock, 2012 (Total EV Stock = 180,000+)

EV Stock: Cumulative Registration/Stock of Electric Vehicles, 2012

EVSE Stock: Non-Residential "Slow" and "Fast" Electric Vehicle Supply Equipment (EVSE) Stock, 2012

Electric vehicles are defined in this report as passenger car plug-in hybrid electric vehicles (PHEV), battery electric vehicles (BEV), and fuel cell electric vehicles (FCEV).
See the Glossary on page 41 for more information.

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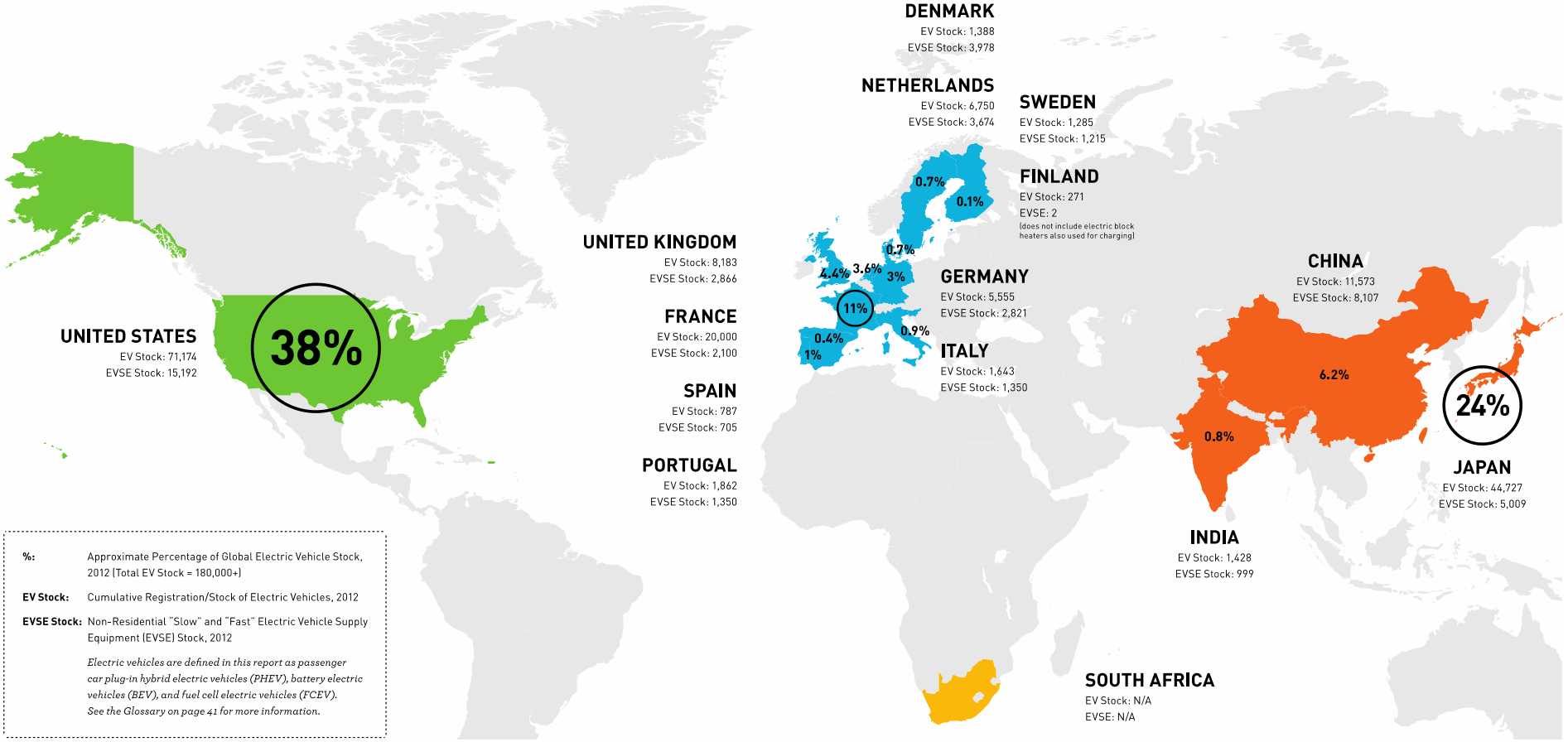
...which make up 0.02% of the world's vehicles fleet



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The world before e-mobility....

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...the world after e-mobility.

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Pathways for Transport

E-mobility as part of a balanced sustainable urban mobility concept

Avoid: reduce travel activity or reduce growth in activity

Shift**:** change travel structure through shifts to different modes of travel

Improve: lower vehicle energy intensity and reduce fuel carbon intensity

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Pathways for Transport

Potential of an integrated approach:

- higher level of socio-economic and cost effectiveness
- co-benefits, such as air quality, traffic congestion, safety and overall societal mobility

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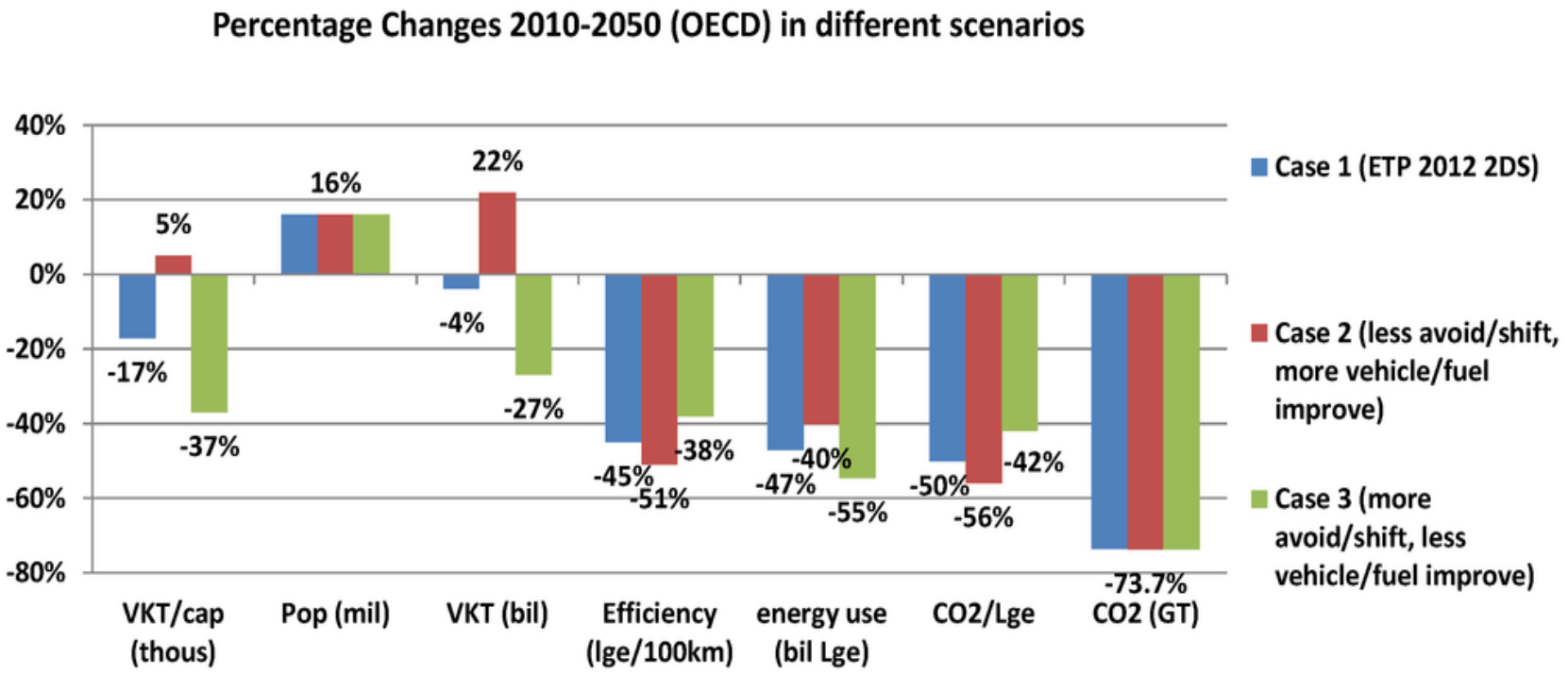
Regional Differences: OECD countries



Light vehicle fleet scenarios until 2050 in OECD countries

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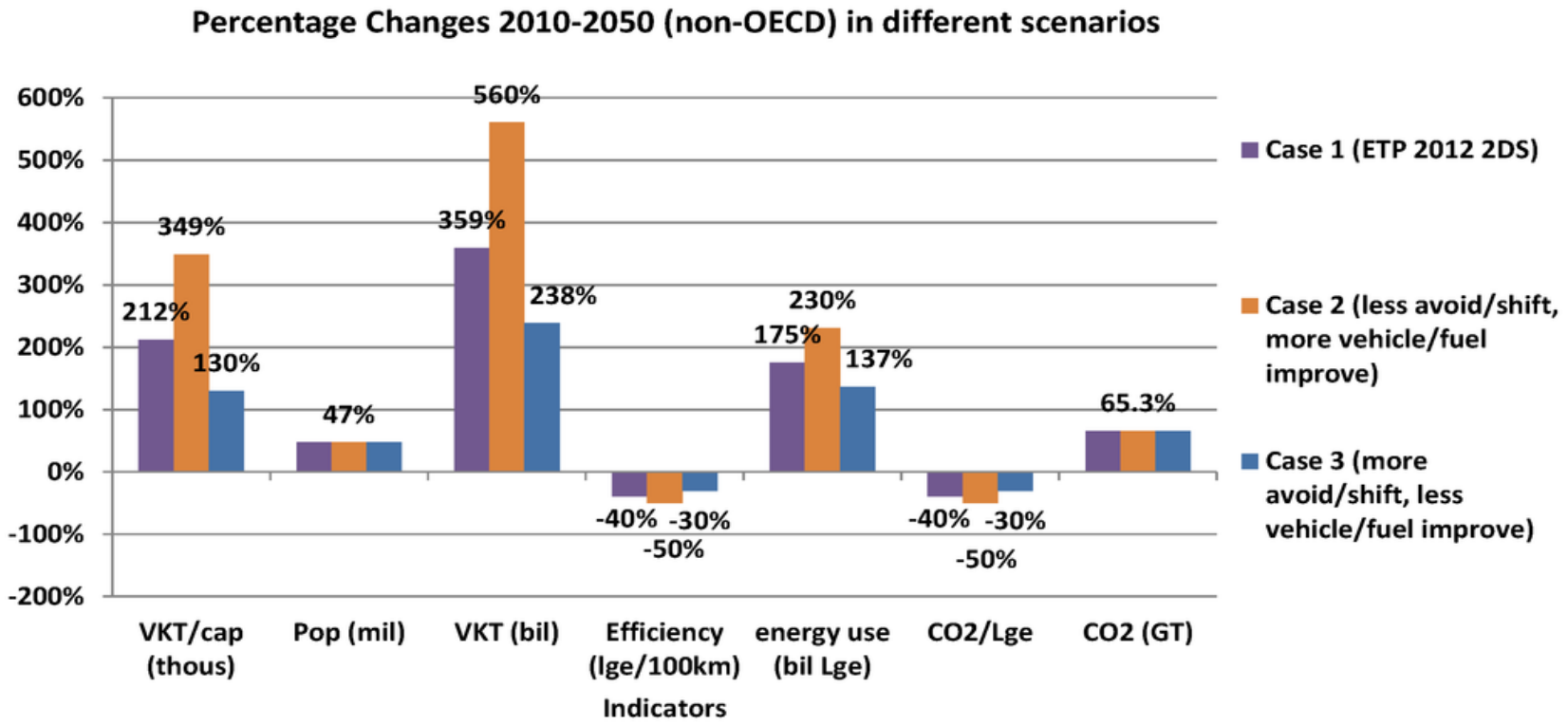
Regional Differences: non OECD countries



Light vehicle fleet scenarios until 2050 in non-OECD countries

(Fulton, Lah, Cuenot 2013)

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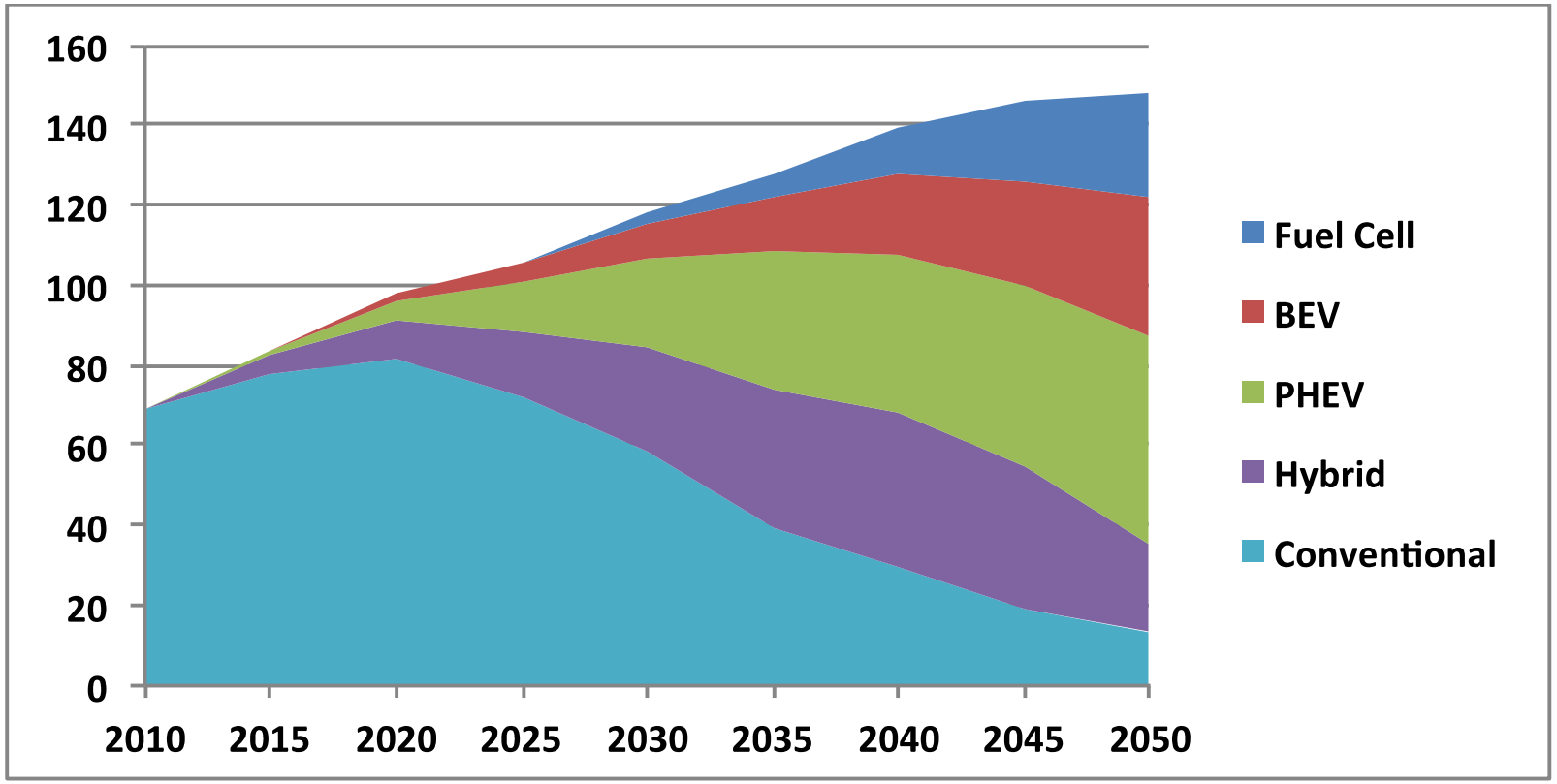
New technology light-duty vehicle (LDV) sales



New technology light-duty vehicle (LDV) sales in 2-degree scenario combined (battery electric vehicle (BEV) + plug-in hybrid vehicle (PHEV) + Fuel cell).

(Fulton, Lah, Cuenot 2013)

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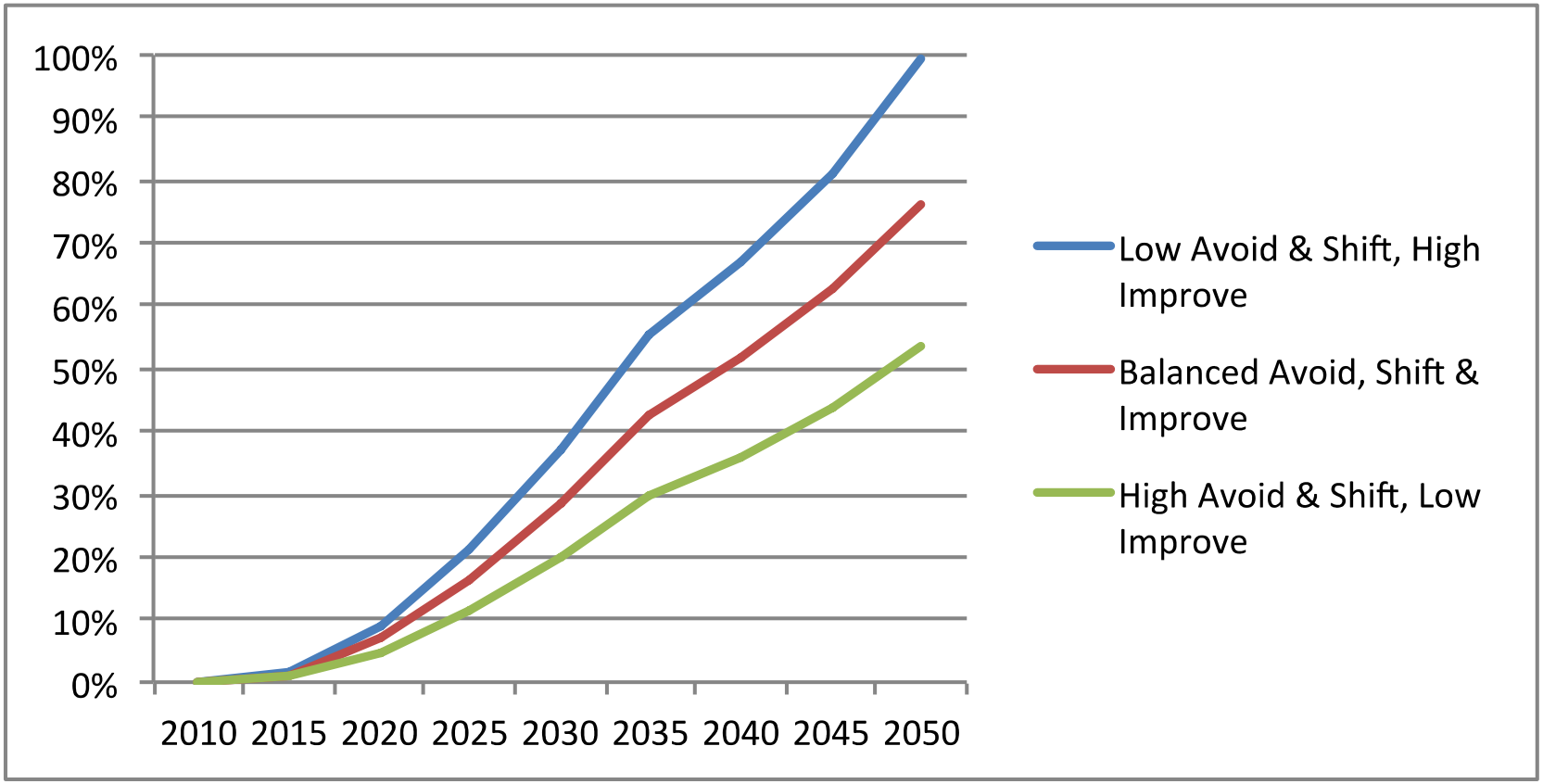
Sales share in three cases



(Fulton, Lah, Cuenot 2013)

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Key factors for low-carbon e-mobility

- Currently the well-to-wheel carbon intensity varies greatly among countries/regions.
- When electricity and hydrogen in plug-in and fuel cell vehicles reach a substantial market share, they can serve strongly to decrease the average LDV fuel carbon intensity **after 2035**

Source: IEA

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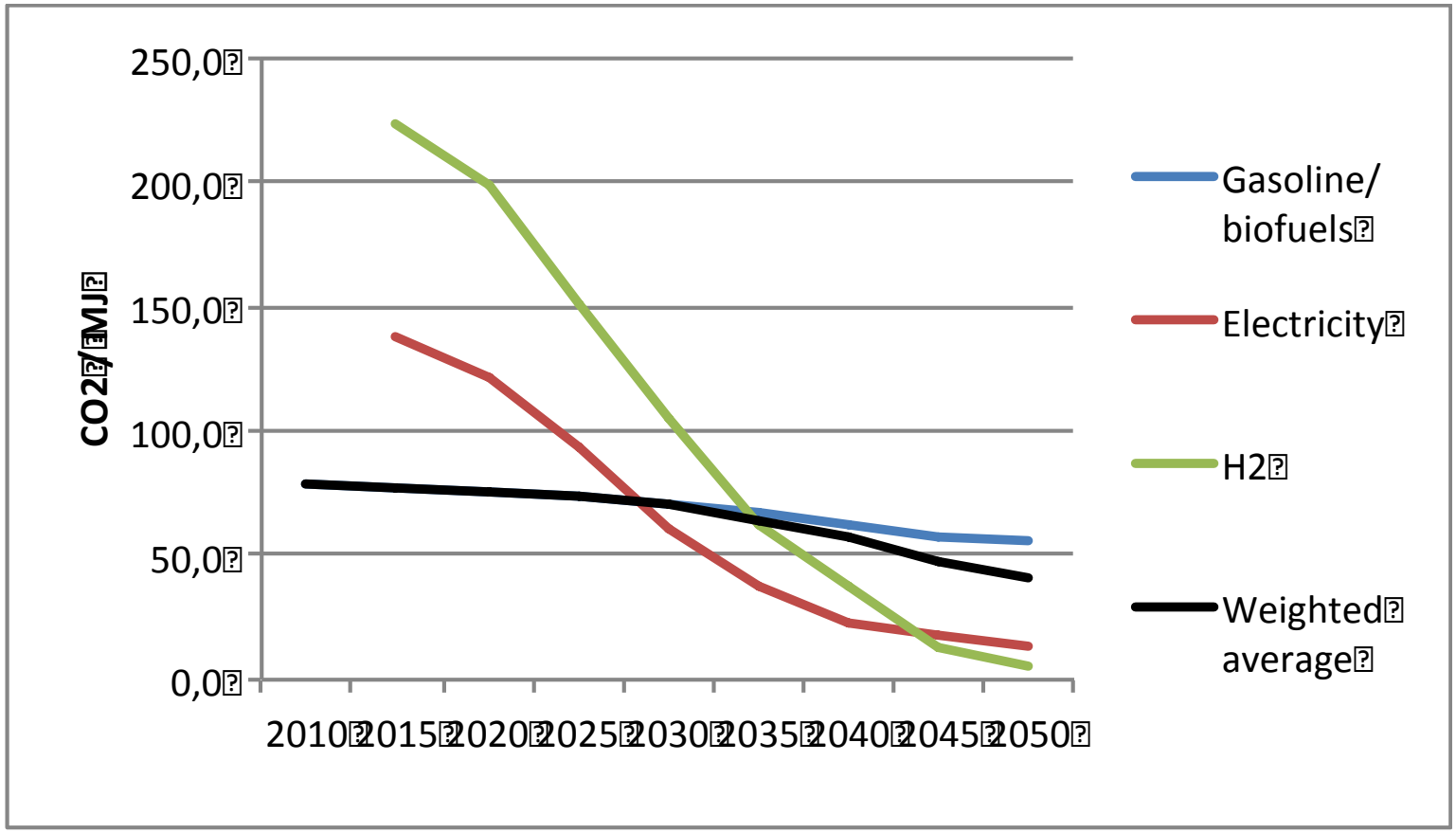
Pathways for Transport



LDV Fuel Carbon Intensity in 2DS

(Fulton, Lah, Cuenot 2013)

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Different options for e-mobility

E-mobility for car-sharing and public transport fleets

- Public procurement as enabler
- Direct control or indirect through contracts
- Leadership role and test-bed for good practice

Source: Eltis

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Different options for e-mobility

Low carbon taxi fleets

- E-tricycles in Manila (locally produced e-trikes)
- Electric taxis in Shenzhen (entire taxi fleet to be electric by 2016)

Source: ADB 2011

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Different options for e-mobility

Electric two-wheelers

- Rapid growth of electric two-wheelers in particular in China driven by regulation
- At the peak there were over 150 million electric two-wheelers on the road in China
- Growing safety issues: the Black Death”
- Now electric scooters are going to be banned in many cities for saftey reasons

Source: ADB 2011

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Different options for e-mobility

Basic requirements

- Standardised charging infrastructure
- Battery costs (currently $485/kW/h) and materials
- Battery replacement and recycing

Source: Eltis

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A balanced approach is vital for success

- Stronger shifts to low-carbon modes, such as public transport and non-motorized trasport would require less effort with regard to low-carbon technology and fuel uptake
- If travel demand is less managed stronger efficiency improvements and fuel and technology switch is required
- A balanced approach inludes: reduction of travel demand and foster modal shifts (Avoid/Shift) AND improvements in vehicle technology and fuels (Improve)

Source: Eltis

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