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SUSTAINABLE TRANSPORTATION ENERGY PATHWAYS

An Institute of Transportation Studies Program

Impacts of Used Vehicles on Climate Change and Air Polution Worldwide

Ensuring Better Air Quality and Reduced Climate Emissions through Cleaner Used Vehicles

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Key issues for today

- Why are 2nd and vehicle imports a concern?
- What is the current status and trends in global trade?
- What are different countries doing to grapple with the issue of old vehicles entering their markets?
- What policies are preferred?
- Can we reach some common agreements on basic principles regarding this issue?

Reasons for 2nd hand vehicle import/export

Import side:

- Used vehicles offer consumers car ownership at a lower cost
- Open trade policies do not restrict flows
- Regulations/fiscal policies on imports sometimes favor 2nd hand vehicles

Export side:

- Economically attractive prices relative to internal markets
- Stringent emission standards/recycling standards in exporting countries

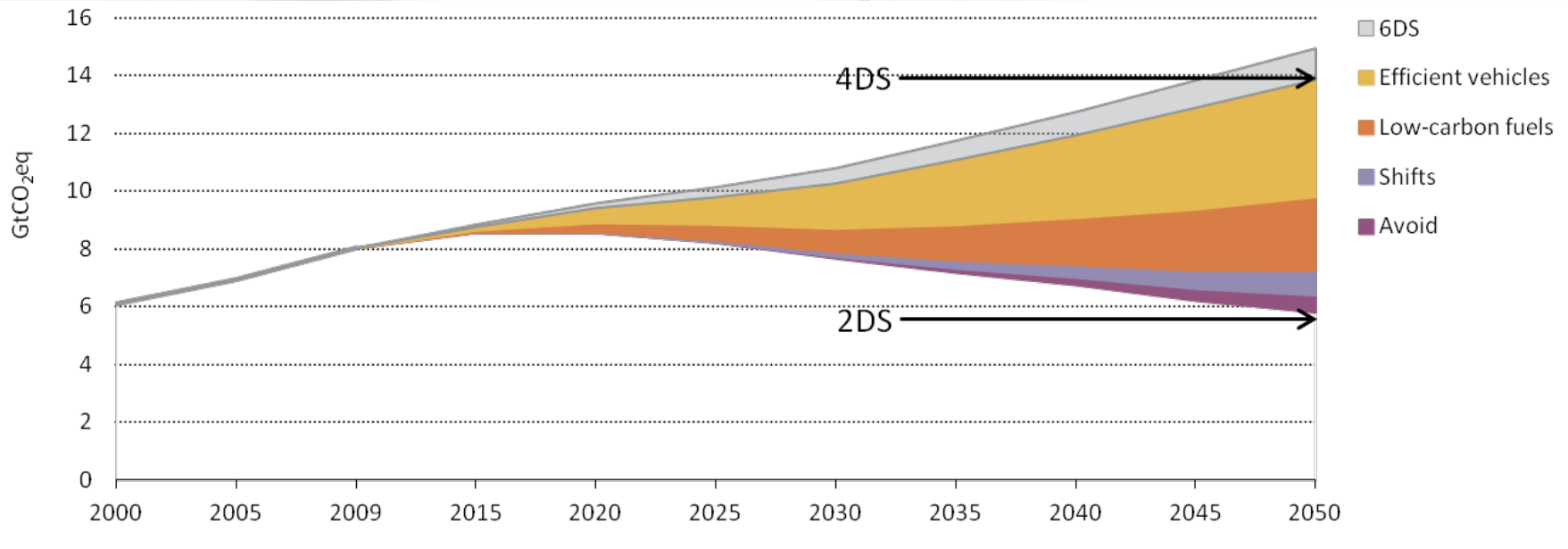
Why concerns about this trade?

Basically the spread of inferior vehicles:

- Vehicle model year highly correlated with safety (individual vehicles may also become less safe as they age)
- Strong correlation with pollutant emissions
- Rising correlation with fuel consumption/CO2 emissions
- Rising car ownership leads to increasing traffic congestion
- Oil consumption/balance of payments
- Vehicle scrappage/disposal issues

Paris Agreement: Deep Transport CO_2 Reductions Needed

- IEA 2 degree scenario may not be agressive enough



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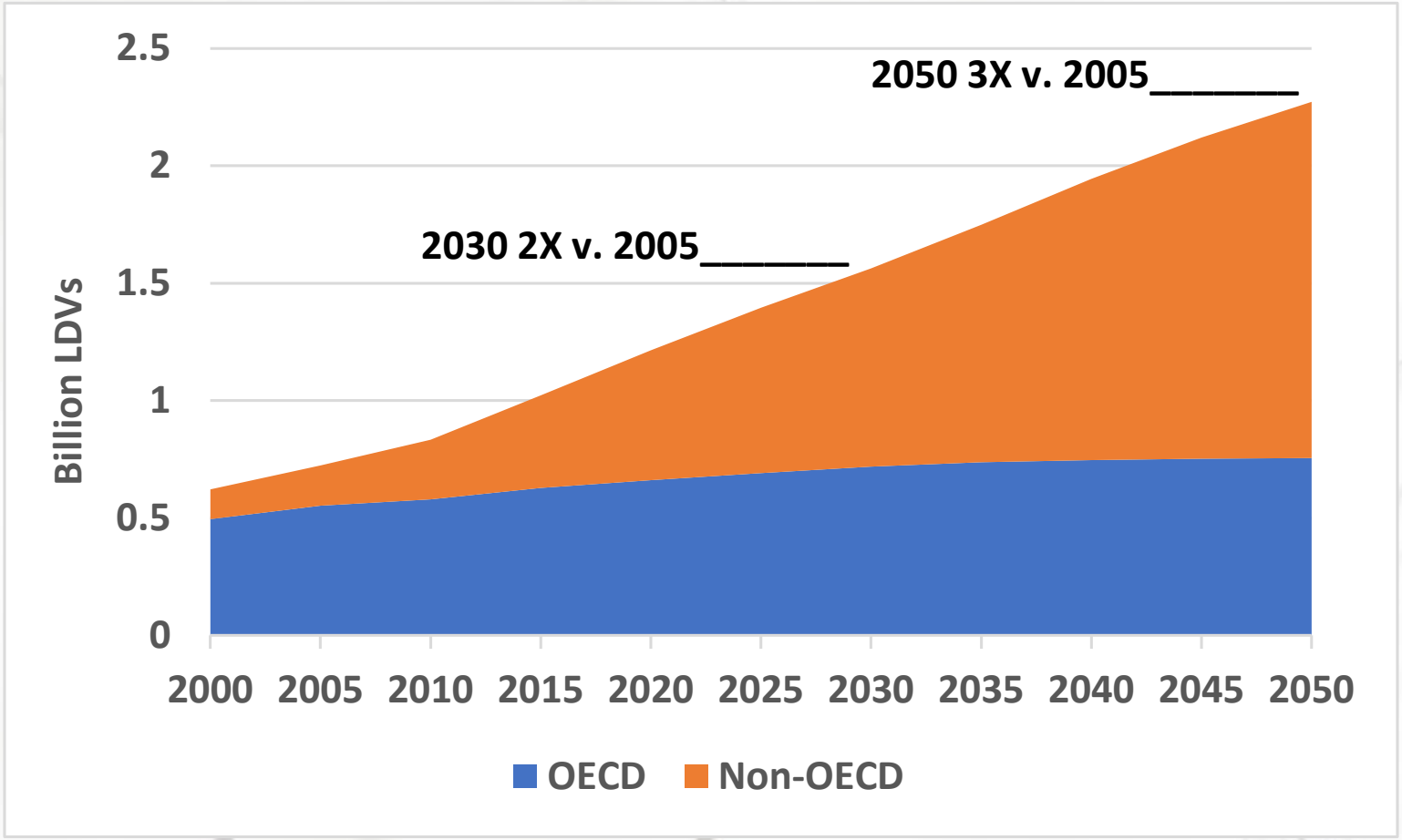
International Energy Agency

IEA ETP 2012 (and later ETPs): global light-duty vehicle stock will exceed 2 billion by 2050

- Almost all growth is in developing countries



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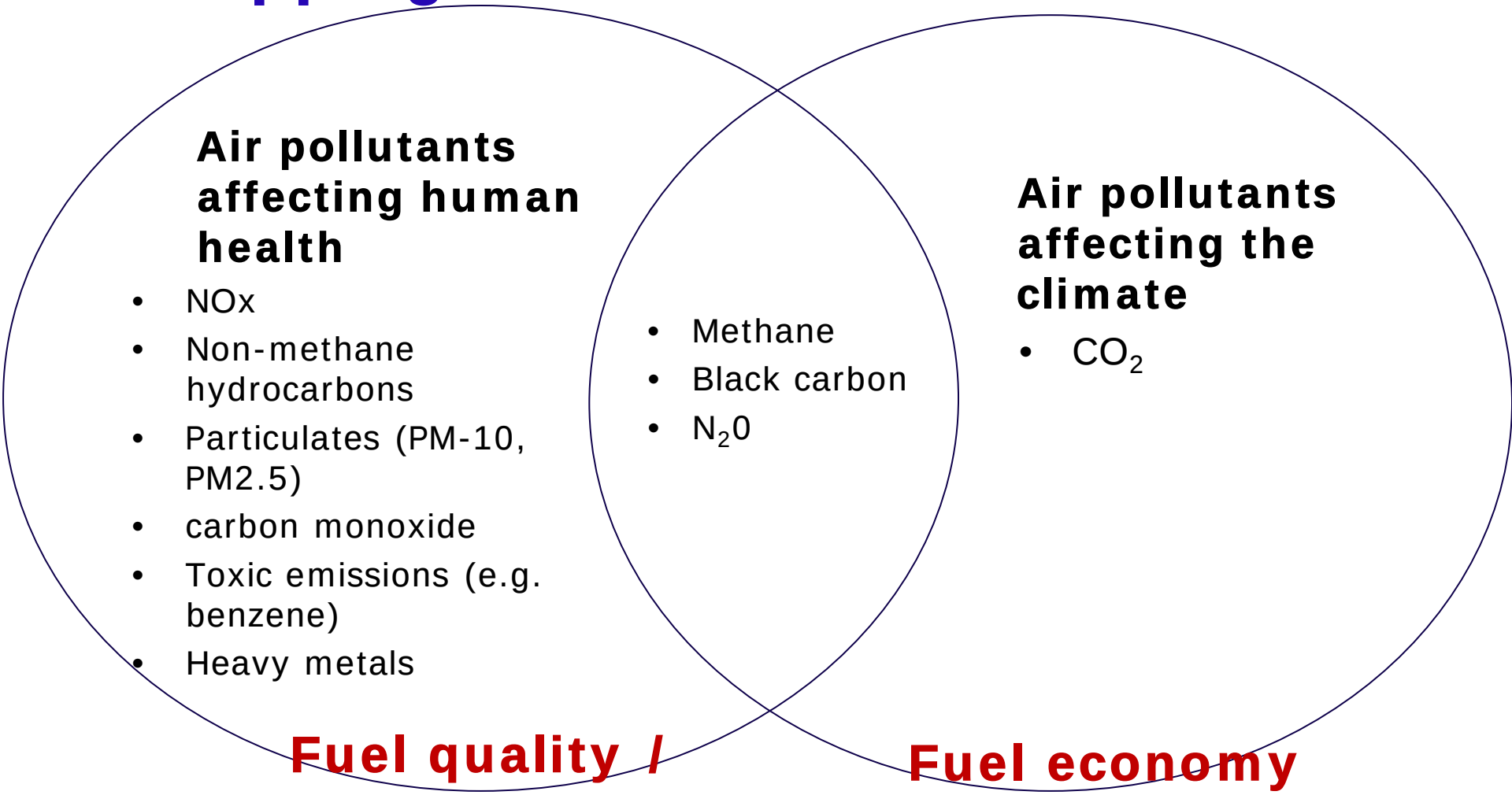
Air pollutants, CO2 – all are dropping with newer models

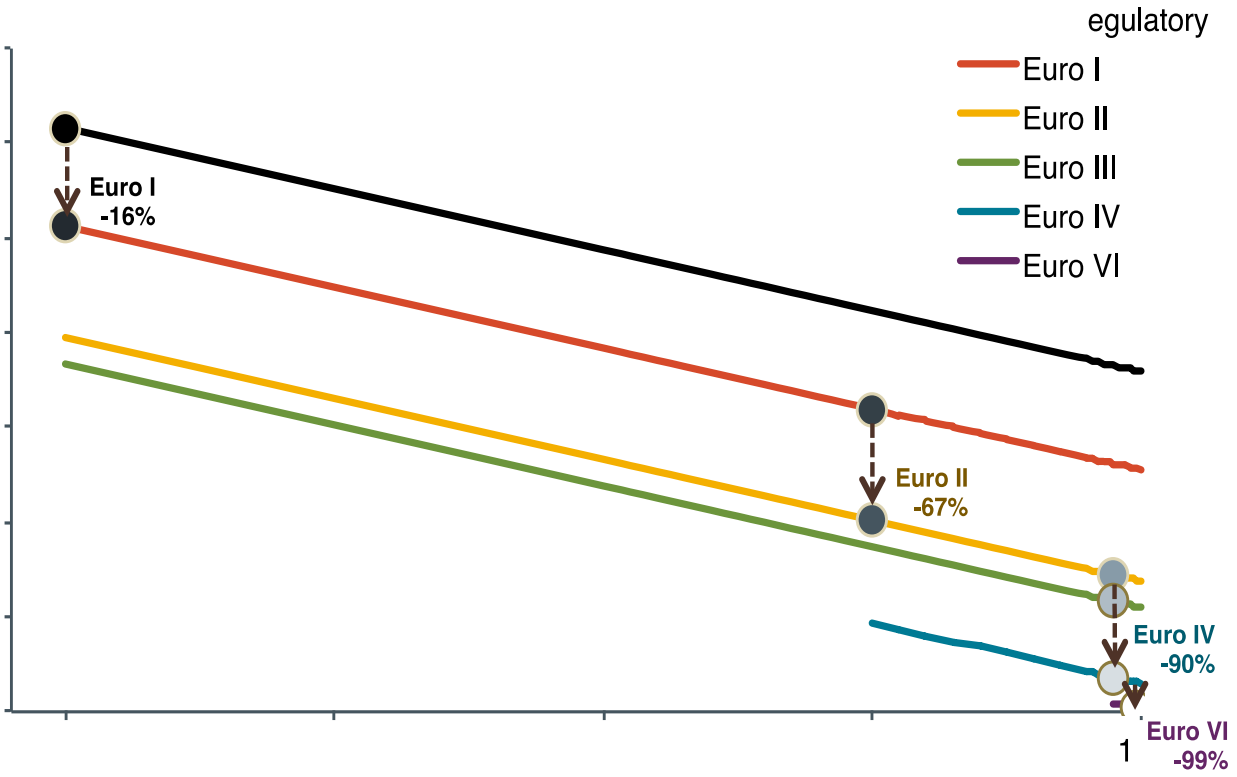


Fuel quality / tailpipe controls

Fuel economy improvement

Reducing air quality requires coordination of fuel quality and vehicle emission controls

- **PM2.5 emissions as a function of vehicle emission standards**

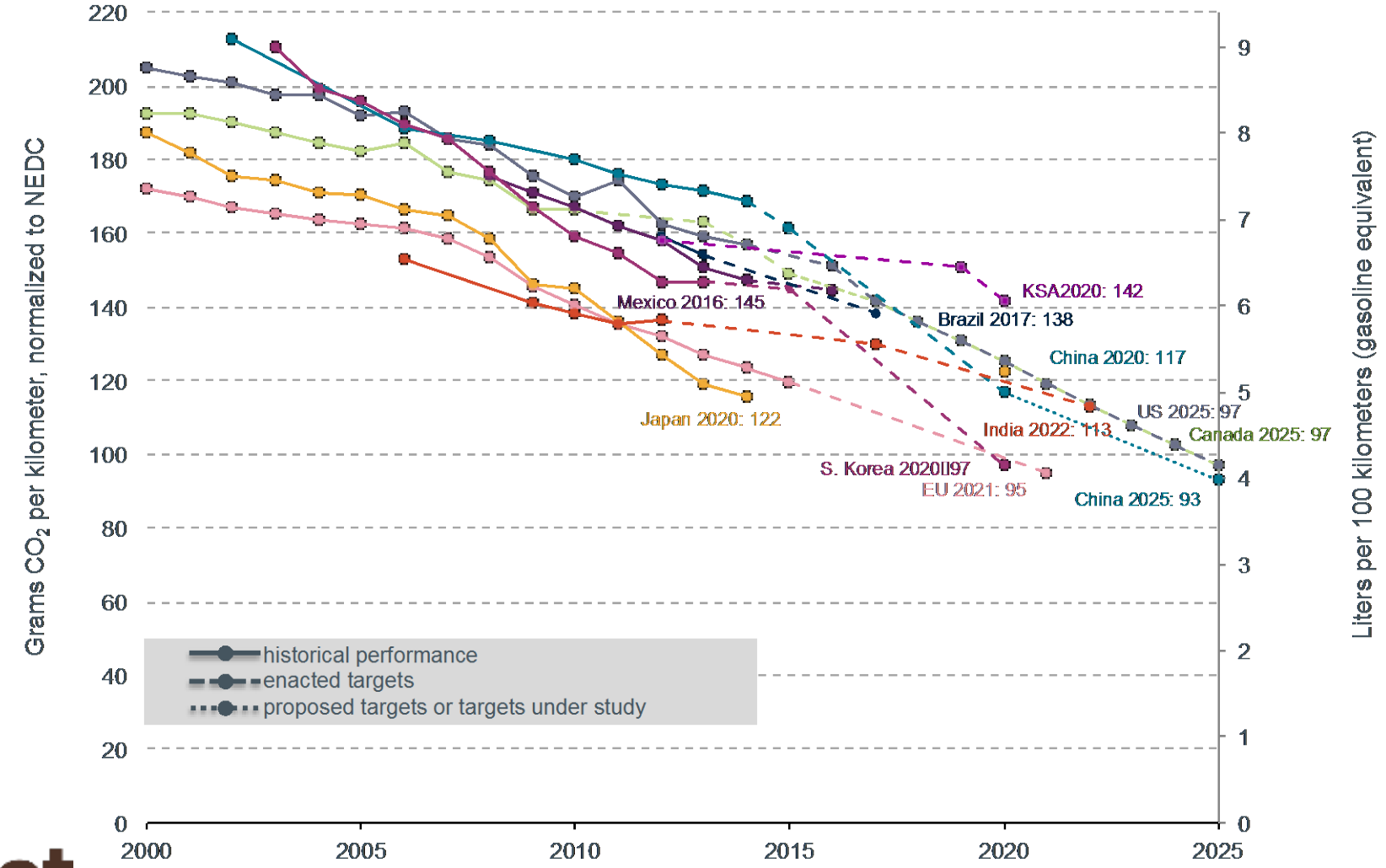


- **Impact of fuel sulfur levels and emissions control standards on $PM_{2.5}$ emissions from heavy-duty diesel vehicles (grams/km) Source: Climate and Clean Air Coalition (2016)**

Global Fuel economy Initiative: cut energy use/km by 50% by 2030

	2020	2030	2050
New Cars	30% reduction* in L/100km compared to 2005 Engines, drive- trains, weight, aerodynamics.	50% average improvement globally Hybridisation of most models.	50% + globally Significant contributions from Plug-in vehicles
Total fleet	20% reduction With lag time for stock turnover; includes eco-driving, maintenance	35% reduction	**50by50**

Historical fleet CO_2 emissions performance and current standards (gCO_2/km normalized to NEDC) for passenger cars



* Note that Japan has already exceeded its 2020 statutory target, as of 2013.

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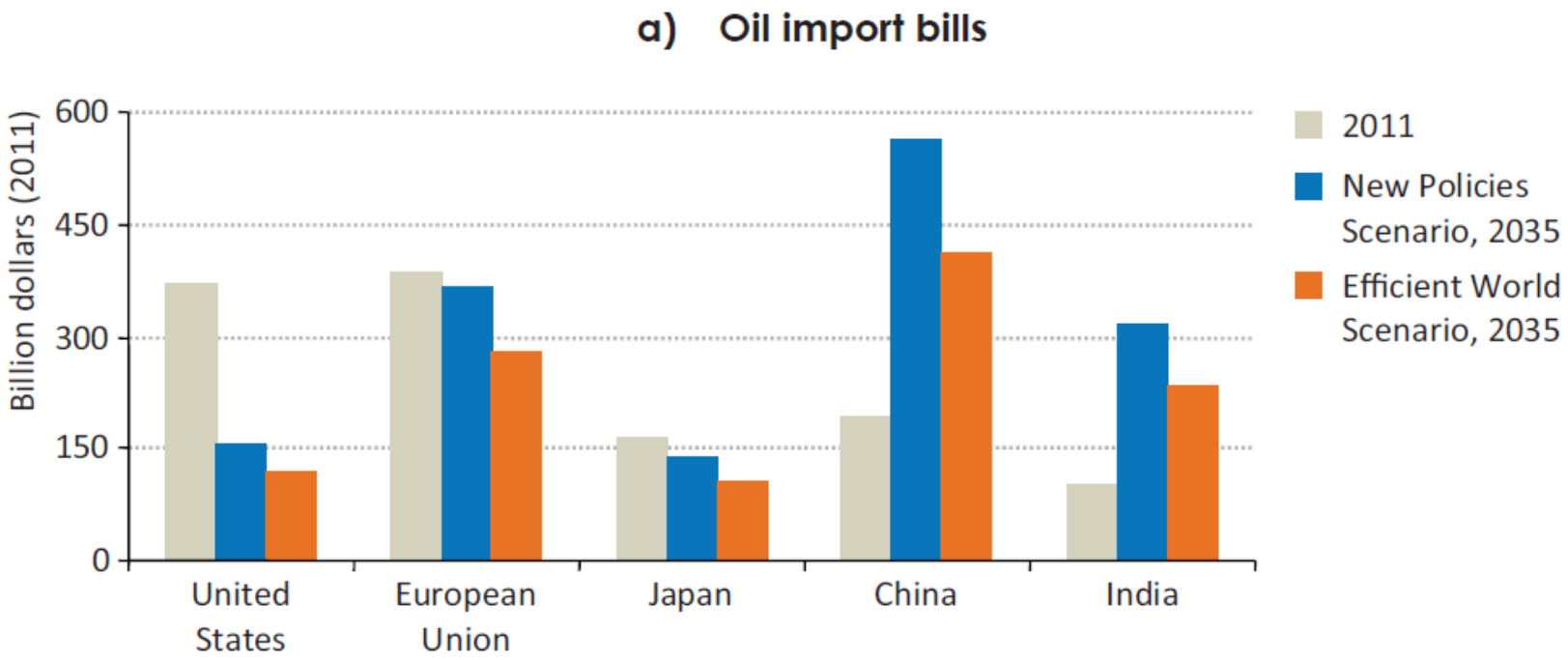
Improving efficiency can save $billions

Countries could dramatically cut their fuel import bills in the future, but must strongly encourage newer, highly efficient models

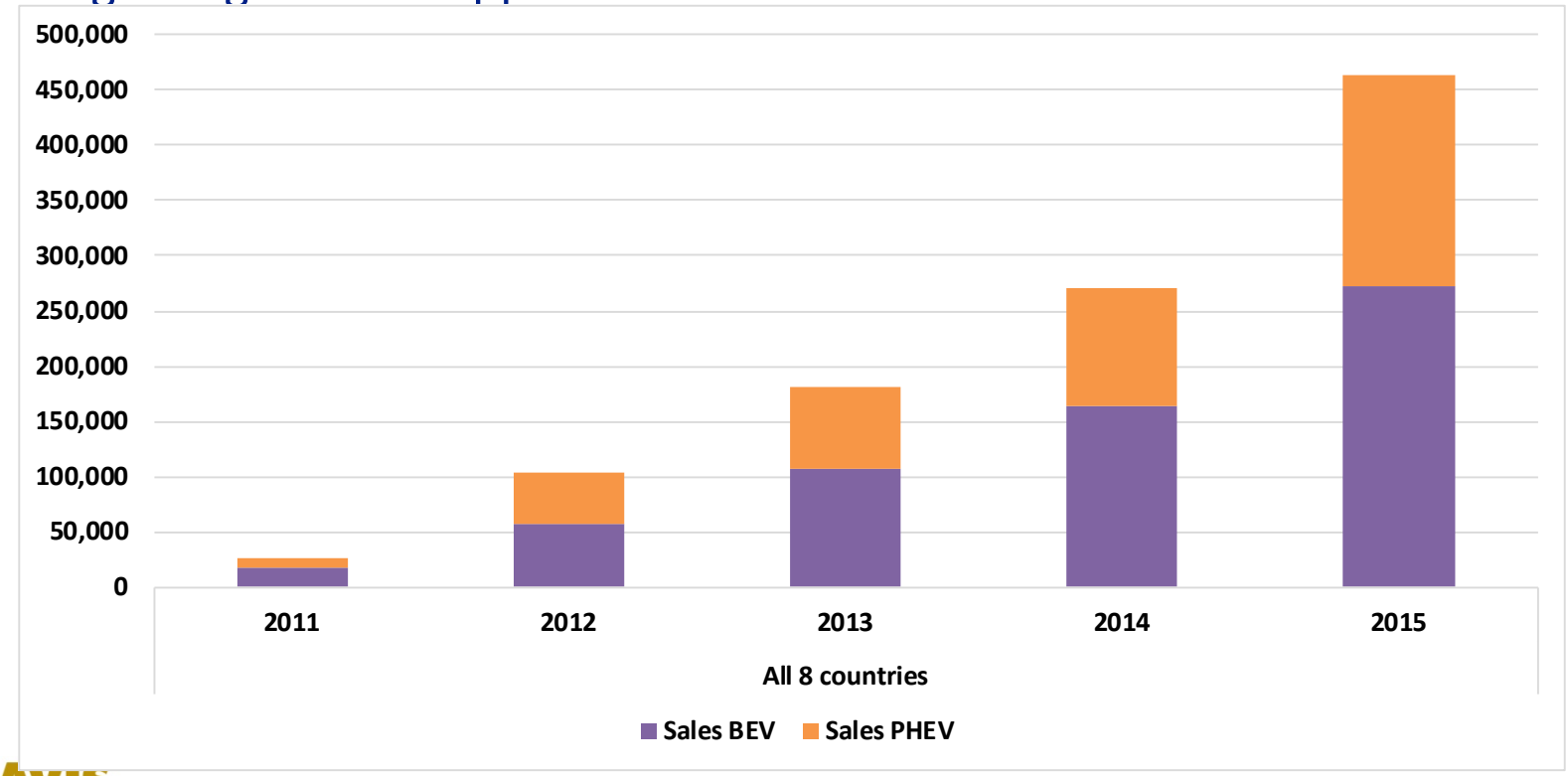
Figure 10.9 ▷ Fuel import bills in selected countries by fuel and scenario



Source: IEA World Energy Outlook 2012

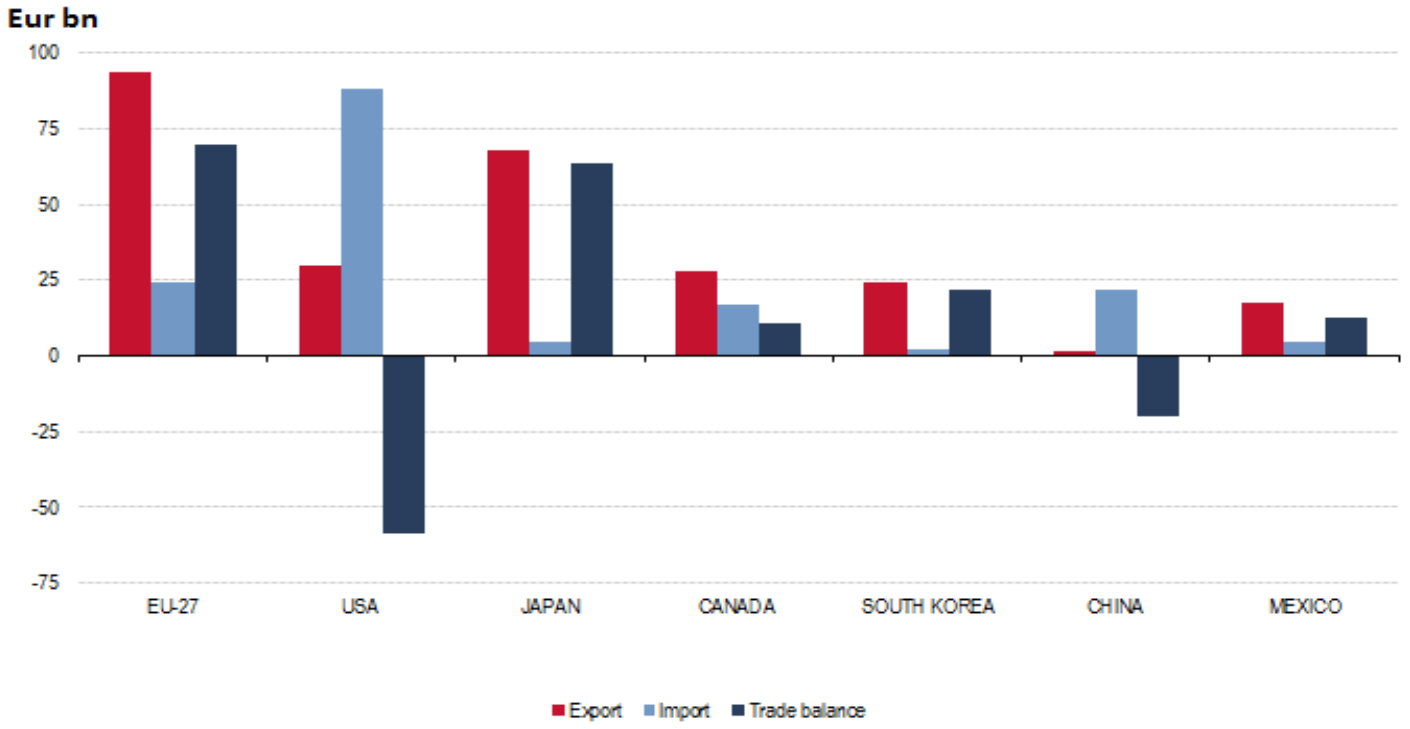
Electric vehicles – the shape of the future, better than the past

- UN Declaration on E-mobility calls for 100 million sales by 2030, and is consistent with IEA 2 degree scenario
- Sales of BEVs and PHEVs by year across top 8 national markets growing quickly
- Beginning to make appearances as 2nd hand vehicles



The major vehicle exporting countries

- **Vehicle balance of trade varies considerably**



A few countries account for large numbers of 2nd hand exports

Export Statistics of used vehicles from Japan in 2015		
Rank	**Country**	**Vehicle exports numbers**
1	New Zealand	113,183
2	United Arab Emirates	104,952[3]
3	Myanmar	87,741
4	Kenya	65,469[4]
5	Chile	58,603
6	Sri Lanka	52,279
7	Pakistan	44,427
8	Russia	44,018
9	South Africa	38,463
10	Tanzania	36,641
	Total	**645,776**

Source: (Japan Export Vehicle Inspection Center, 2015)

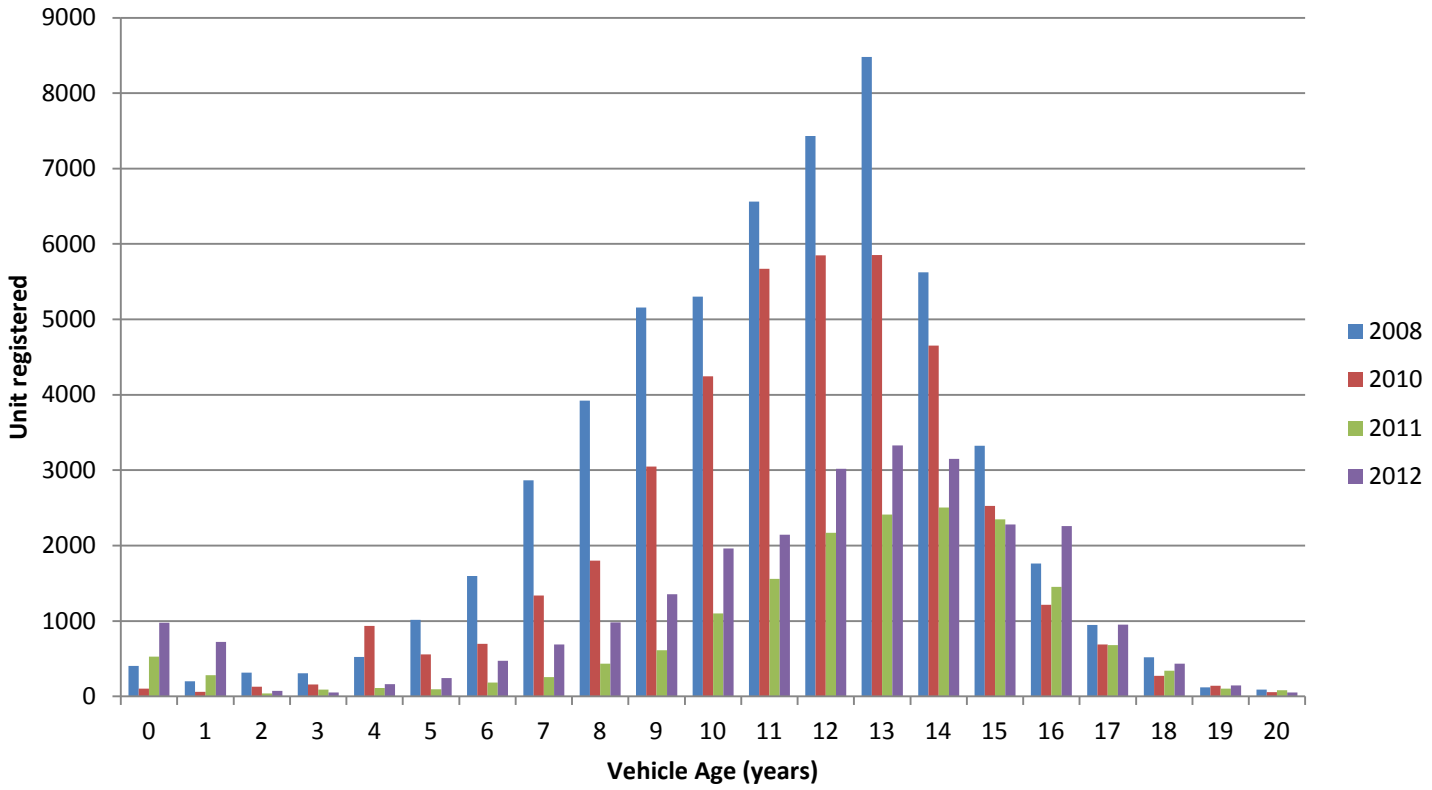
2nd hand vehicle restrictions in Africa: state of play

- **Many countries restricting to 5 years or less**
- **Some countries still allowing quite old vehicles to enter**

Countries with Various Import Age Restrictions in Africa

Age Restrictions	Countries with Age restrictions
3 Years	Mauritius, Seychelles, Algeria, Chad
4 Years	Gabon, Senegal
5 Years	Libya, Mozambique, Niger, Tunisia
7 years	Cote d Ivoire
8 years	Kenya, Mauritania, Namibia
10 years	Eritrea, Benin, Democratic Republic of Congo
12 Years	Liberia
12 Years	Nigeria and Swaziland

Some countries are seeing average age of imported vehicles rising



Asia – patchwork of different regs

		BAN	CHI	HK	IND	INO	MAL	NEP	PAK	PHI	SIN	SRI	VIE
Compliance to emission standards	for NEW vehicles	☑	☑	☑	☑			☑		☑	☑	☑	
	specified for used/ reconditioned vehicles	☑											
	for IN-USE vehicles		☑	☑			☑			☑		☑	☑
Importation of used vehicles	Allowed	☑		☑	☑		until 2015	☑	☑	☑	☑	☑	since 2006
	Should conform with emission stds	☑		☑	☑		☑			☑	☑	☑	
	Should conform with roadworthiness stds			☑	☑		☑				☑		
	Should conform with steering/ control stds	☑		☑	☑		☑			☑	☑	☑	
	Depending on age/ mileage/ engine type			☑	☑		☑		☑		☑	☑	
	Banned		since 2002			since 2007	2016			2002; 2007			since 2006
	for used 2- & 3-wheelers	☑	☑			☑							☑
	for used passenger cars		☑			☑				☑			☑
	for used commercial light duty vehicles	☑	☑										some
	for used heavy duty/ construction vehicles	☑				☑							
Restrictions	Vehicle age cap	< 4 yrs				☑		☑	☑		☑		
	Conditions for 2-wheelers			☑	☑				no 2-stroke			no 2-stroke	
	Conditions for heavy duty vehicles			☑									
Exemptions	For some vehicles based on type				MUVs			HDVs		HDVs			HDVs
	For some vehicles based on ownership												
	For entry into economic/ free port zones									☑			

Potential policies to discuss

- **Regulatory**
  - Age-based restrictions of vehicles
  - Emissions standard-based restrictions
  - Fuel economy regs applied to 2nd hand vehicles
- **Vehicle import or registration taxes**
  - By age (but rising, not declining by age!)
  - Pollutant standard/CO2 emissions based
  - Ad valorem or engine size also can work
  - Incentives for highly efficient/electric vehicles

What other information do we need?

- **International trade flows still poorly understood**
  - How many vehicles of what types?
  - New v. 2nd hand vehicles entering each country, age and model-level detail
  - Information on origins of vehicles
- **National registration databases with new and (newly registered) 2nd hand vehicles are very useful**

Final thoughts, questions…

- How do policy makers grapple with the strong desire for car ownership – whatever the societal cost?
- Need to better document the impacts 2nd hand vehicles have on air quality, energy/CO2, traffic, and safety
- How much do 2nd hand vehicle flows slow down spread of new technologies?
- Need to catalog policies and align these where possible
- End-of life issues – what is happening to these vehicles?