COP 18

Doha, Qatar 2012

Measuring transport's contribution to a decarbonized energy sector

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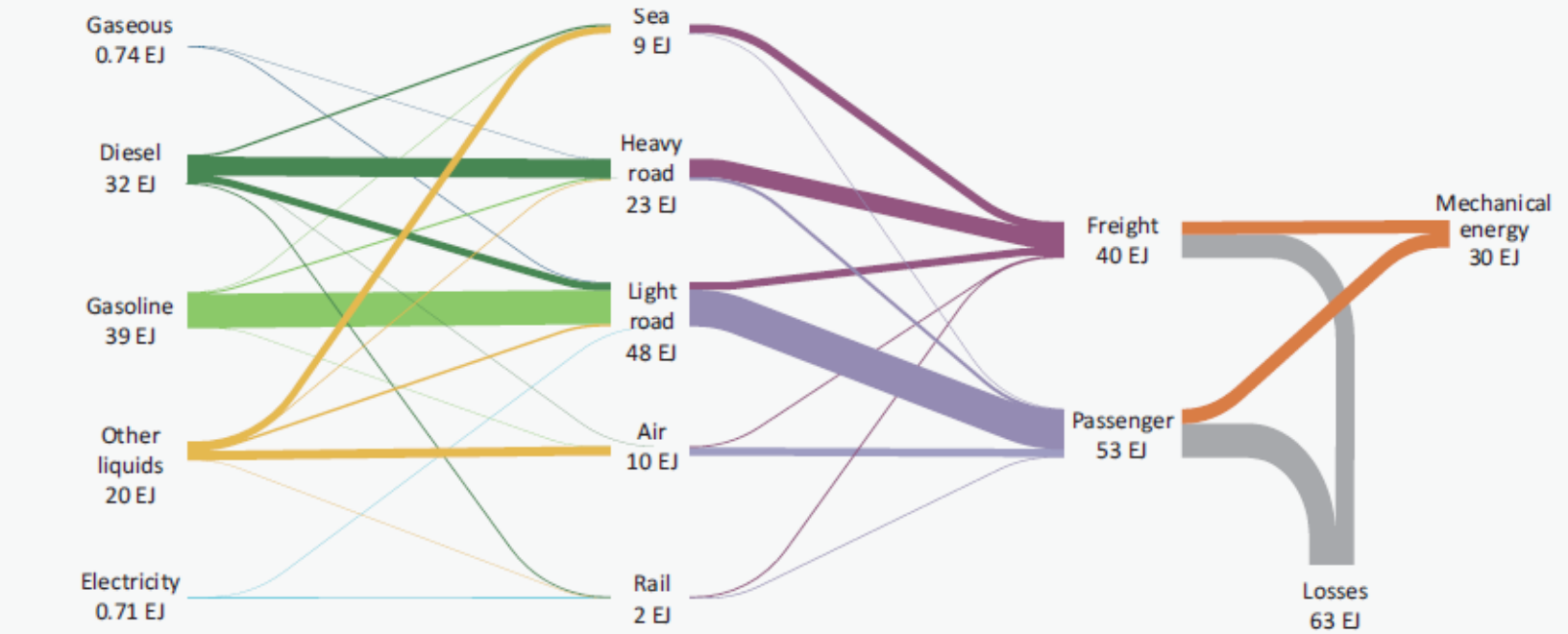
www.iea.org

Outline – All about data

- Understanding historical trends
- Transparency of data at the IEA
  - Cross-validation of official statistics
- The way ahead : long term projections
  - Costing out transport sector investments
- Future opportunities

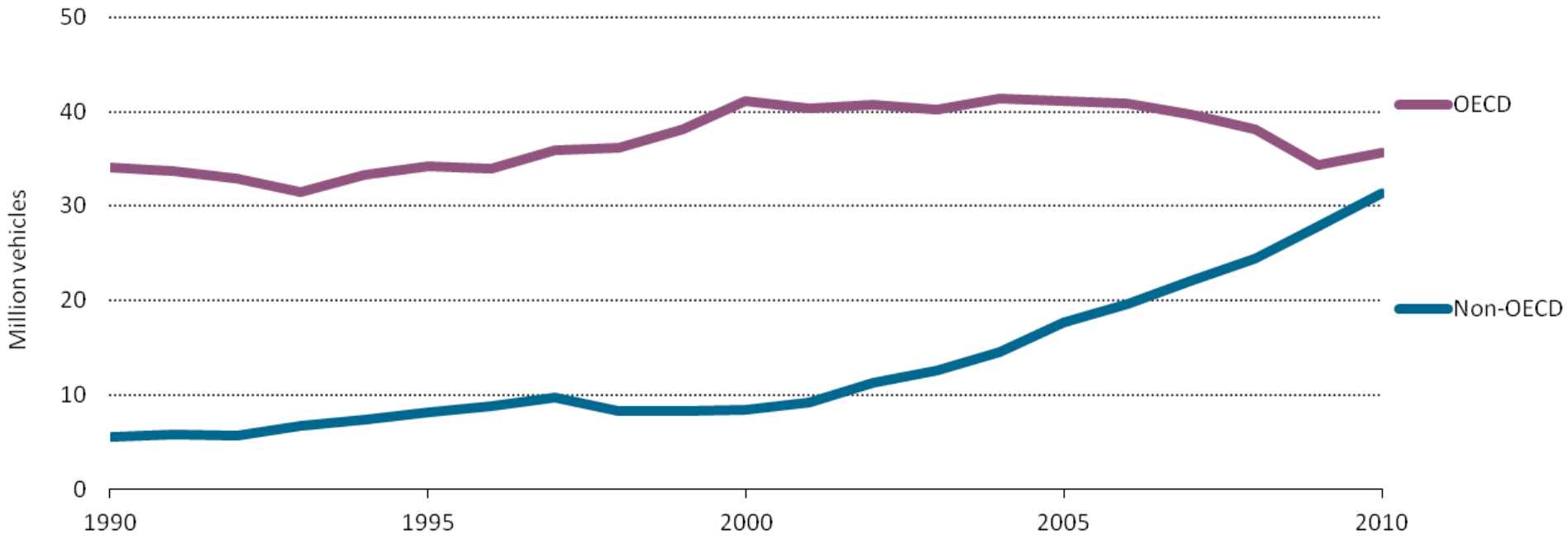
Transport energy flow, 2009

- The IEA collects and publishes official energy use data through questionnaire to member and non member countries
- Energy balances offers limited details for the transport sector



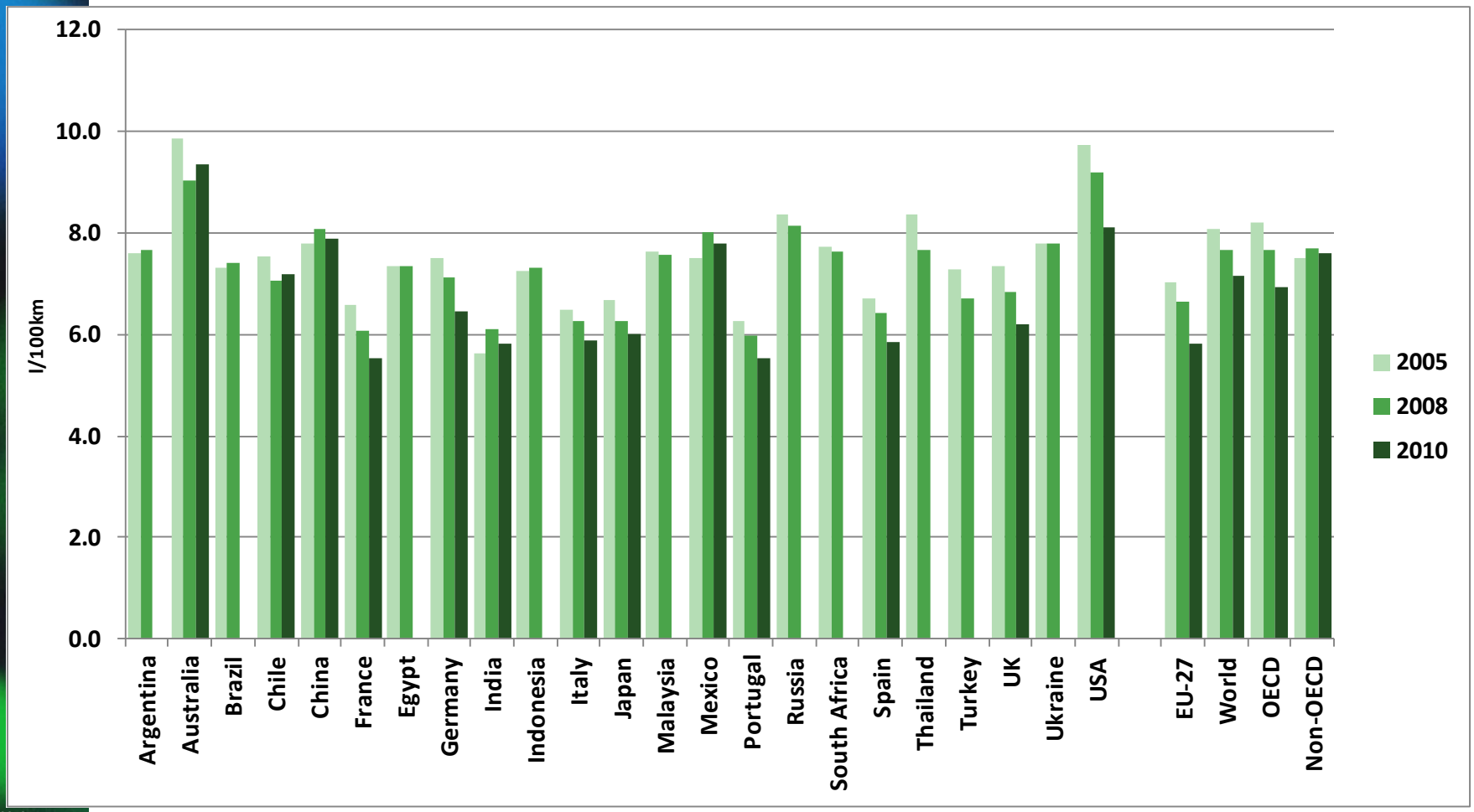
Disaggregating transport energy use – vehicle stocks

- IEA uses ASIF methodology
- Vehicles stock (S) is a key driver for energy demand
  - Need to track new vehicle sales and stock turnover



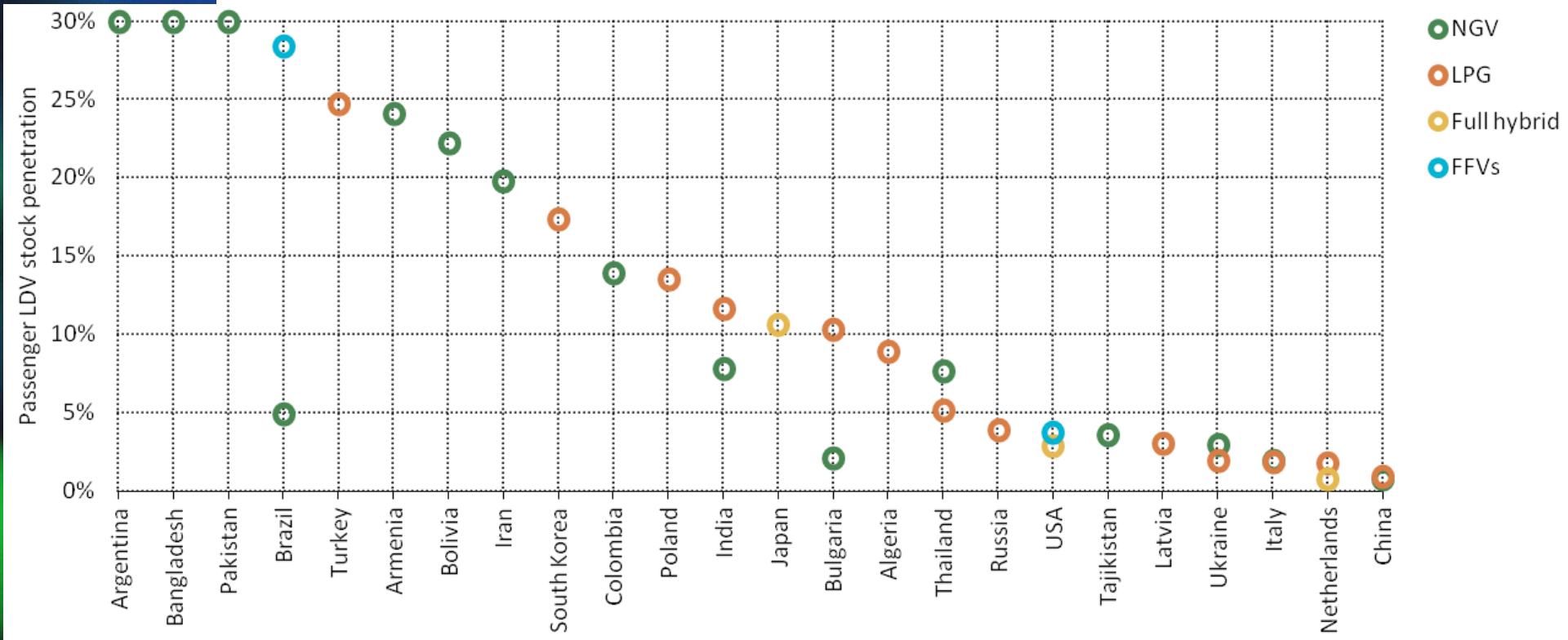
Tracking fuel economy

- Fuel economy is critical to evaluate the specific energy demand of the vehicle stock (l)



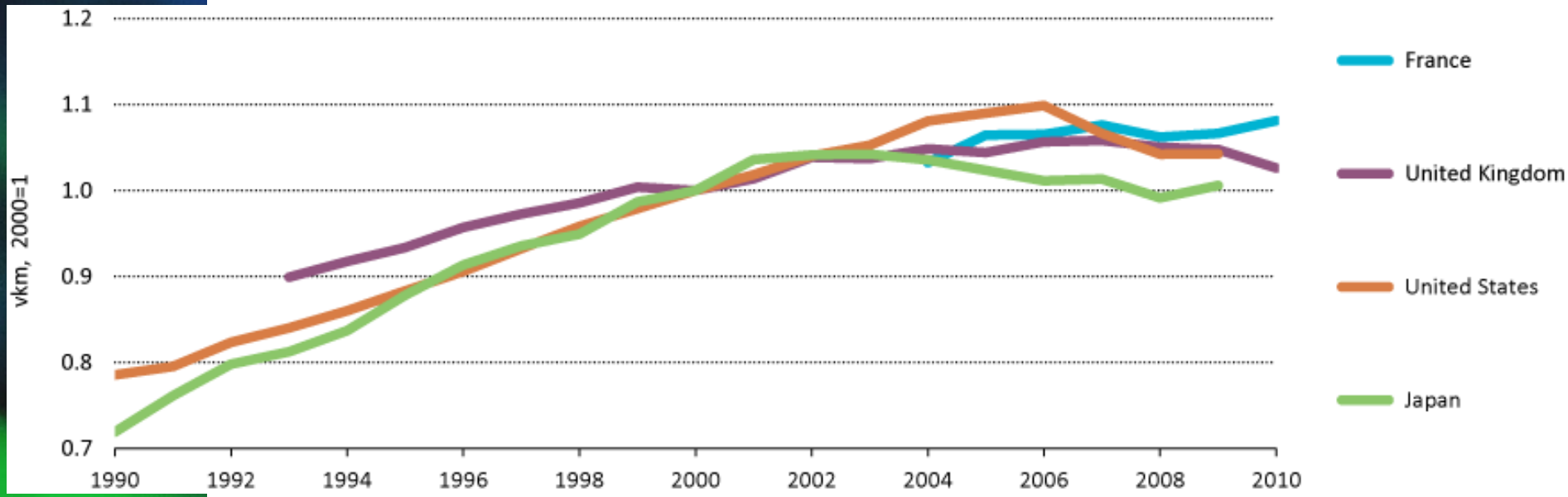
Fuel type disaggregation

- **Fuel type provides information on the impacts of the vehicle energy use (F)**
  - **the stock values are split by fuel type, covering alternative fuel vehicles the might grow in the**



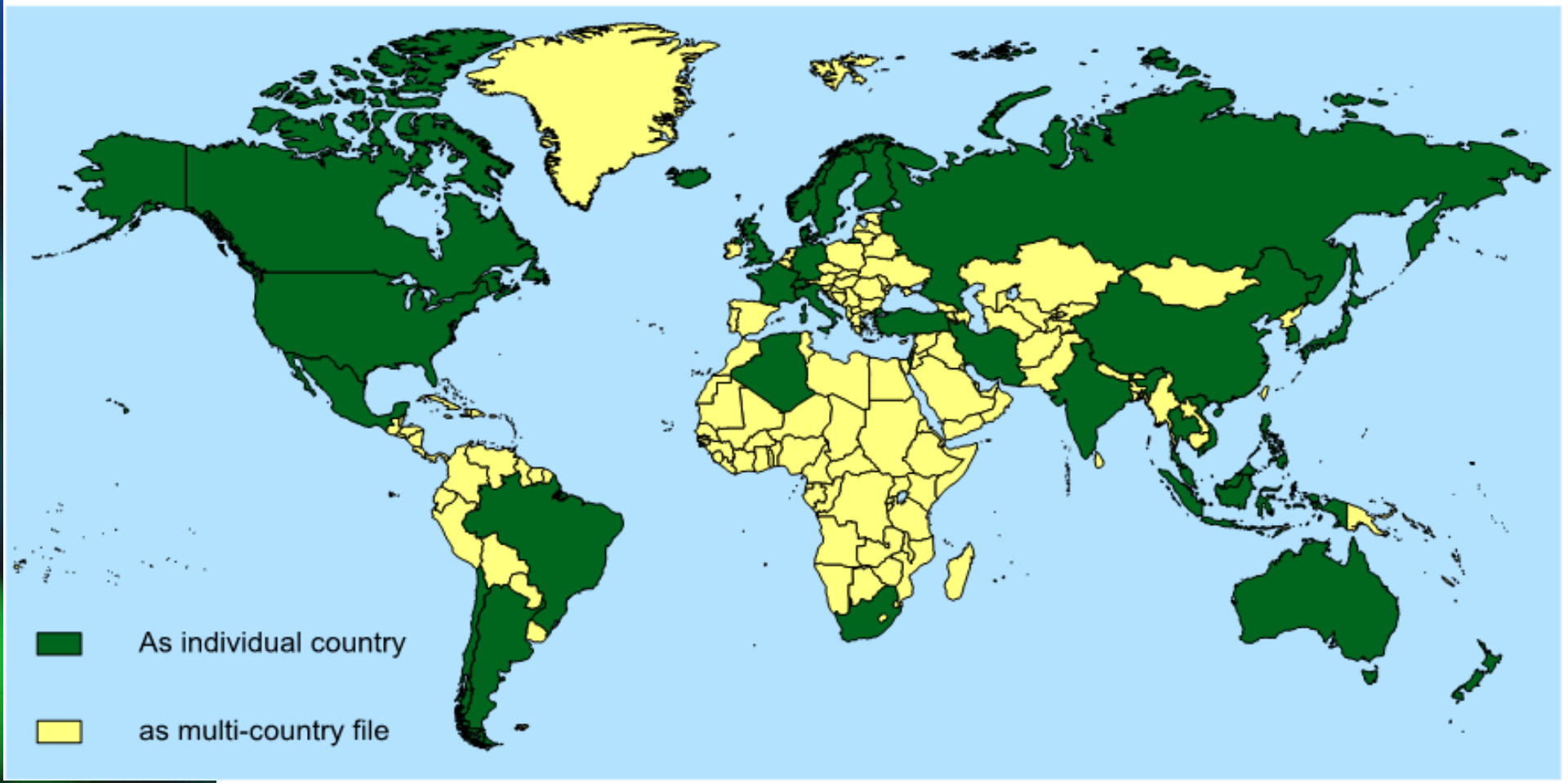
Closing the loop : mileage

- Mileage drives the overall energy demand of the vehicle stock (A)
  - Data is hard to get, and expensive to survey
  - Little reliable data time series exist



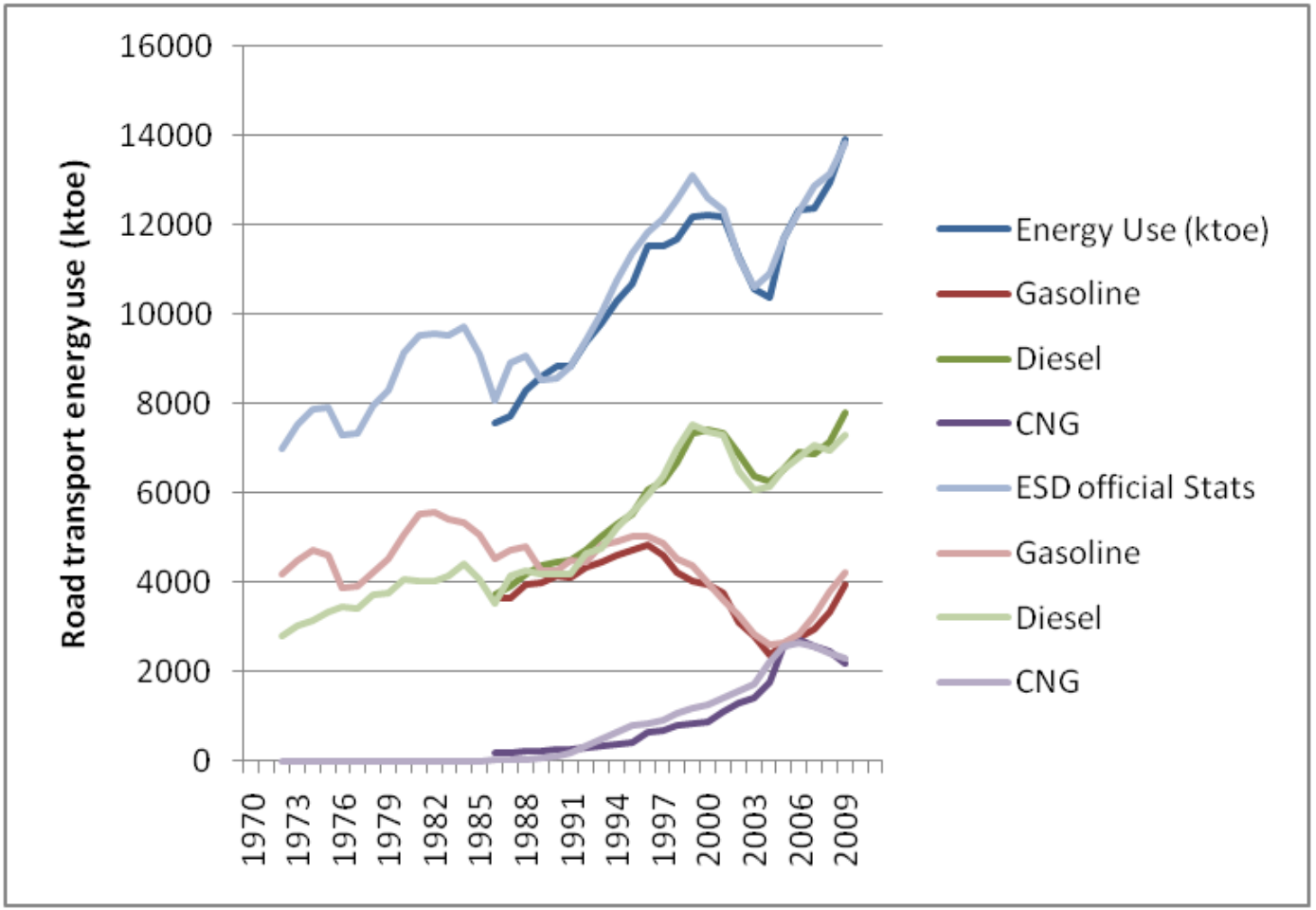
Country level database for road transport

- 33 individual countries are covered in detail today



IEA data transparency

- Cross-validation of official IEA statistics
  - Argentina fuel use



ETP 2012 – Choice of 3 Futures

ETP 2012

2DS

a vision of a **sustainable** energy system of reduced Greenhouse Gas (GHG) and CO_2 emissions

The 2°C Scenario

4DS

reflecting pledges by countries to cut emissions and boost energy efficiency

The 4°C Scenario

6DS

where the world is now heading with potentially **devastating** results

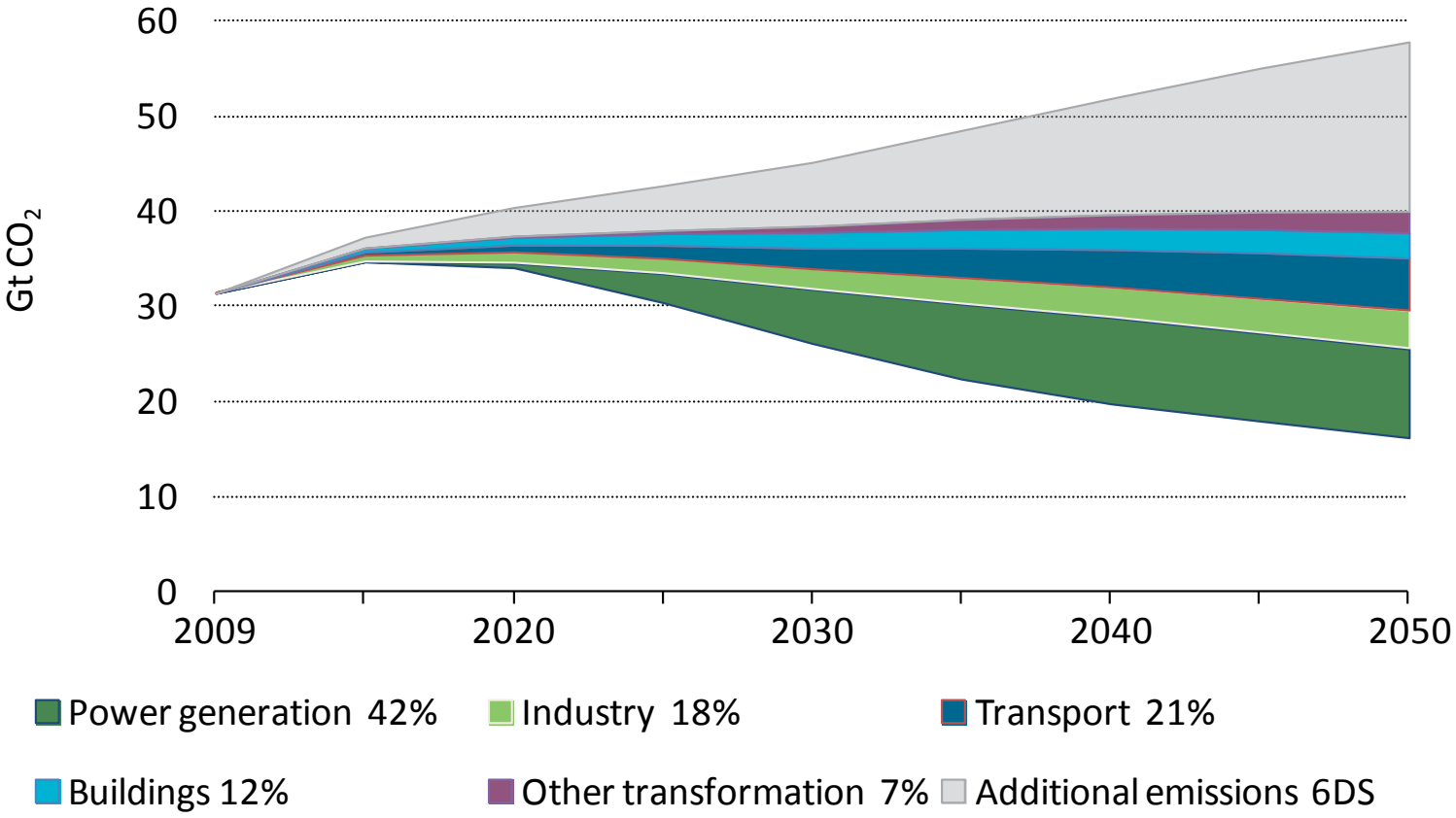
The 6°C Scenario

International Energy Agency

The IEA Energy Technology Perspectives calls for CO_2 cuts to 50% below 2009 levels by 2050 (21% for transport)

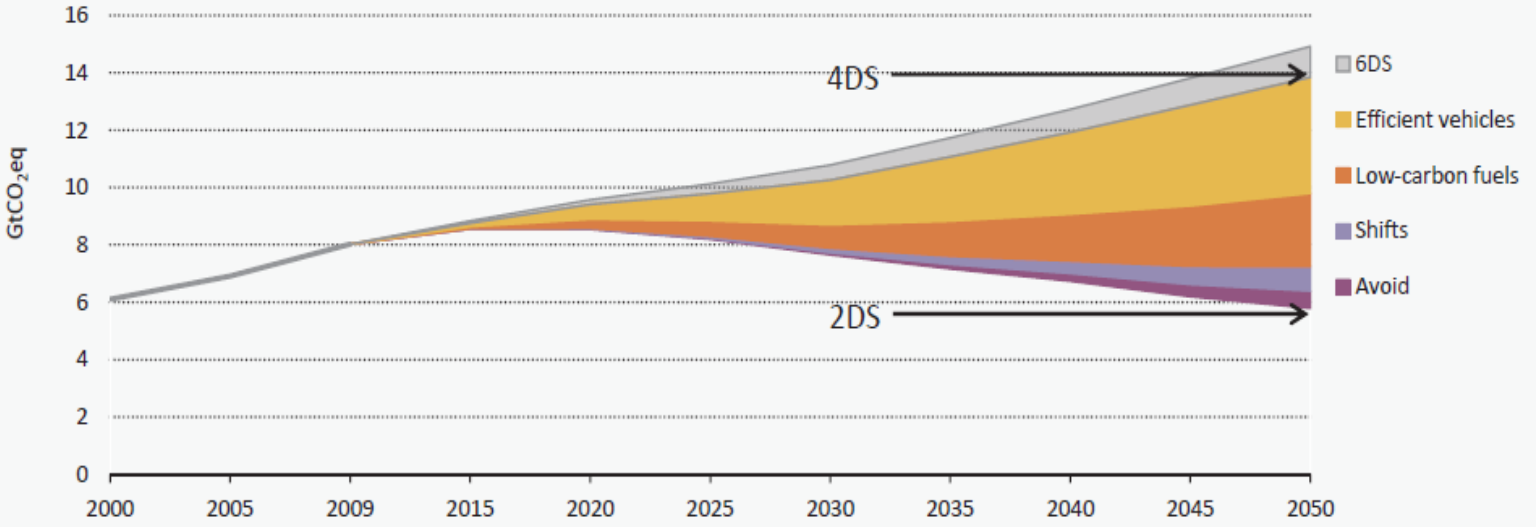
- To achieve this, we need a global energy technology revolution to meet climate change and energy security challenges.
  - A key part of this will be a revolution in transport to new technology vehicles and new fuels
- Some early signs of progress, but much more needs to be done.
  - How fast can we ramp up sales of low emission vehicles?
  - What infrastructure will be needed, by when?
  - What policies are needed?
  - What is the role of national governments, municipal governments, electric utilities, auto makers and others?

2DS Emission reduction by sector

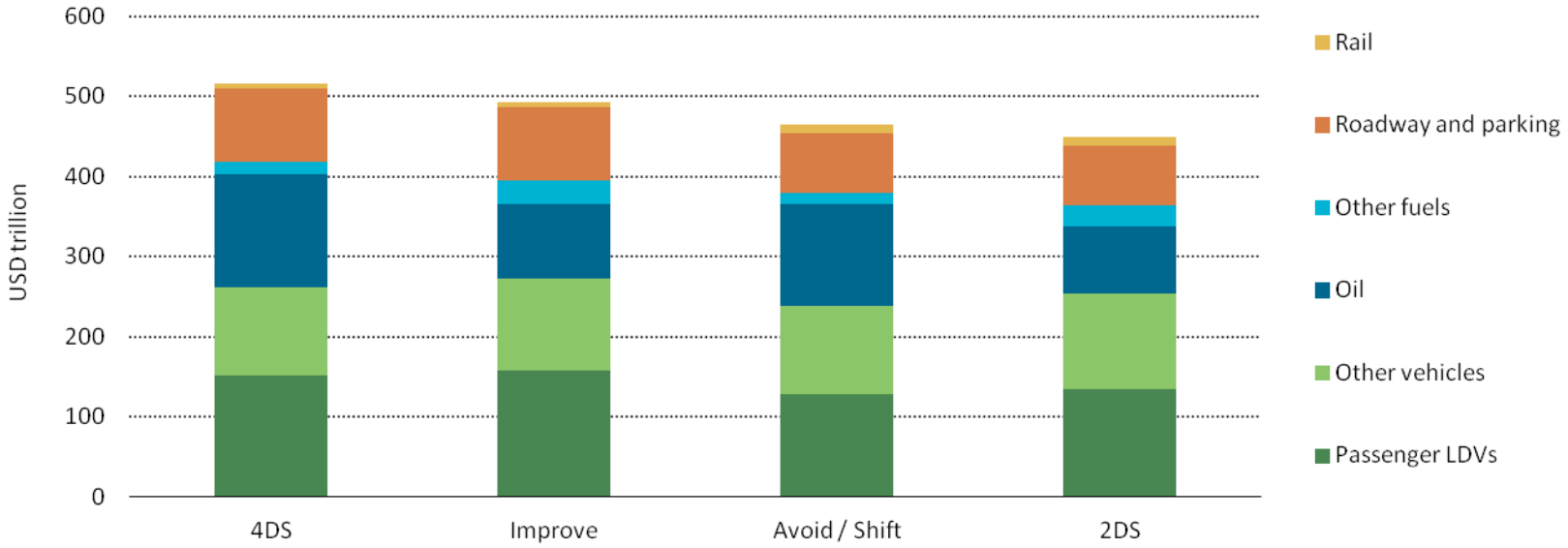


Avoid-Shift-Improve strategy in the transport sector

- Avoid/Shift contribution to lowering GHG emissions is modest when low-carbon technologies are widely implemented



Cumulative transport costs, 2010-2050



Transport sector investments are projected to reach more than ***USD 500 trillion in the 4DS*** *– or about 8% of global GDP (in real terms).*

The Improve *case greatly reduces expenditures on fuels, whereas the* Avoid/Shift *case cuts down on net infrastructure investments and vehicle costs.*

In an* Avoid/Shift and Improve *case* (2DS), *cumulative transport investments are reduced by more than USD 65 trillion (in real dollars).

ETP 2012 spendings Projections

(In USD Trillions)	4DS		2DS	Change
	2010-2020	2010-2050	2010-2050	
Vehicles	40	261	253	-8
Fuels	30	156	110	-46
Infrastructure	23	99	85	-14
Total	**93**	**516**	**448**	**-68**

Shifts in investments in 2DS include increased rail, high-speed rail (HSR) and bus-rapid transit (BRT) expenditures. However, net reductions in passenger vehicles, road, parking and fuel expenditures produce significant savings of nearly USD 68 trillion (or 13% over 4DS investments).

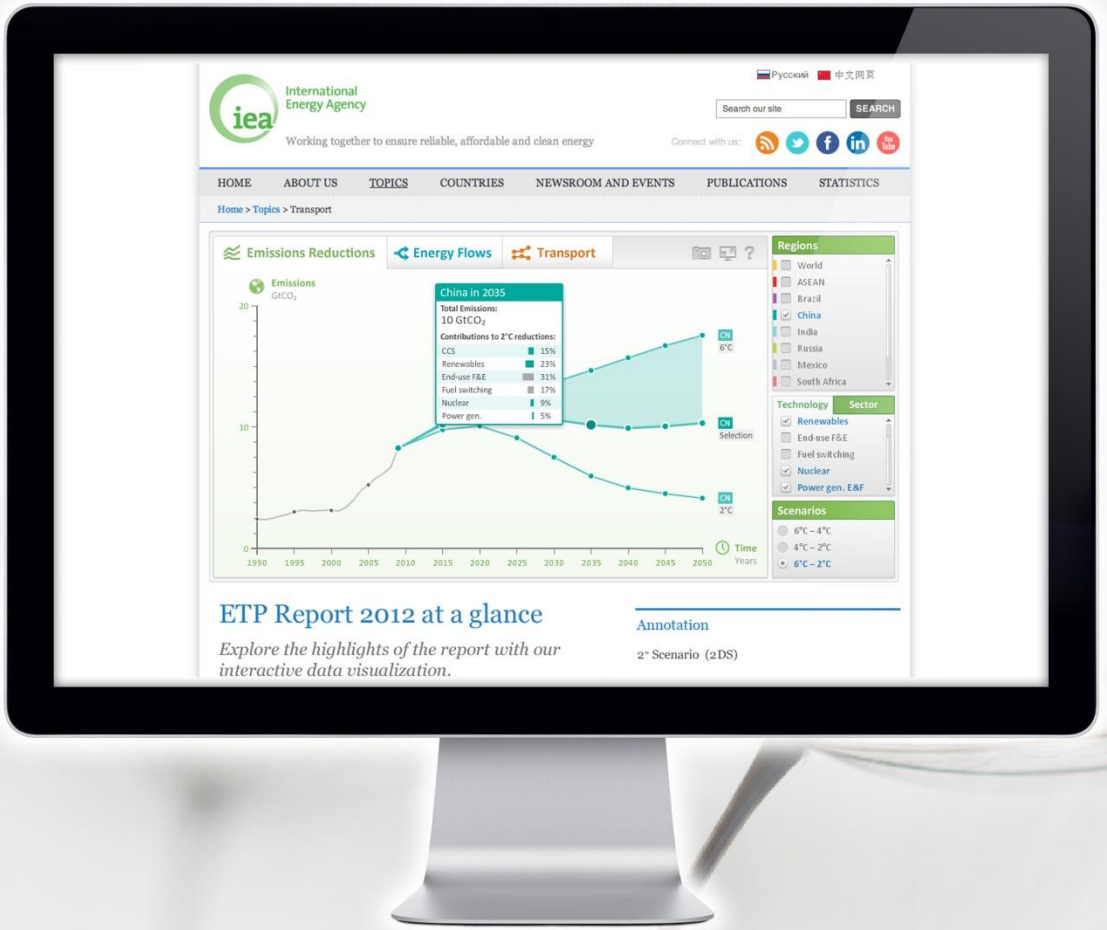
Potential future opportunities related to sustainable transportation

- RIO+20 Voluntary Commitments
  - The IEA has been involved in 5 of the 18 transport-related Rio+20 VCs
  - IEA methodology and tools could help assess the potential impact of the announced $175b Commitment to Sustainable Transport by 8 MDBs
    - On energy use
    - GHG emissions
    - Pollutant emissions
  - Other impacts may also be studied in conjunction with others

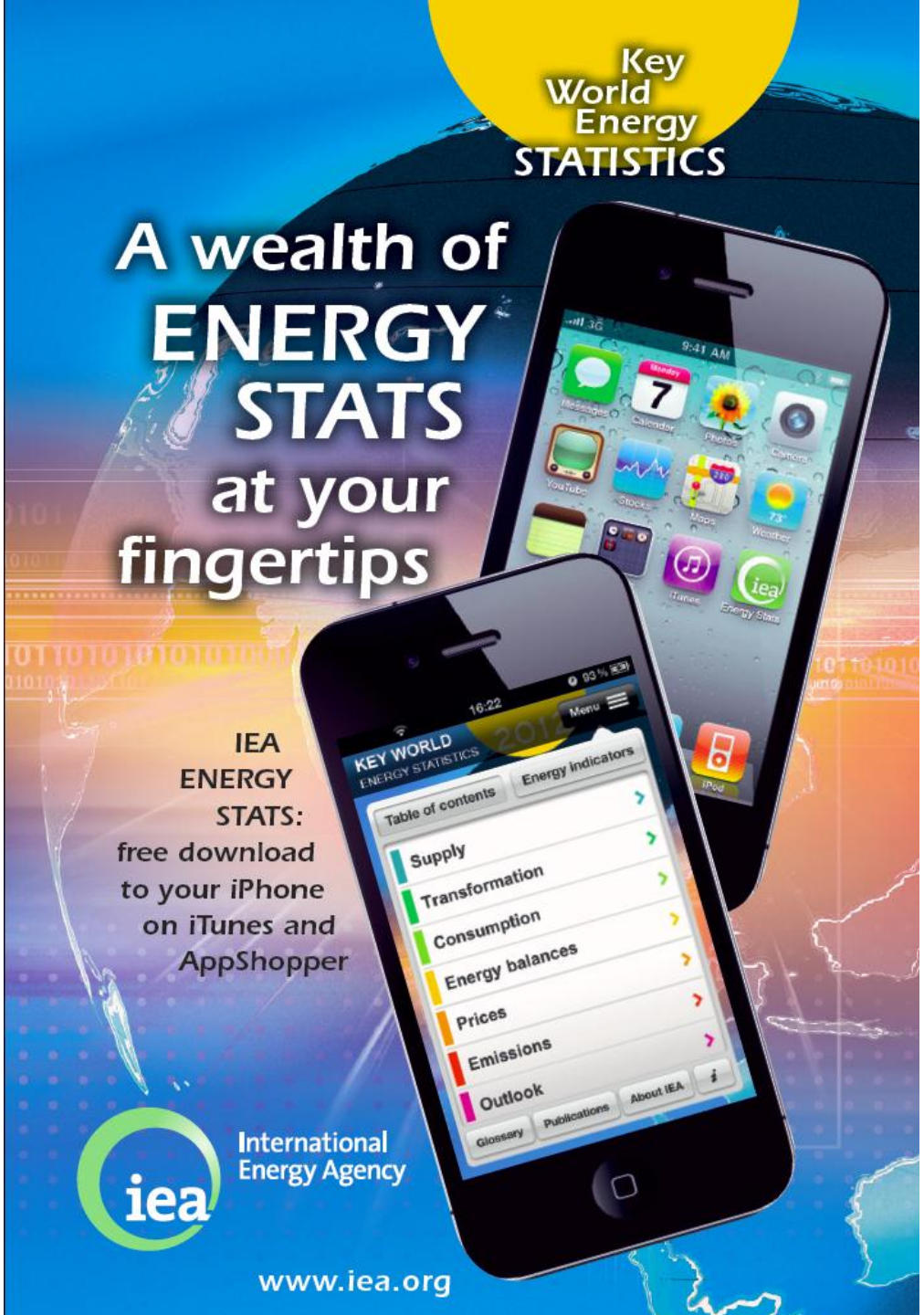
Conclusions

- Data key to assessing transport sector's future
- Gathering and collecting data is labour intensive and costly
- IEA is continuously seeking partnerships with other institutions, such as through the ADB-led Global Transport Intelligence (GTI)
- Transport on a positive path with many initiatives becoming reality!

Explore the data behind *ETP*



www.iea.org/etp



International Energy Agency

THANK YOU!

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Backup Slides

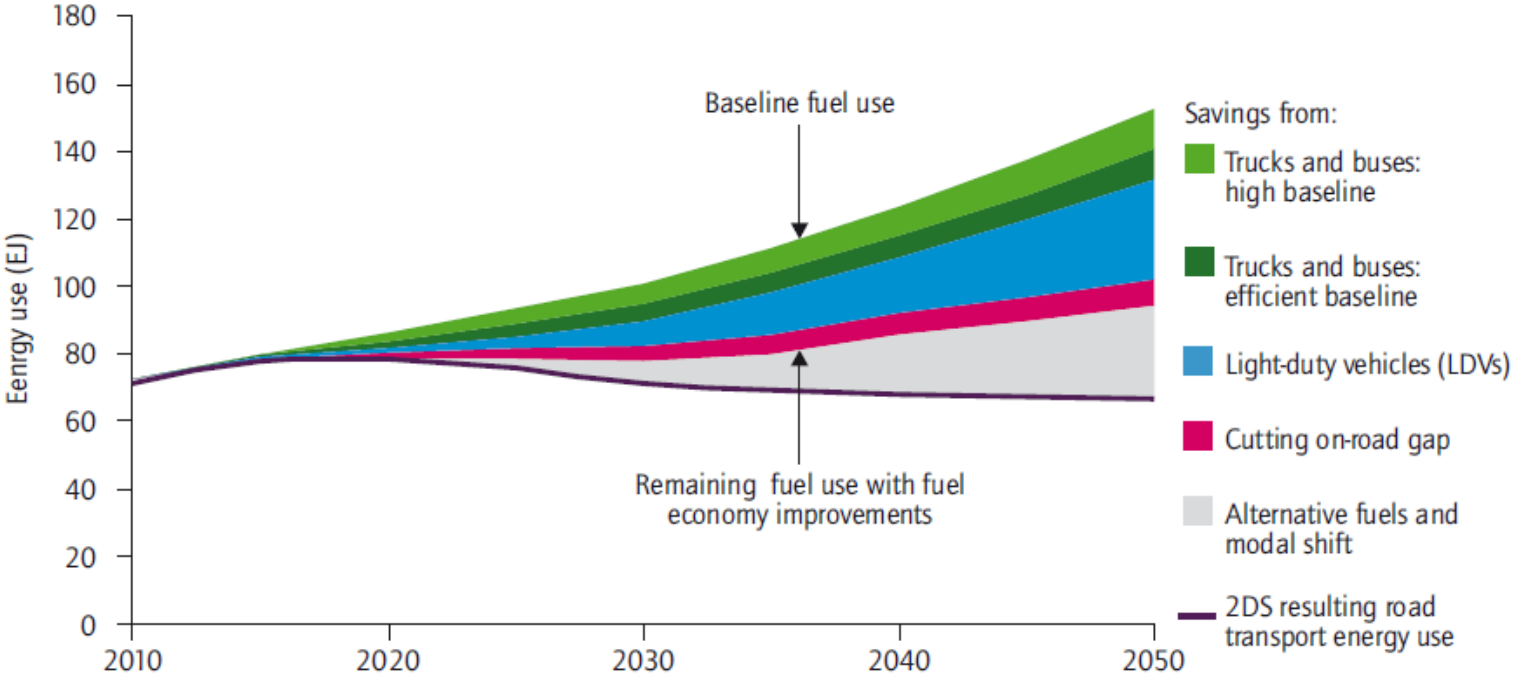
ETP 2012 key messages

Electric and Advanced Vehicles

- IEA believes these will have to play a major role in reaching low CO_2 levels, especially after 2020…
- … fuel economy is the low-hanging fruit, which is cost-effective today
- Sales of LEVs ramp-up must begin now in order to reach long term targets
  - Battery costs and characteristics remain the key technical issue, but for how long?
- Will we need fuel cell vehicles, H2?
  - This may also depend on batteries

Fuel efficiency in road transport

- ETP 2012 calls for CO_2 cuts to 50% below 2009 levels by 2050 (25% for transport)

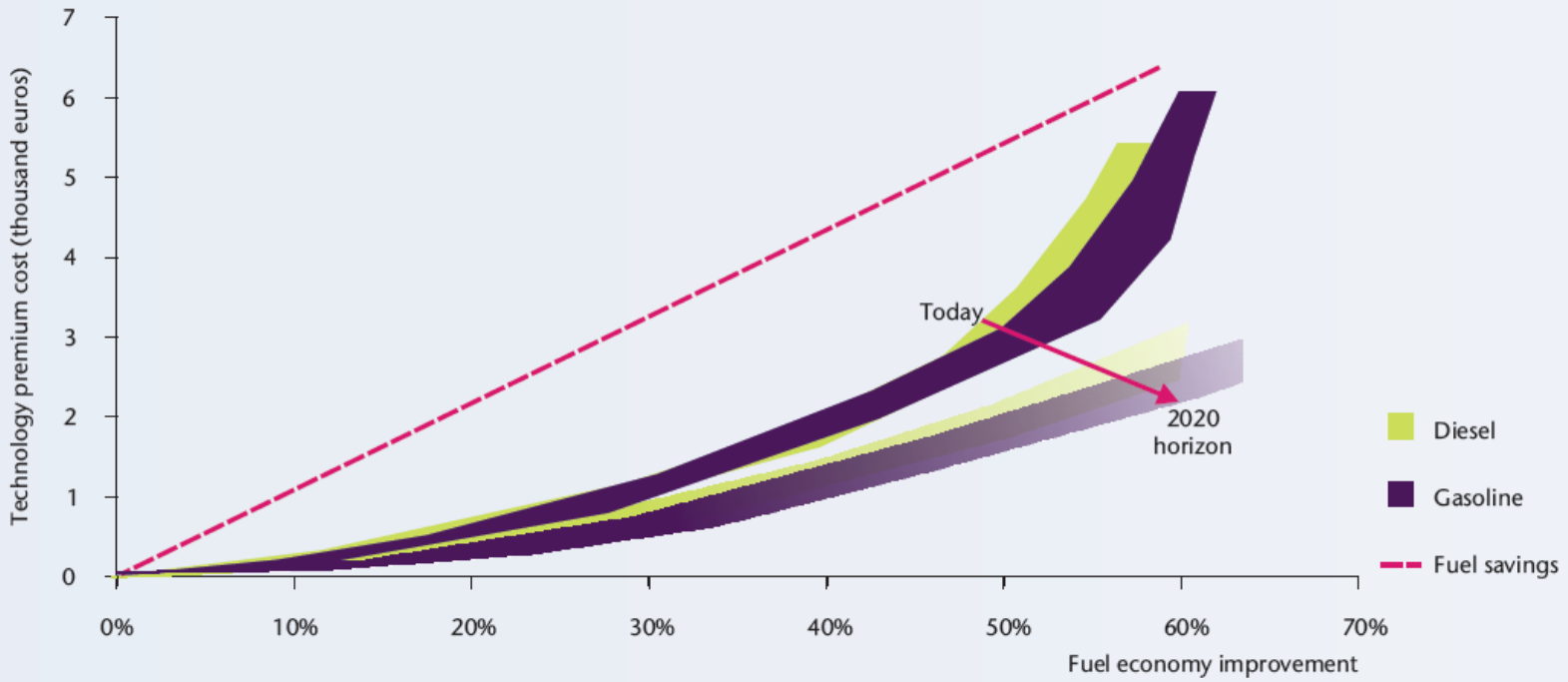


Note: two-wheelers' energy savings do not show up, as the savings are too small to be visible.

Around 50EJ could be saved due to fuel efficiency measures in road transport by 2050

Improving Fuel Economy is cost-effective

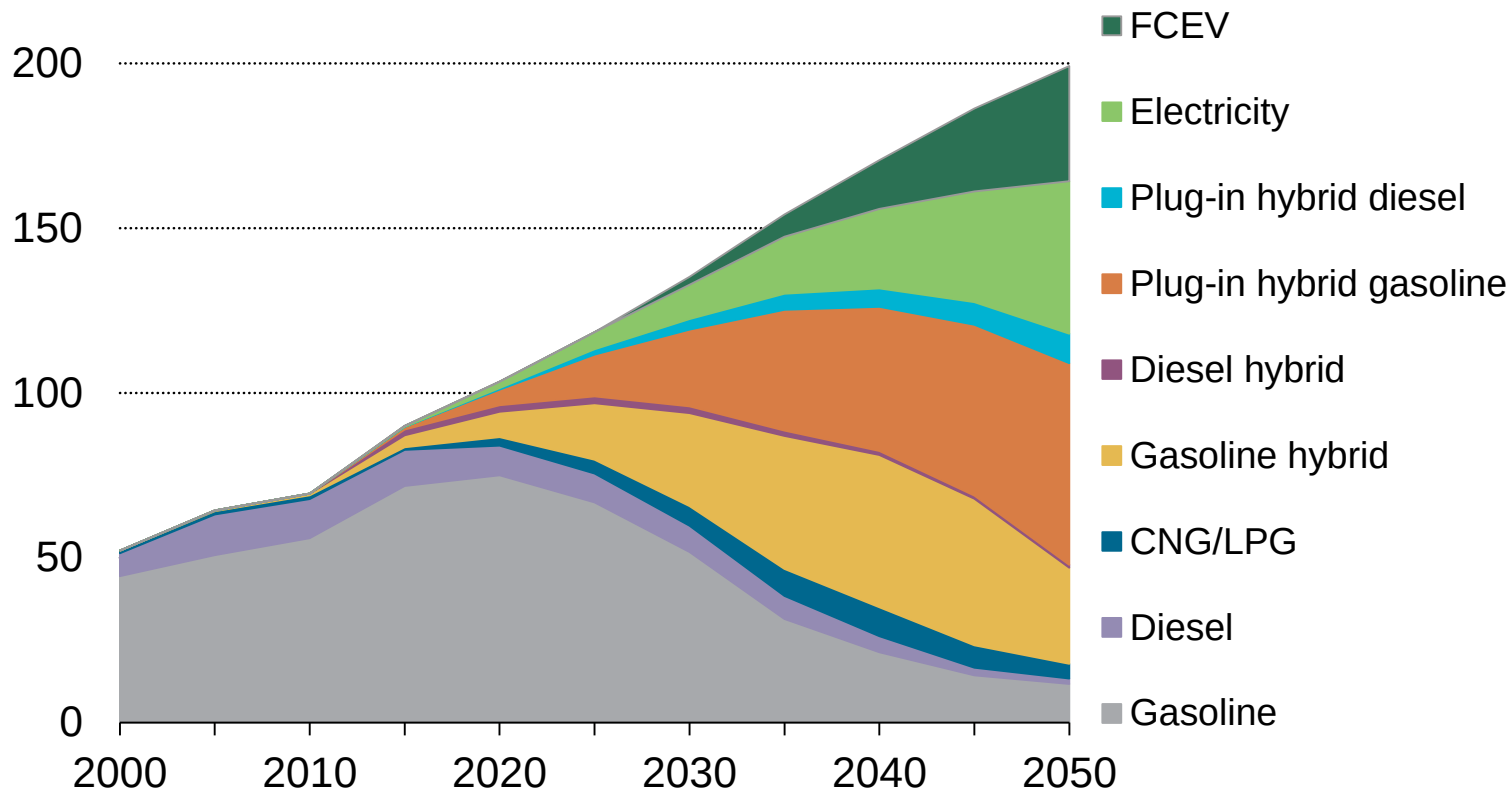
- At an additional USD 3000 vehicle costs, fuel consumption could be cut by half



Source: IEA analysis based on TNO, 2009 and ICCT, 2012.

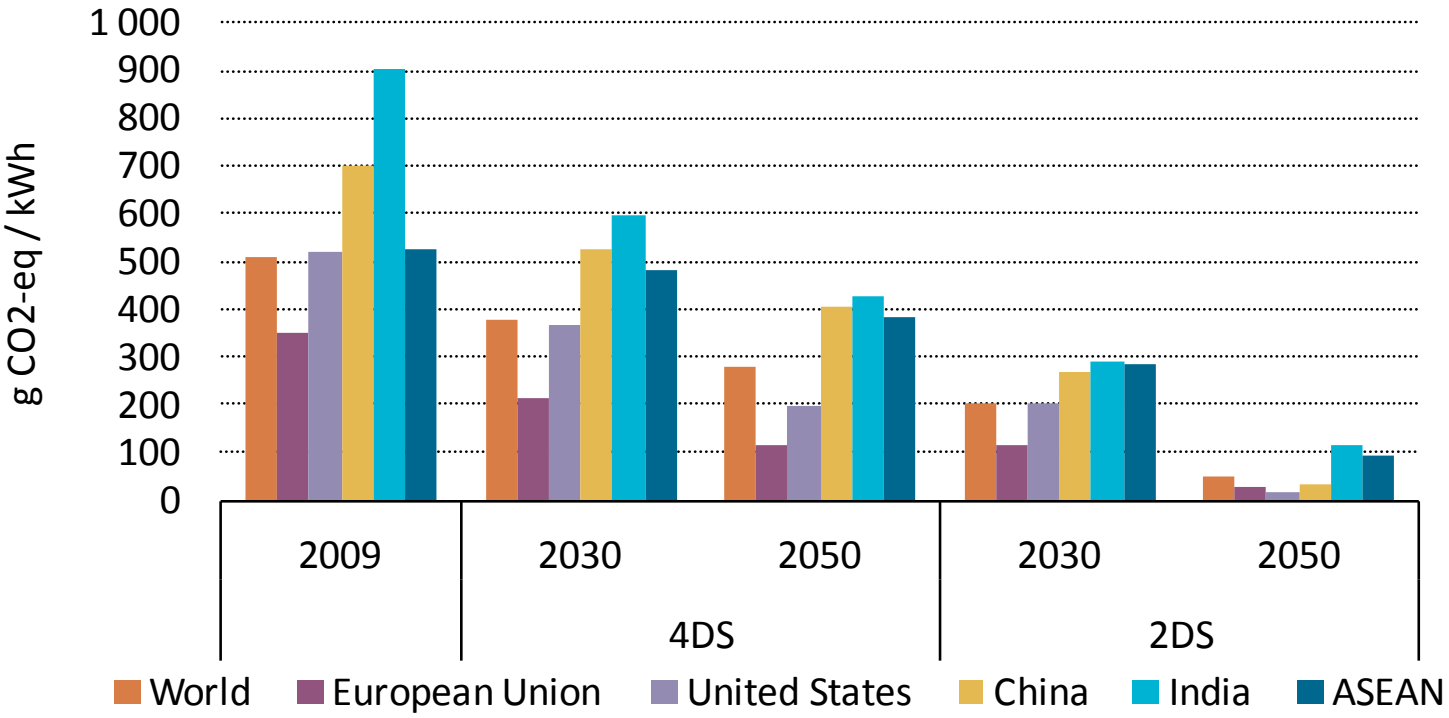
Note: Fuel savings over the lifetime of the vehicle are calculated based on 150 000 kms, for a base fuel economy of 8L/100km, with a fuel price of EUR 1 per litre (USD 4.7 per gallon), with no rebound effect as fuel economy improves.

Electric vehicles need to come of age



More than 75% of light duty vehicles (sales) need to be propelled by an electric motor in 2050

In the 2DS, electricity becomes a near zero carbon fuel by 2050

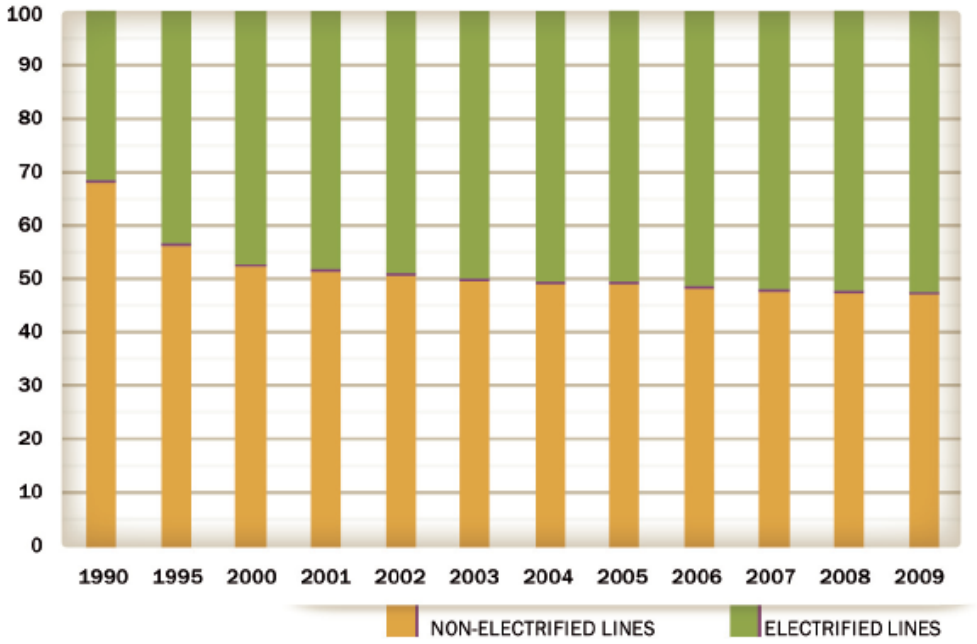


Carbon intensity drops by 90% by 2050 in the 2DS .

Electrification of the transport sector

- Rail to play a lead role?
- Globally, 2/3 of the energy supply of the rail sector comes from oil
- Cost-effective within years
- In Europe, half of the lines not electrified

Fig.20: Share of electrified versus non-electrified railway lines, 1990-2009
(% of track-km)

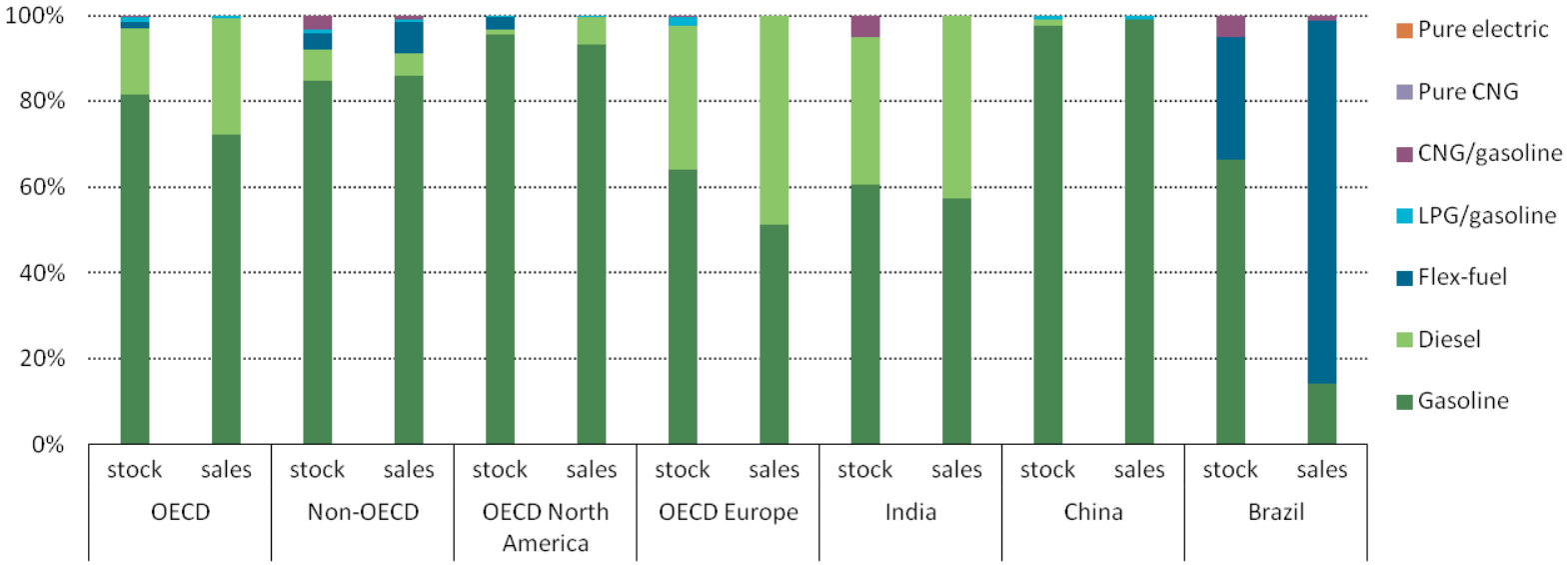


FCEVs – Prospects and Barriers

- FCEVs might be necessary to reach 2DS in the long term – especially when over-reliance on biofuels should be avoided.
- Fuel cell stack costs and on-board storage costs need to come down significantly
- The lack of H2 infrastructure is a major barrier for H2 roll-out due to chicken and egg problem: FCEVs and refilling infrastructure need to be rolled out at the same time causing underutilized infrastructure and associated higher risks on investment
- State of the art:
  - Currently around 650 FCEVs and 200 stations world-wide
  - Some car manufacturers claim to commercialise FCEVs by 2015 but this seems to be very optimistic

Gasoline and diesel vehicles dominate sales and stock of passenger LDVs in most major markets.

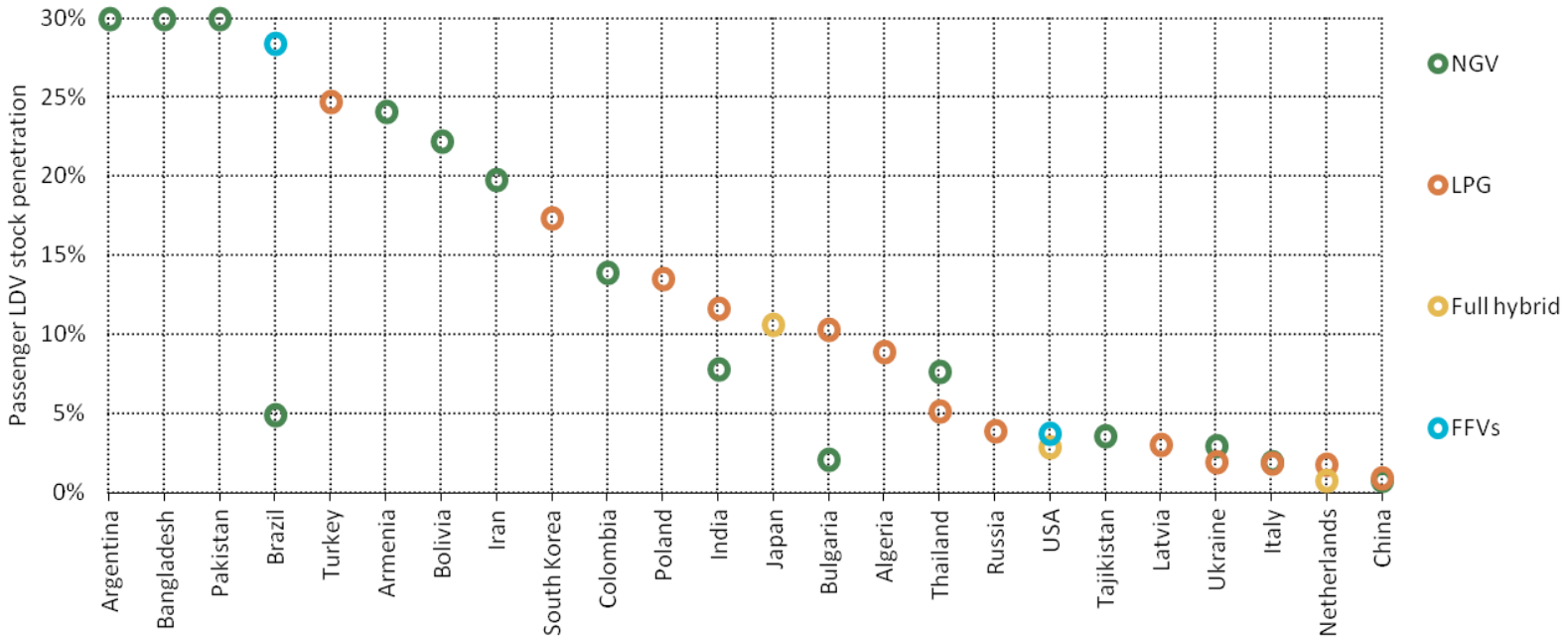
Passenger LDV sales and stock shares by technology for selected countries and regions, 2010



Source: IEA MoMo

Alt-fuel vehicle shares surprisingly high in some countries

- Countries with major share of alternative technologies have specific policies in place promoting those technologies



Source: ETP 2012

International Energy Agency

Fuel Economy Initiative

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The Global Fuel Economy Initiative (GFEI)

- Launched on 4 March 2009 in Geneva by IEA, ITF, UNEP, and the FIA Foundation

FIA Foundation
for the Automobile and Society

International Transport Forum

UNEP

- GOAL: reduction in vehicle fuel consumption per km of 50% by 2050 (for the vehicle stock) compared to 2005
  - Roughly equivalent to a 50% reduction by 2030 for new sales, worldwide
  - Requires an average improvement 3% per year for 25 years!
- Four main activity areas:
  - Analysis of global fuel economy trends and potential
  - Outreach to governments, assistance in policy development
  - Outreach to stakeholders, dialogue to improve coordination
  - Information campaigns

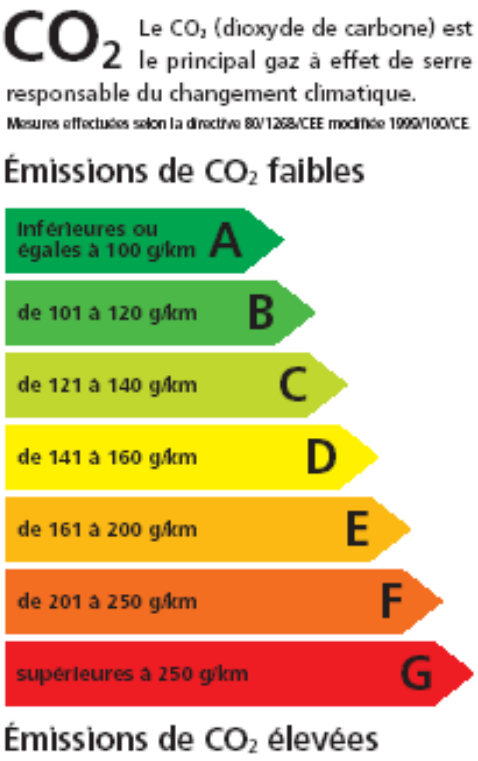
GFEI Analysis

The global average was about 8 L/100km in 2005. It improved to below 7.7 in 2008. But the rate of change was well less than that needed to hit GFEI targets.

		2005	2008	Annual Change 2005-2008
Fuel Economy (lge/100km)	Global Average	8.04	7.65	-1.6%
	GFEI Objective	8.04	4.02	-2.7%
		2005	2030	Required Annual Change 2005-2030

France's "Bonus/Malus"

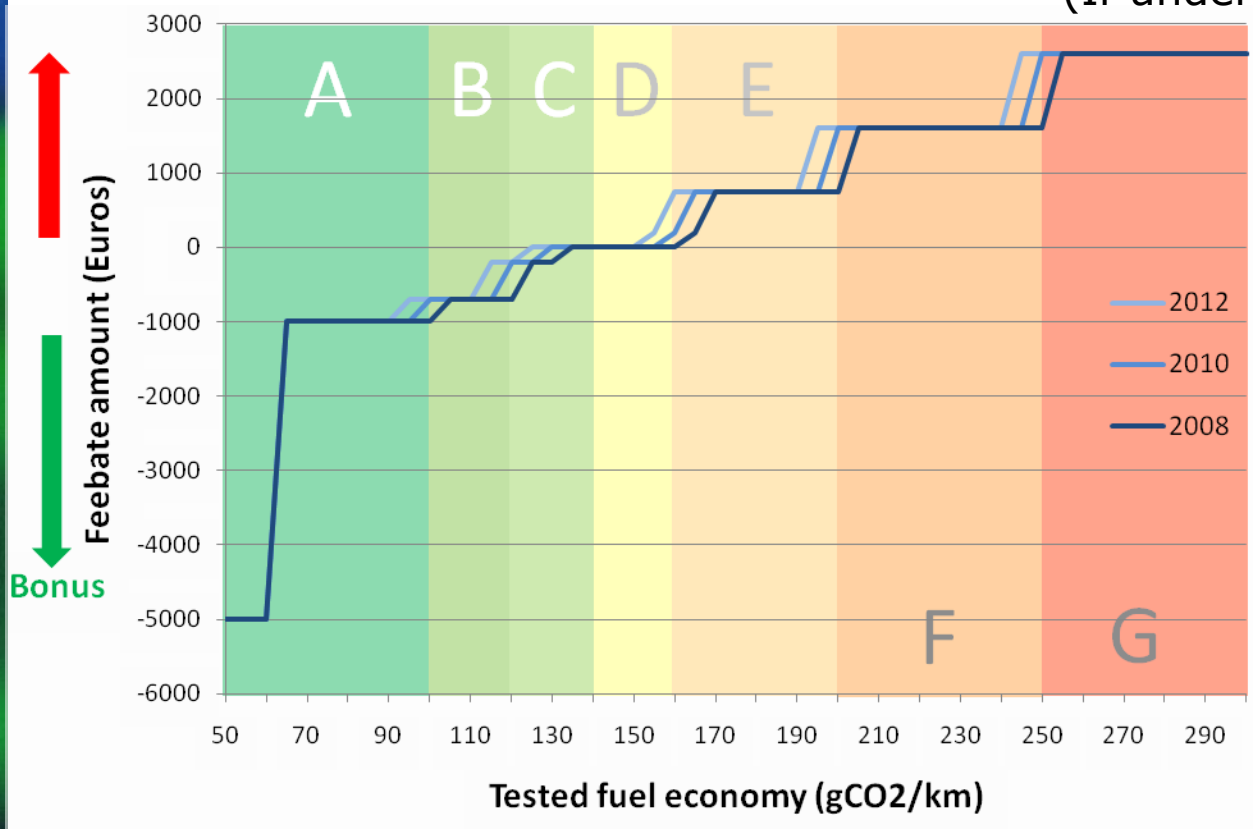
- Since 2006, car labeling for new vehicles is compulsory at dealerships
- Label value based on NEDC test cycle fuel economy
- Political commitment after the « Grenelle de l'environnement »
- French OEMs good at small diesel cars



The original Bonus/Malus

- It was announced in Sept 2007, to start in January 2008, designed to be revenue neutral
- -5gCO2/km every 2 years
- Special Bonus for hybrids and LPG : 2000 €

(If under 110 gCO2/km)



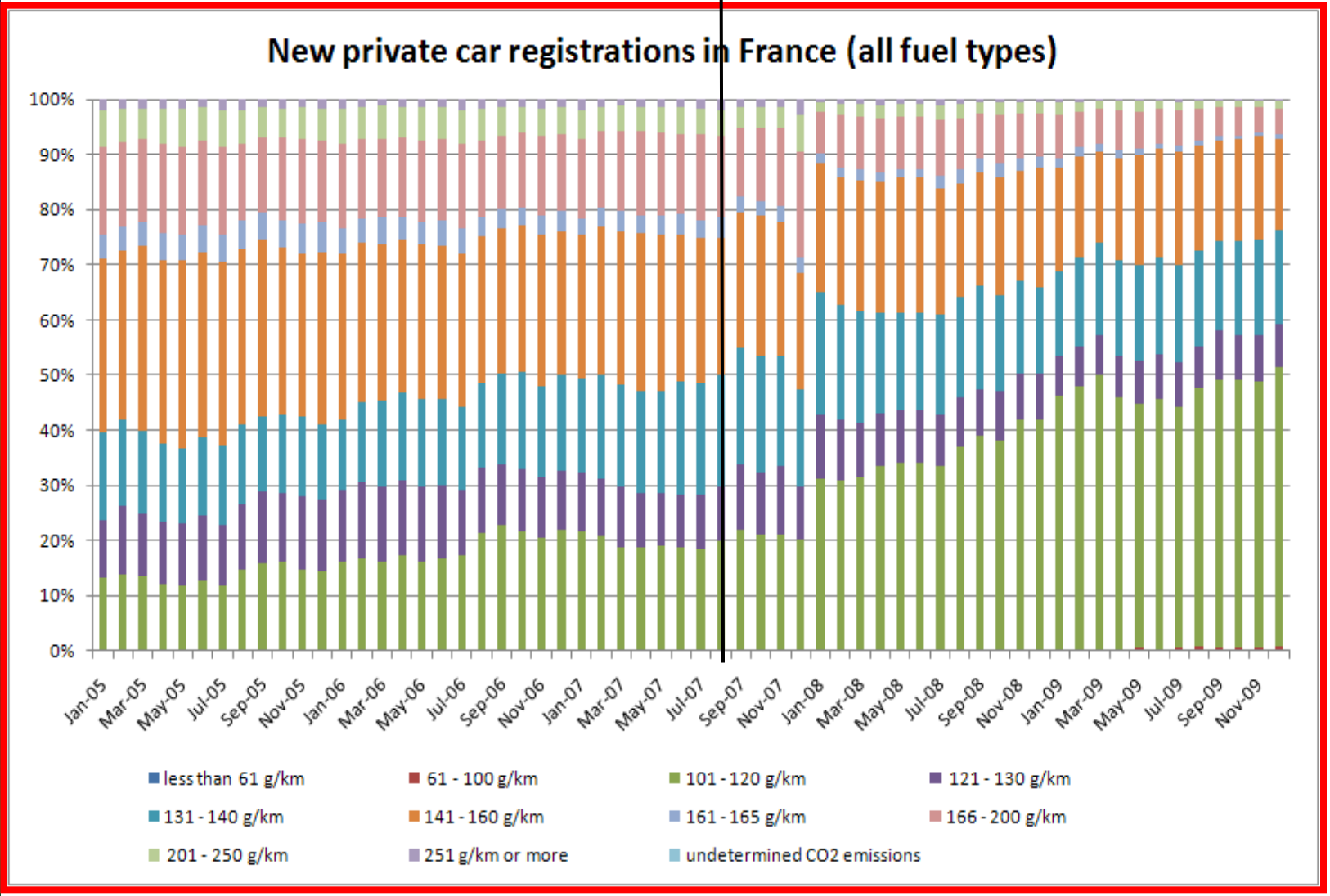
	CO2, g/km	Barème, €
Malus	>250	2600
	De 201 à 250	1600
	De 166 à 200	750
	De 161 à 165	200
	De 131 à 160	0
Bonus	De 121 à 130	200
	De 101 à 120	700
	De 61 à 100	1000
	<60	5000

Source : Code Général des Impôts

Impact on sales

Introduction of bonus/malus Jan 2008

- Immediate and lasting



Bonus/Malus conclusions

- Bonus/Malus had an immediate and substantial effect on consumer purchase behavior (was not considered a new tax)
- Information (labels) was already well installed
- Mid term visibility of feebate evolution great asset for OEMs; better product planning
- Economic neutrality difficult to reach: design prior to feebate launch key to success
- France has Europe's most efficient new vehicle fleet (2009) as number of vehicle models meeting the standards steadily increased

International Cooperation: Electric Vehicles Initiative (EVI)

www.iea.org

Electric Vehicles Initiative

- Initiative announced at the Clean Energy Ministerial in Washington DC, July 2010
  - Kick-off meeting was held in Paris 29 Sept/1 Oct 2010
- 15 countries: China, Denmark, Finland, France, Germany, India, Italy, Japan, Netherlands, Portugal, South Africa, Spain, Sweden, United Kingdom, United States
  - Together these countries account for about 80% of world's vehicle demand, probably most of EV sales in coming years
- International Energy Agency serves in a facilitator role
- Three primary objectives:
  - Common data collection/analysis efforts
  - Greater RD&D collaboration
  - City forum that links cities within EVI countries (e.g., City Casebook)
- Recent events: Pilot Cities conference in Shanghai, April 2011
- Upcoming Event: EVI Meeting in Stuttgart (tbc), October 2012

Electric Vehicles Initiative

Projected electric and plug-in hybrid vehicle sales through 2020, based on national targets

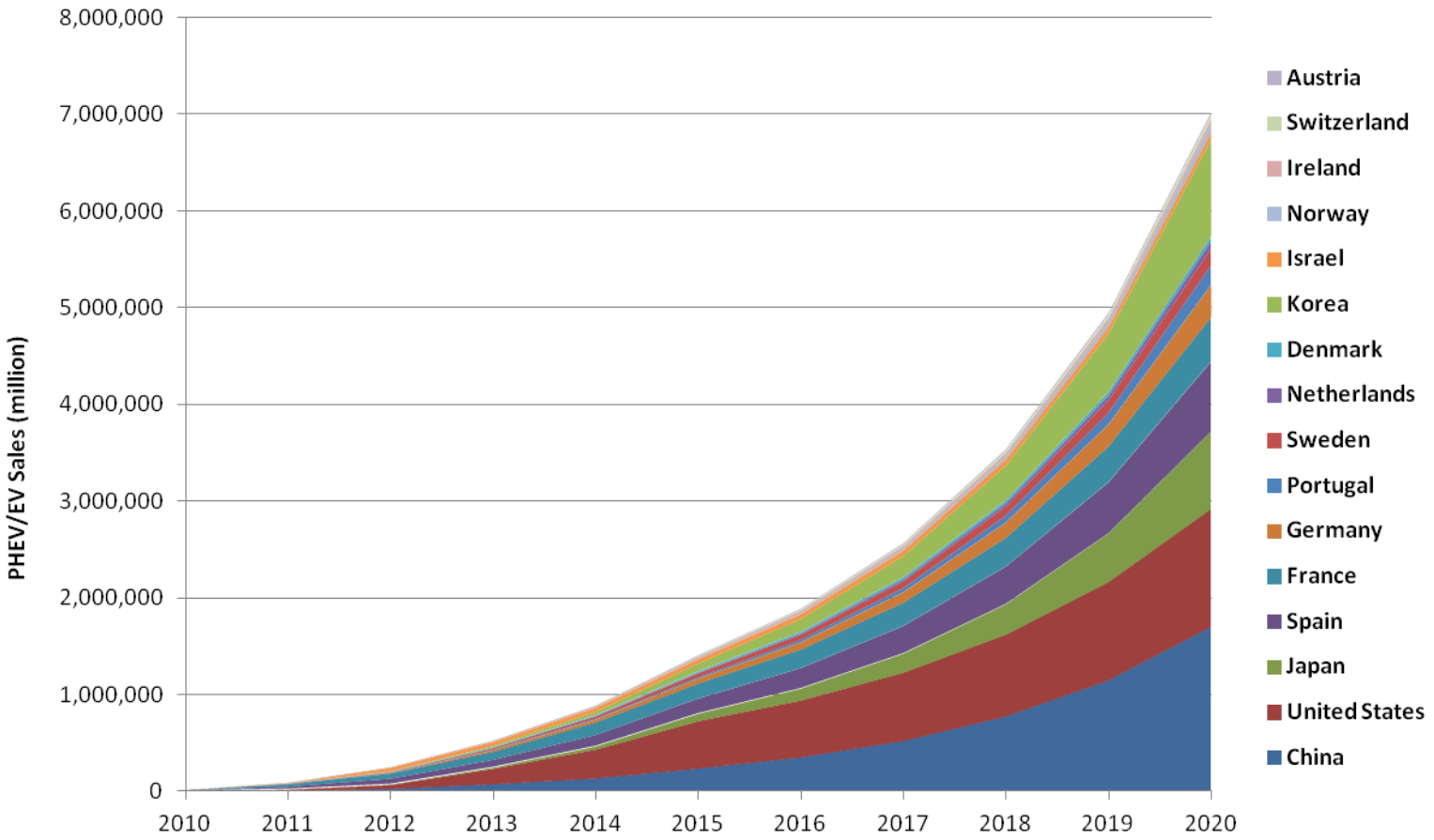


Figure based on announced national sales and stock targets, with assumed 20% annual sales growth after target is met, if target is before 2020 (e.g. China's target is for end of 2011).

Electric Vehicles Initiative

Projected electric and plug-in hybrid vehicle stock (cumulative sales) through 2020, based on national targets

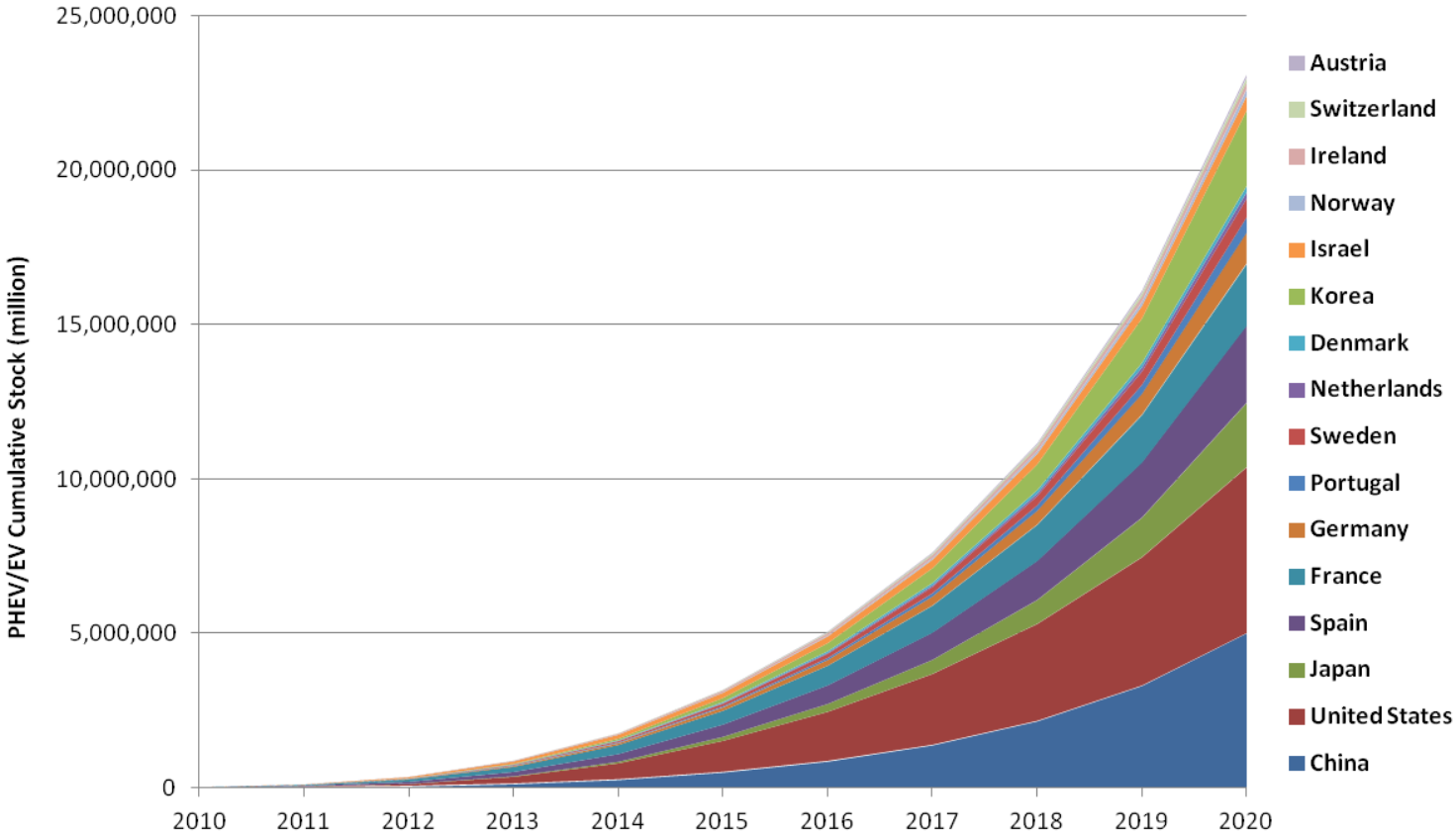
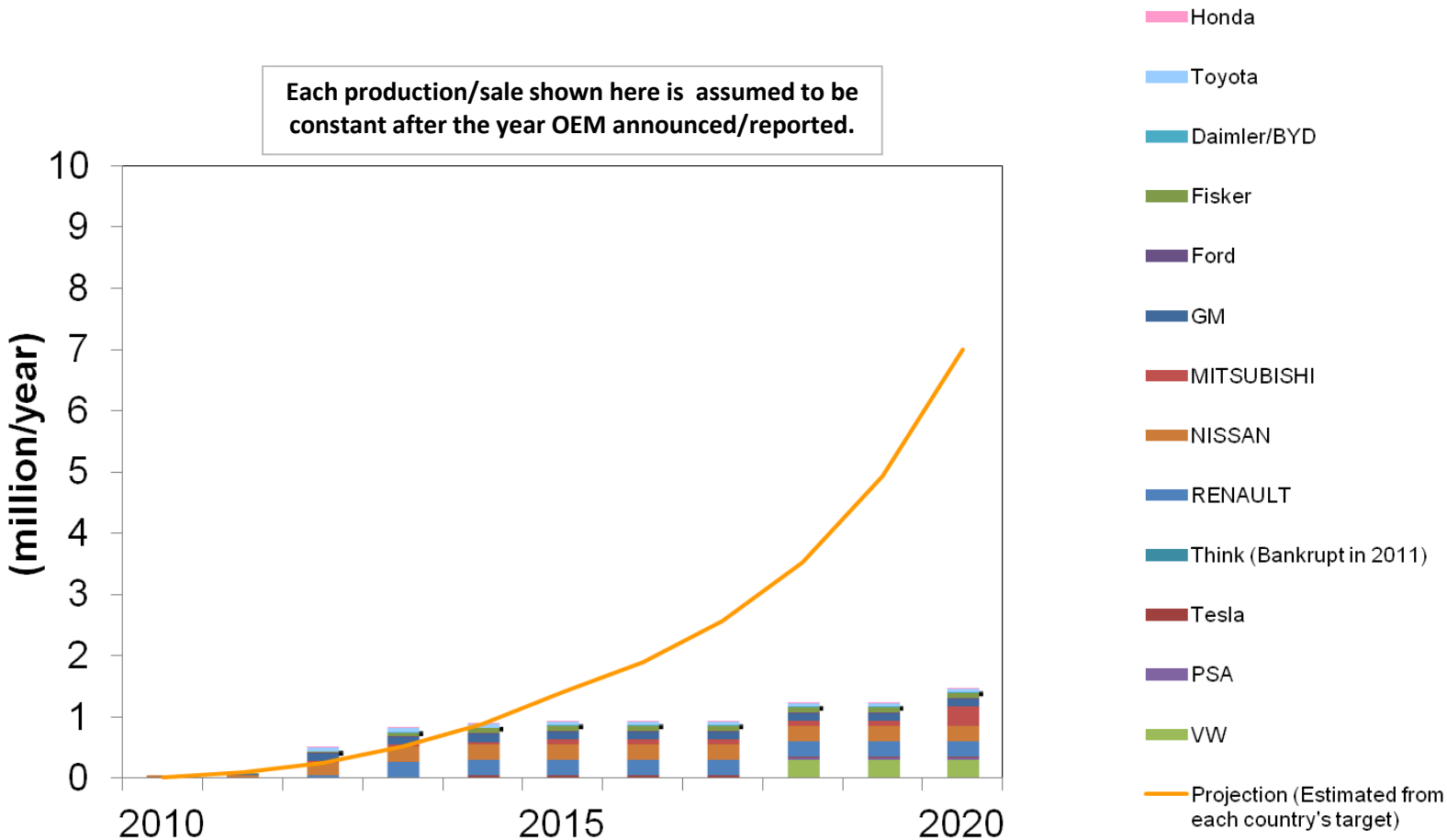


Figure based on announced national sales and stock targets, with assumed 20% annual sales growth after target is met, if target is before 2020 (e.g. China's target is for end of 2011).

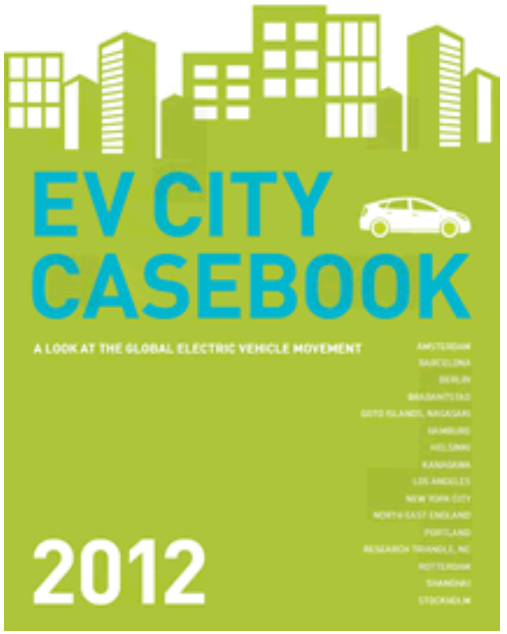
Electric Vehicles Initiative

Government Targets and PHEV/EV Production/Sales as Reported by OEMs



Electric Vehicles Initiative

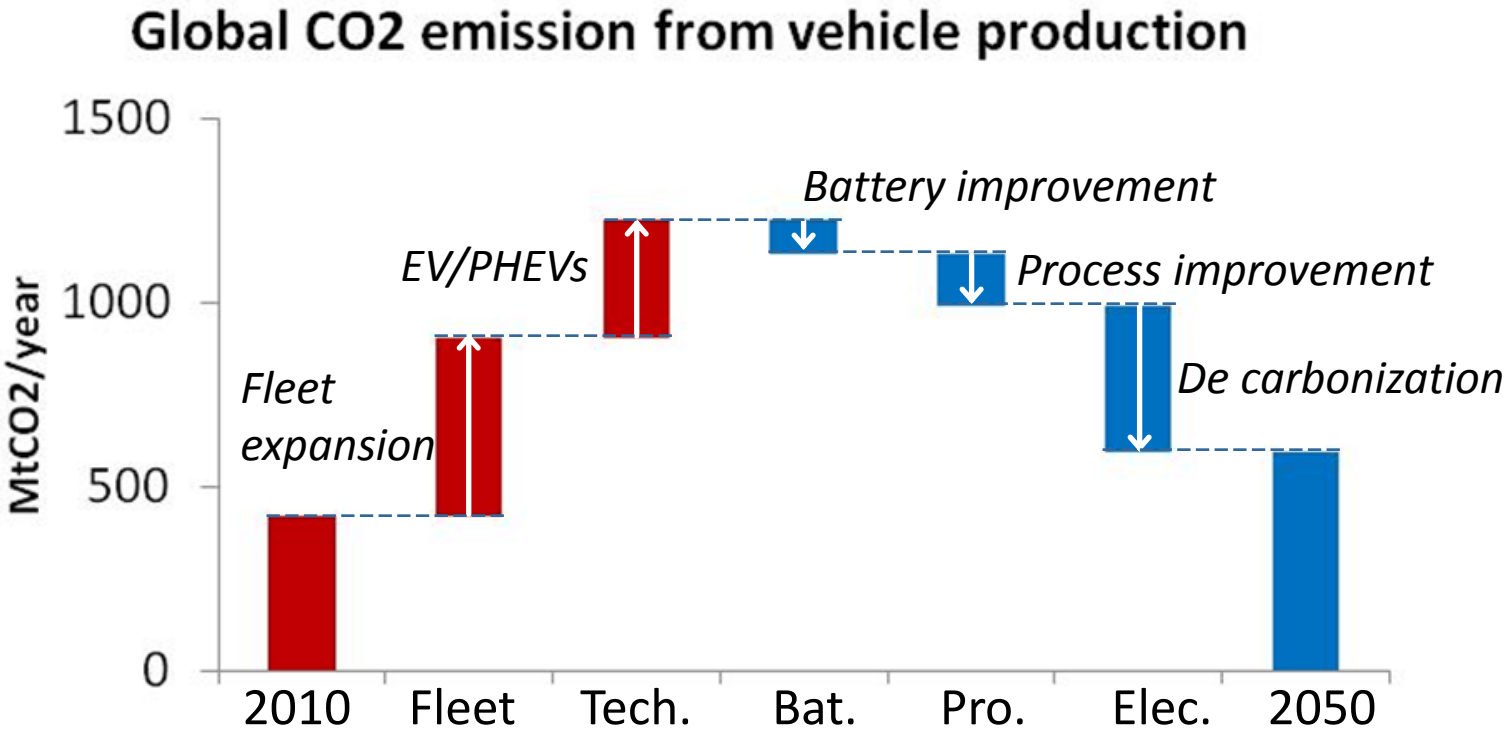
EV City Casebook



- A comprehensive look at the global EV movement detailing policies, incentives, programs, and customer behaviors in 16 cities and regions across nine countries and three continents, capturing nearly 30% of existing EVs.
- Download at www.worldevcities.org

LCA of electric vehicles

- Fleet expansion and new material (Li-ion) could emits triple CO2 in 2050 from production
- De-carbonization of electricity could play a big role



IEA Modeling of Avoid/Shift and Improve Potential

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ETP 2012 2DS (Avoid/Shift and Improve)

- Avoid: “smart growth” and modal-shifting policies to mitigate mobility needs (*e.g.* urban core development and virtual mobility)
- Shift: mode-shifting policies and investments to improve the share of the most efficient modes (*e.g.* bus, metro rail and high-speed rail)
- Improve: technology improvements that improve vehicle fuel economies, lower GHG emissions, and promote growth in alternative vehicle and fuel technologies (*e.g.* electric vehicles and low-sulfur fuels)