Overview of Global Fuel Economy Policies

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GFEI
GLOBAL FUEL ECONOMY INITIATIVE

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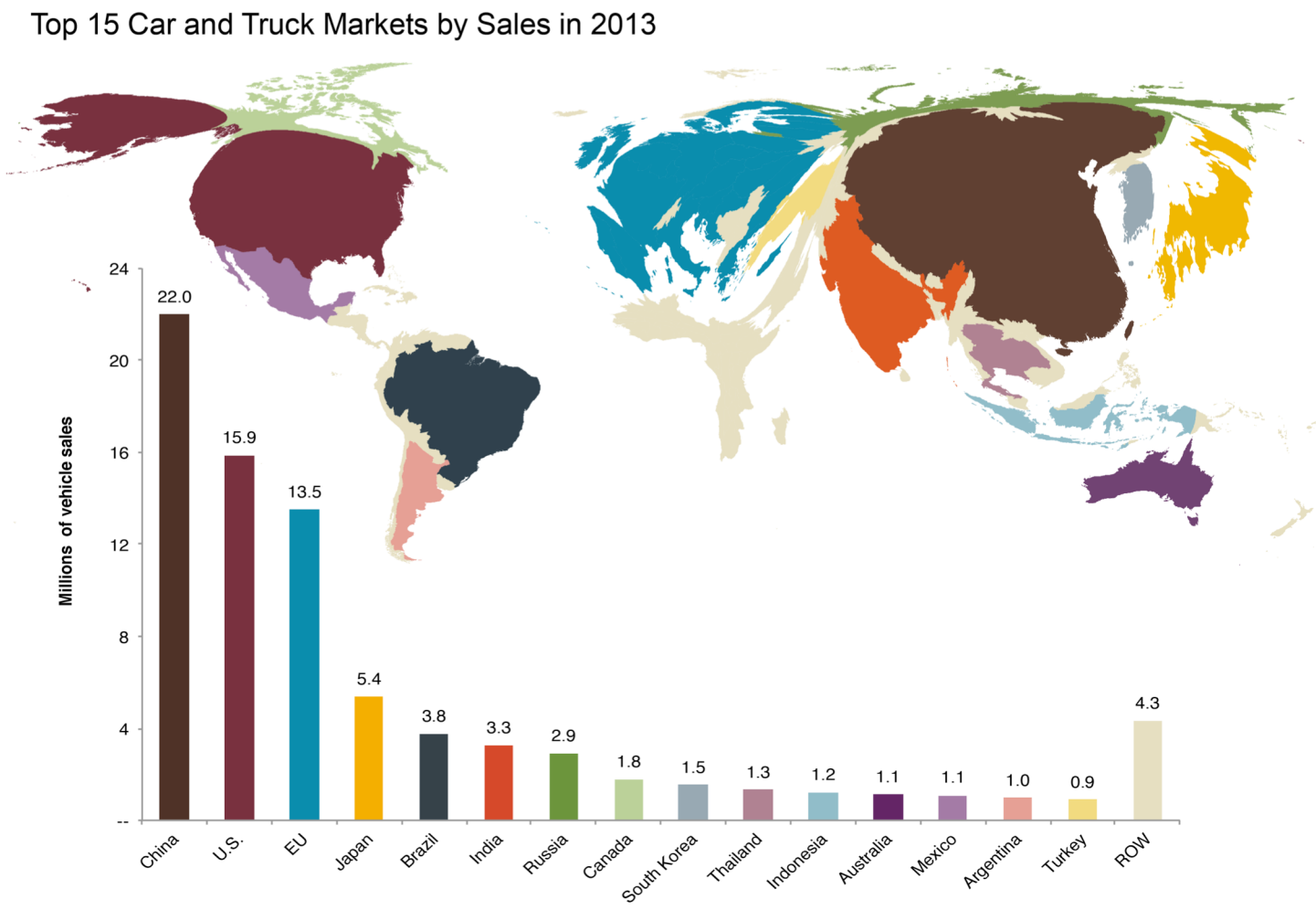
What is ICCT?

- **ICCT is an independent non-profit research organization that provides technical support on transport efficiency and emission policies in major auto markets**



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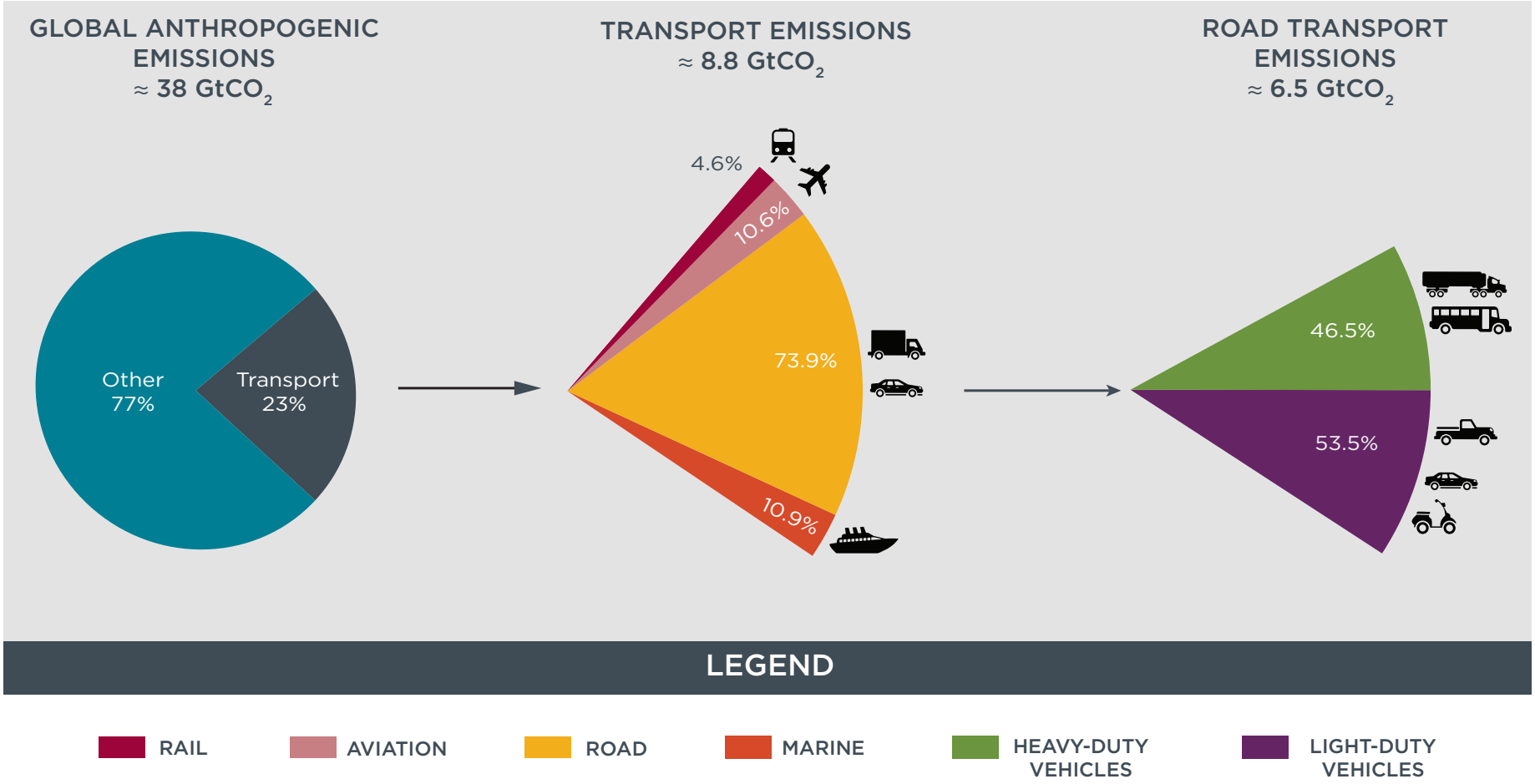
Outline

- Motivation of fuel efficiency policies
- Fuel efficiency standards
- Fuel efficiency fiscal measurement
- Fuel efficiency labeling
- Summary

1 Background and motivation of fuel efficiency policies

Vehicles make up more than 20% of greenhouse gas emissions …



Notes:
Global anthropogenic CO_2 emissions in 2010 based on IPCC (2014).
Transport CO_2 emissions in 2010 estimated by ICCT (2014) include the full fuel lifecycle, including direct emissions from combustion & upstream emissions from extraction, refining, & distribution of fuels.

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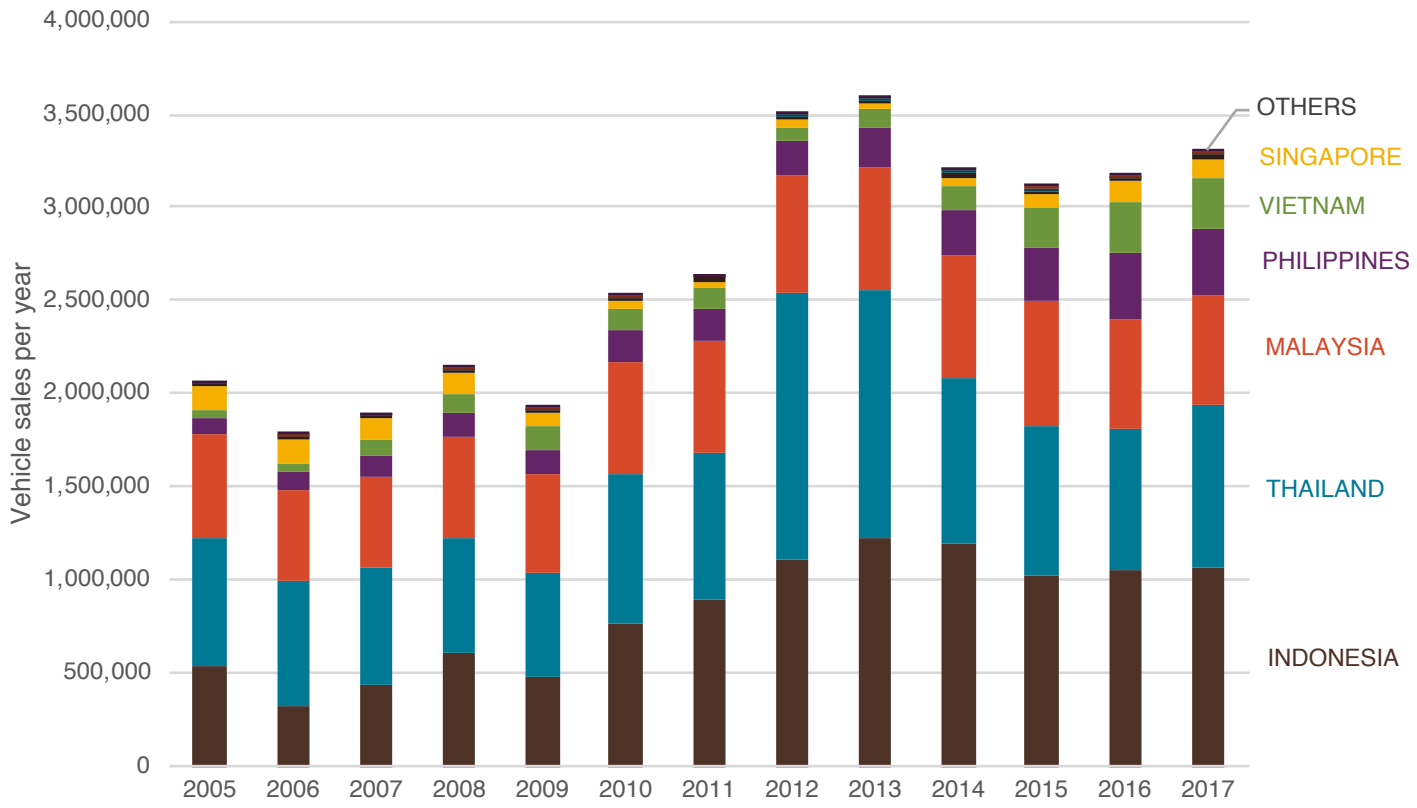
Robust vehicle sales growth in ASEAN countries



Indonesia, Thailand, and Malaysia are among the top vehicle markets in the world.

Integrated Vehicle Efficiency Policy Portfolio

VEHICLE FUEL EFFICIENCY STANDARDS	• Introduce and regularly strengthen mandatory standards • Establish and harmonize testing procedures for fuel efficiency measurement.
FISCAL MEASURES	• Fuel taxes and vehicle taxes to encourage the purchase of more fuel-efficient vehicles. • Infrastructure support and incentive schemes for very fuel-efficient vehicles.
MARKET-BASED APPROACHES	• Voluntary programs such as U.S. SmartWay and other green freight programs
INFORMATION MEASURES	• Vehicle fuel economy labels • Improving vehicle operational efficiency through eco-driving and other measures.

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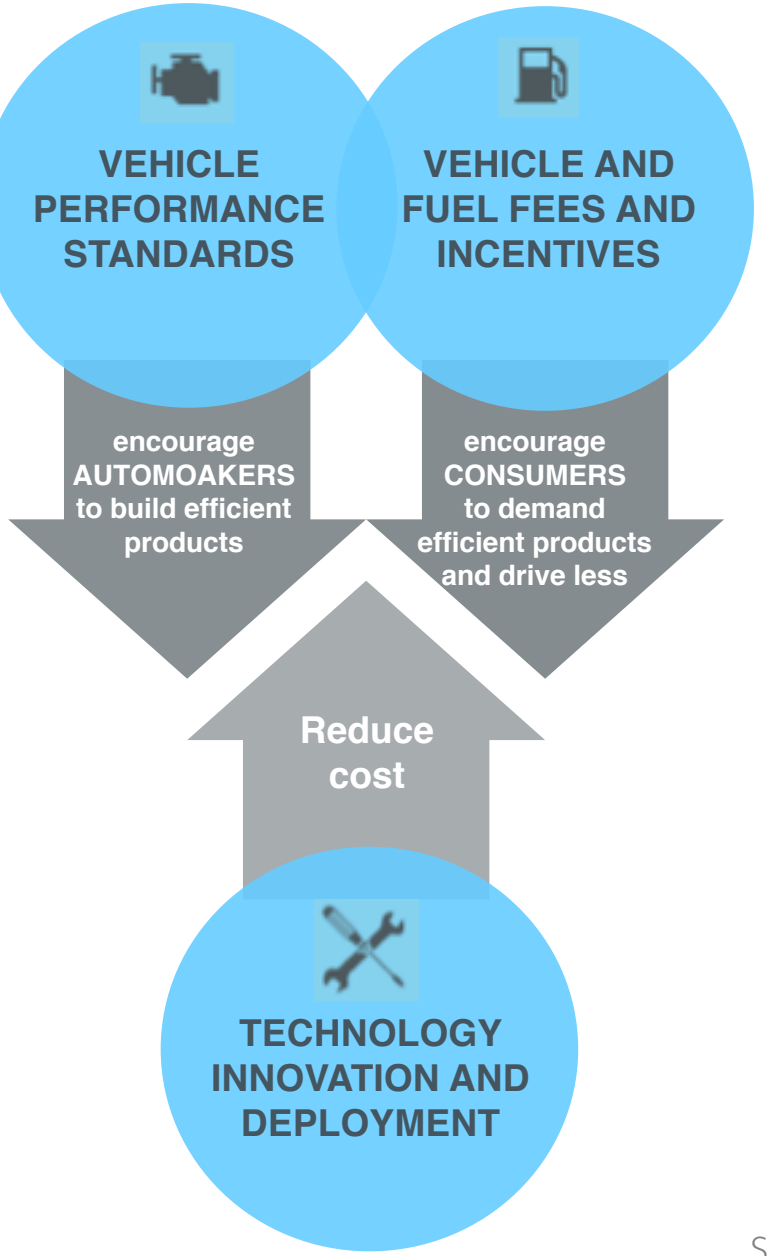
Performance standards, economic signals, and technological innovation complement each other.



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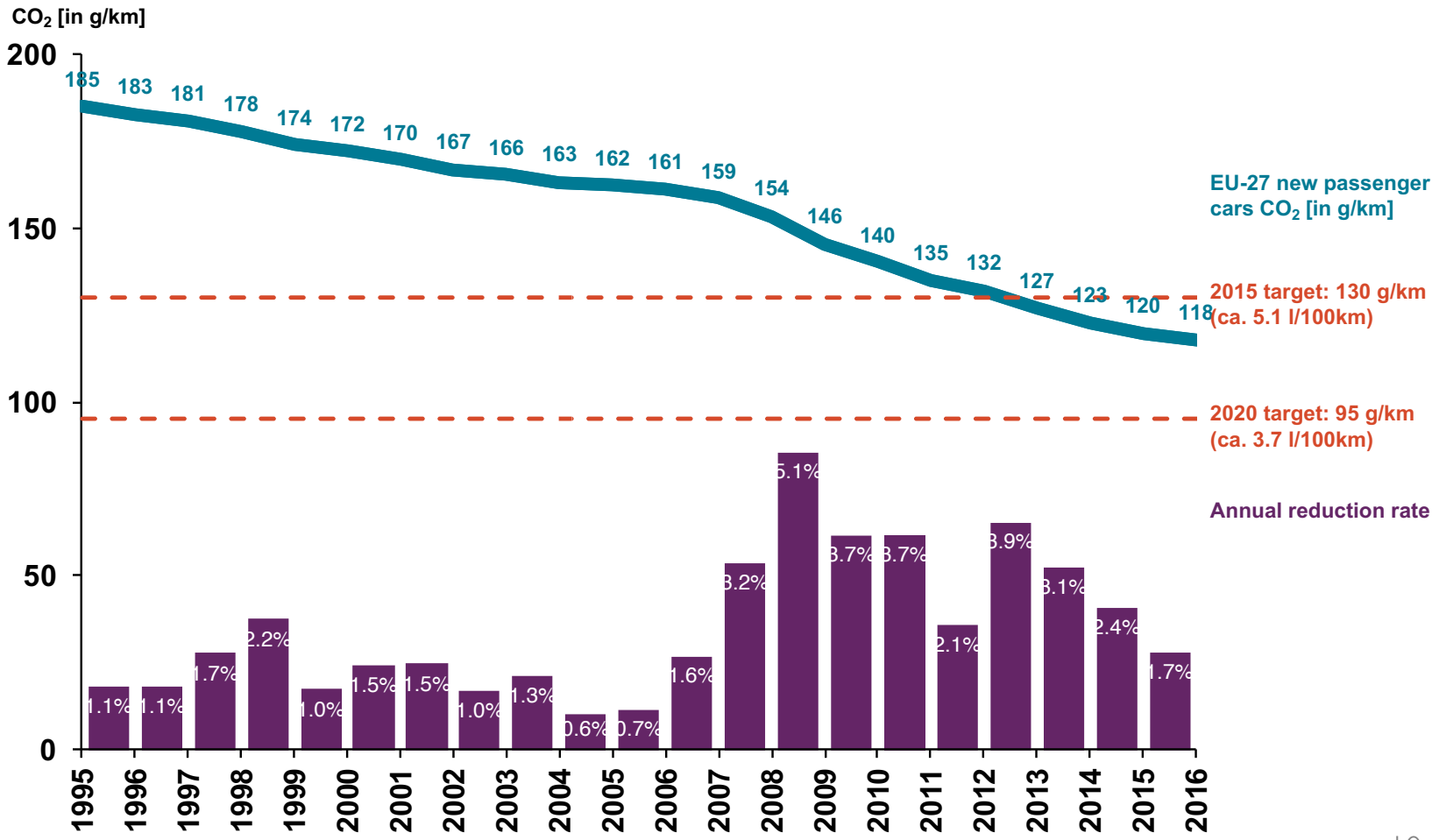
2 Fuel efficiency standards

The importance of mandatory standards

CO_2 performance standards in the European Union

New passenger cars 1995-2016



Data sources: 1995-1999 ACEA data for EU-15; 2000-2013 EU CO_2 monitoring data (2000-2003 EU-15, 2004-2006 EU-25, 2007-2013 EU-27). Note that changes in the number of member states (from 15 to 27) have only minor effects on the overall emission level (about 0.5 g CO_2/km) as passenger car sales numbers in the new member states are relatively low.

Comparison of the adopted standards for efficiency in selected regions

Region	New light-duty vehicles				New heavy-duty vehicles			
	Percent of global LDV sales, 2014	Baseline Model Year	Implementation Period	Reduction in average CO_2 rate (grams/vehicle-km)	**Percent of global HDV sales, 2014**	Baseline Model Year	Implementation Period	Reduction in average CO_2 rate (grams/vehicle-km)
China	27%	2010	2016-2020	35%	31%	2012	2014-2015	11%
EU + EFTA	20%	2010	2020-2021	32%				
US	17%	2010	2017-2025	49%	11%	2011	2014-2018	14%
Japan	6%	2010	2020	16%	5%	2006	2015	12%
Brazil	4%	2012	2013-2017	13%				
India	3%	2010	2018-2022	18%				
Canada	2%	2010	2017-2025	47%	1%	2011	2014-2018	14%
South Korea	2%	2010	2020	39%				
Mexico	1%	2010	2014-2016	18%				
Saudi Arabia	1%	2012	2016-2020	19%				

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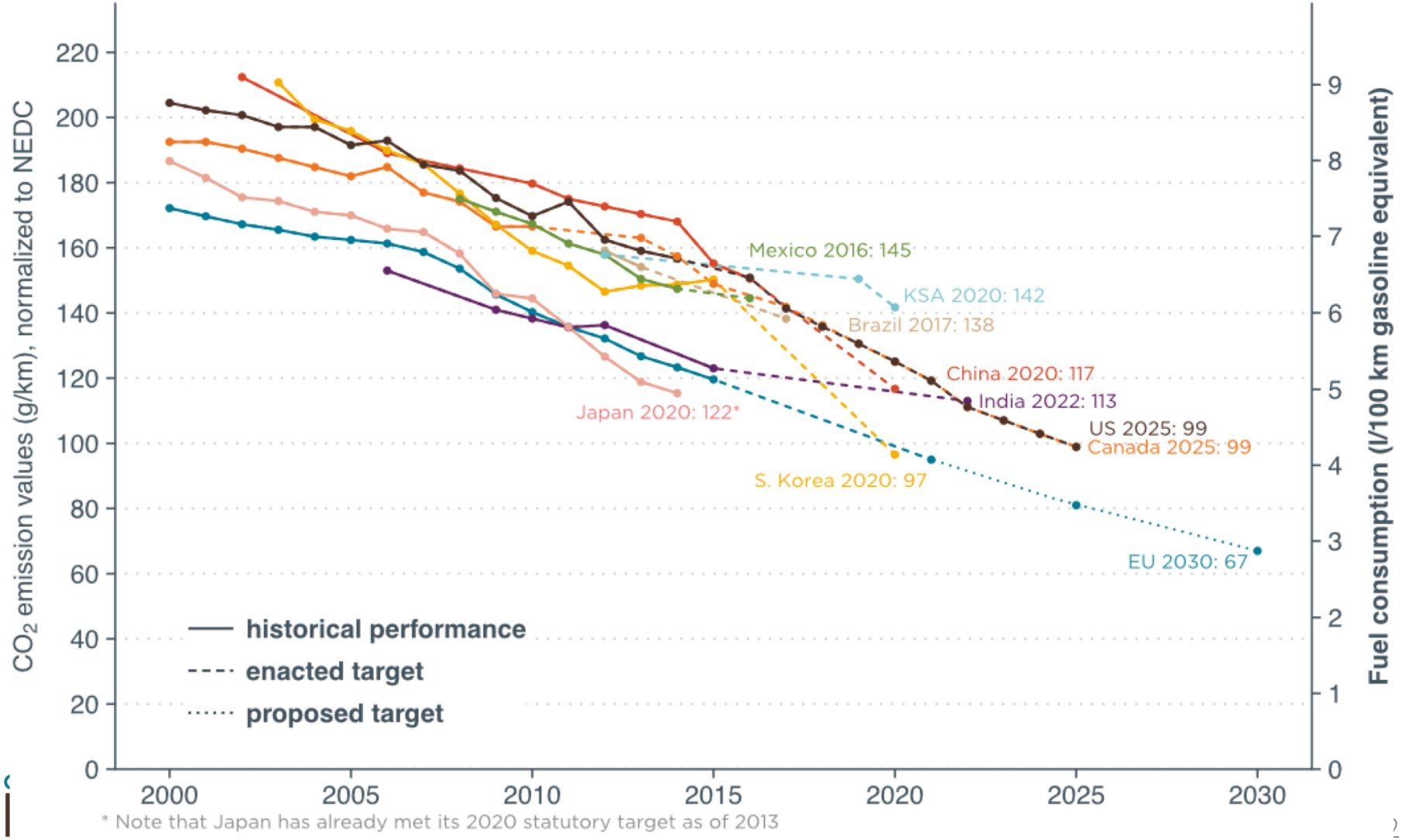
Historical fleet CO_2 emissions performance and current standards (gCO_2/km normalized to NEDC) for passenger cars



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https://www.theicct.org/chart-library-passenger-vehicle-fuel-economy

Cost-effectiveness analyses of light- and heavy-duty fuel economy and CO_2 standards

Rule	Per-Vehicle Cost	Payback Period
US LDV 2017–2025[1]	$1,800	3.5 years
US LDV 2012–2016[2]	$950	3 years
US HDV Phase 1 2014 – 2017[3]	$378–$6,215	1–2 years
California Advanced Clean Cars Program 2017 – 2025[4]	$1,340–$1,840	3 years
Canada LDV 2017-2025[5]	$2,095	2 to 5 years
Canada LDV 2011-2016[6]	$1,195	1.5 years
European 95g CO_2/km Standard 2020[7]	€1,300	4-5 years
India LDV 2020[8]	$400 to $600	2–3 years

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https://www.theicct.org/publications/status-policies-clean-vehicles-and-fuels-select-g20-countries

Flexibility system of compliance with standards

Corporate average target

- Except LCV standards in China

Credit banking and trading

- 3-5 years carry forward, 0-3 years carry backward

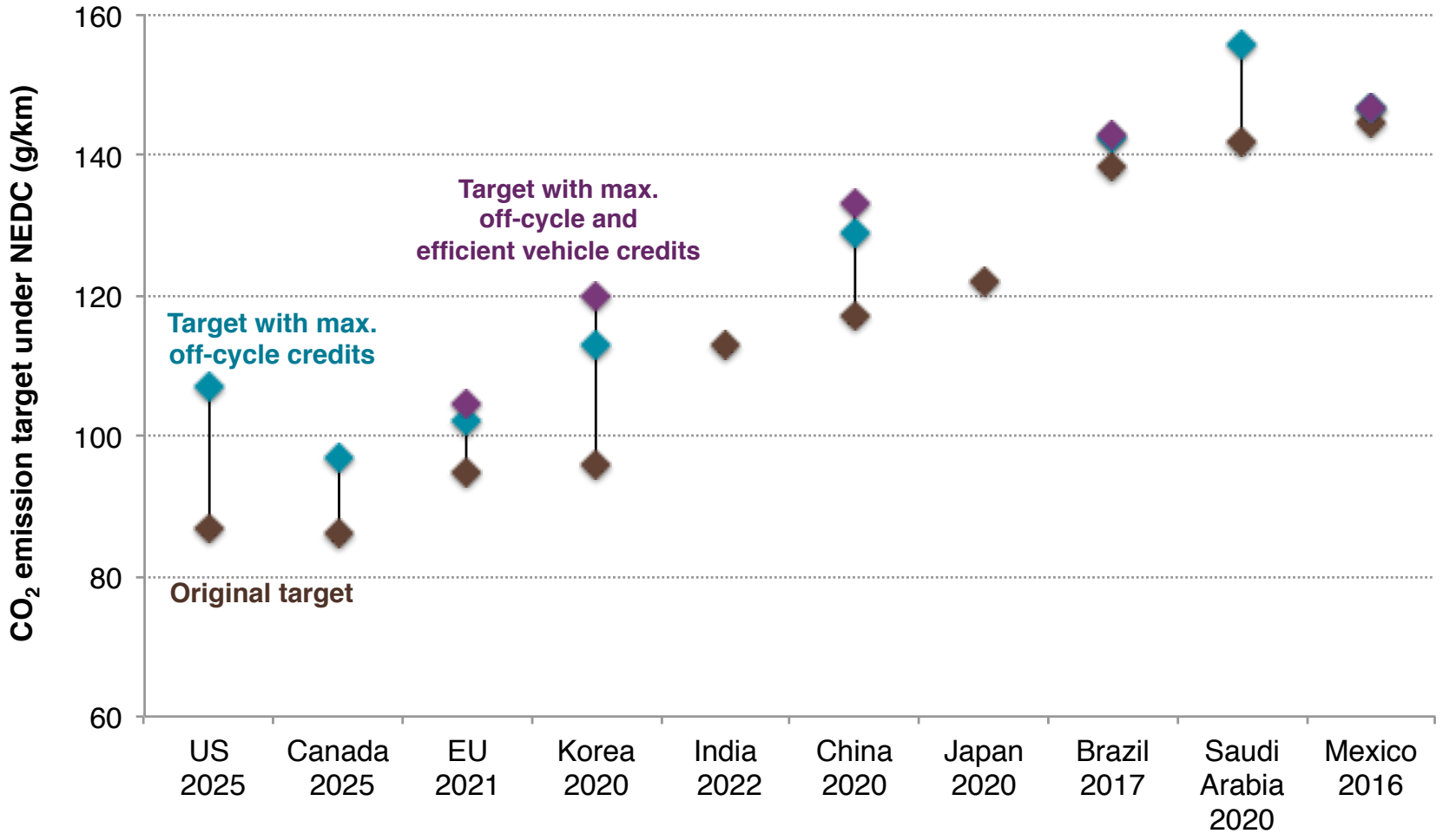
Off-cycle credits

- Not all off-cycle credits are properly designed

Super credits

- To promote electric and alternative fuel vehicles, with multipliers of 1 to 5

Effects of off-cycle credits and efficient vehicle credits on CO_2 targets



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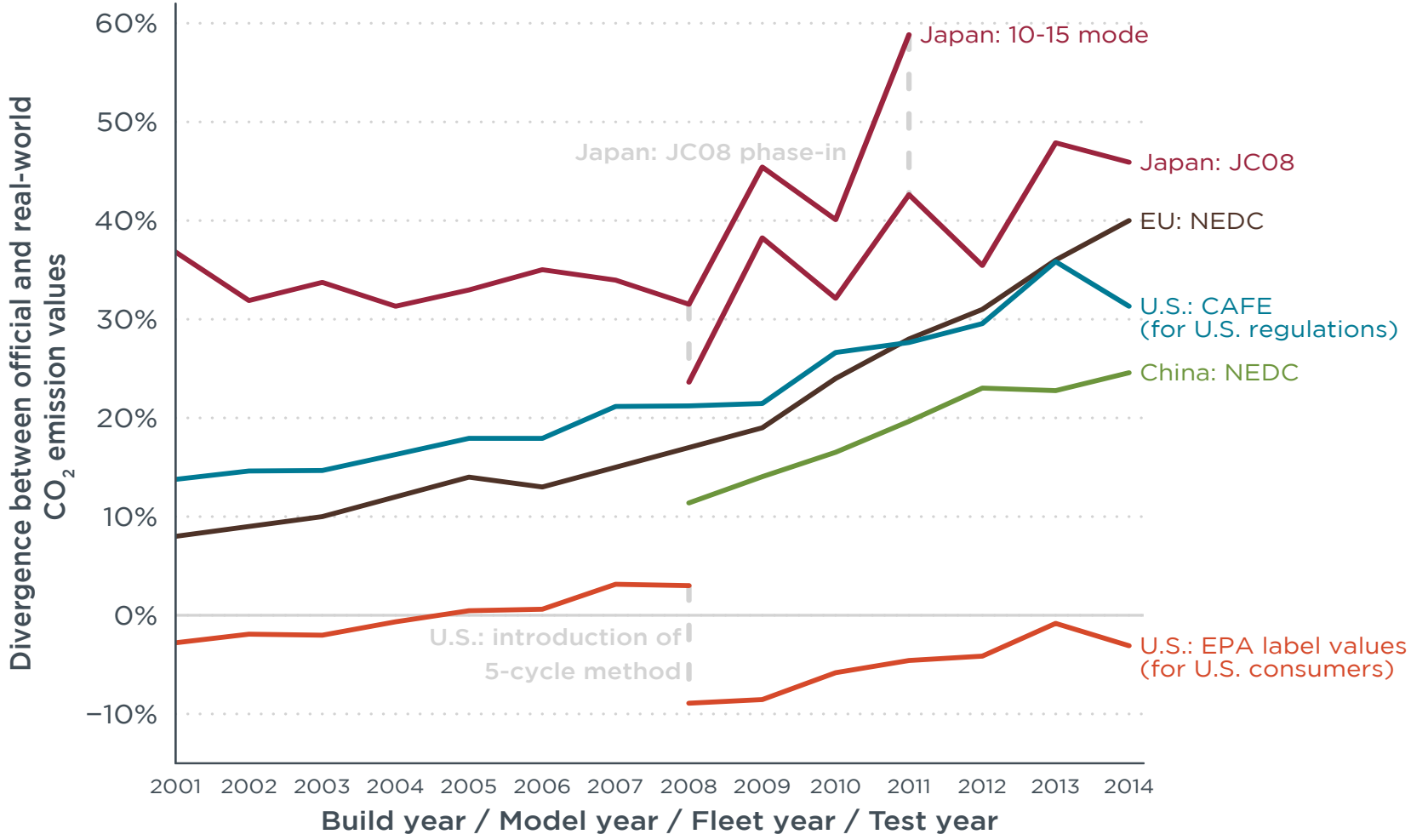
https://www.theicct.org/publications/2017-global-update-LDV-GHG-FE-standards

Real world emissions are an issue that needs to be addressed



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https://www.theicct.org/publications/laboratory-road-intl

3 Fuel efficiency fiscal policies

Fiscal measures to improve fuel efficiency

Fiscal policy type	Characteristics
Vehicle tax/fee based on CO_2	Paid at time of purchase or annually
Subsidy for efficient vehicles	One-time
Feebate	A mix of tax and incentives
Fuel taxes/CO_2 taxes	Paid upon refueling; set by fuel type;
Infrastructure support	Road pricing, VMT taxes, charging stations, discounted electricity

Vehicle tax is a common measure in Europe

33 European countries

One-time tax

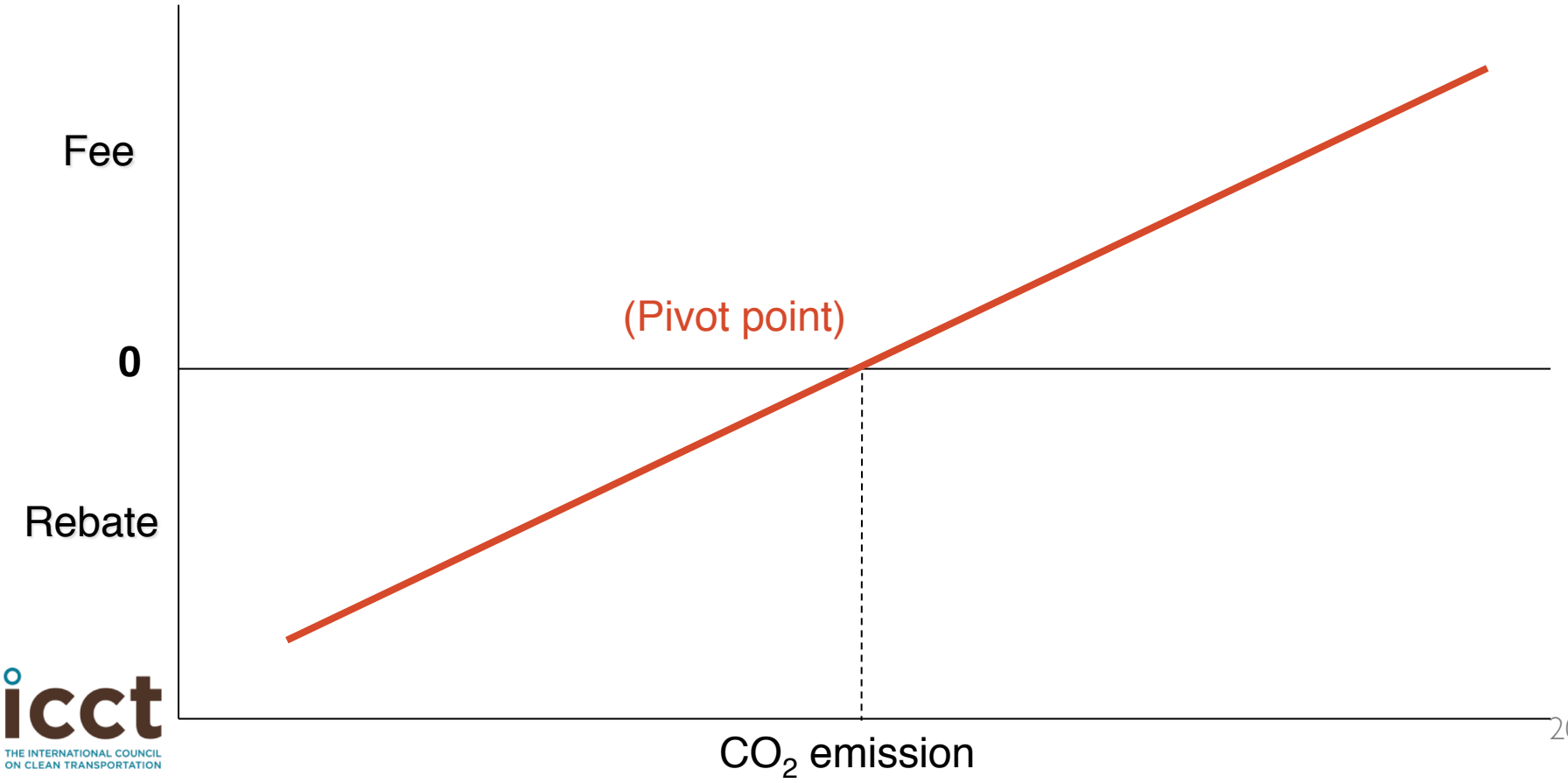
	CO_2 emissions	Engine features	Vehicle features	Price	Fuel
Austria	CO_2 emissions				
Belgium	CO_2 emissions, Euro standards	Cylinder capacity	Age		Fuel type
Bulgaria					
Croatia	CO_2 emissions			Price	Fuel type
Cyprus	CO_2 emissions				
Czech Republic	Euro standards				Fuel type
Denmark			Equipment	Price	Fuel type
Estonia					
Finland	CO_2 emissions			Price	
France	CO_2 emissions				
Germany					
Greece	CO_2 emissions			Price	
Hungary	Euro standards	Engine capacity			Fuel type
Iceland	CO_2 emissions				
Ireland	CO_2 emissions			Price	
Italy		Engine power			
Latvia					
Liechtenstein					
Lithuania					
Luxembourg					
Malta	CO_2 emissions		Length	Price	Fuel type
Netherlands	CO_2 emissions, fuel consumption				Fuel type
Norway	CO_2 emissions, NOx emissions		Weight		
Poland		Engine capacity		Price	
Portugal	CO_2 emissions	Cylinder capacity			Fuel type
Romania					
Slovakia					
Slovenia	CO_2 emissions			Price	Fuel type
Spain	CO_2 emissions				
Sweden					
Switzerland					
Turkey		Engine power		Price	
United Kingdom	CO_2 emissions				Fuel type
Number of countries	18	6	4	9	10

Annual tax

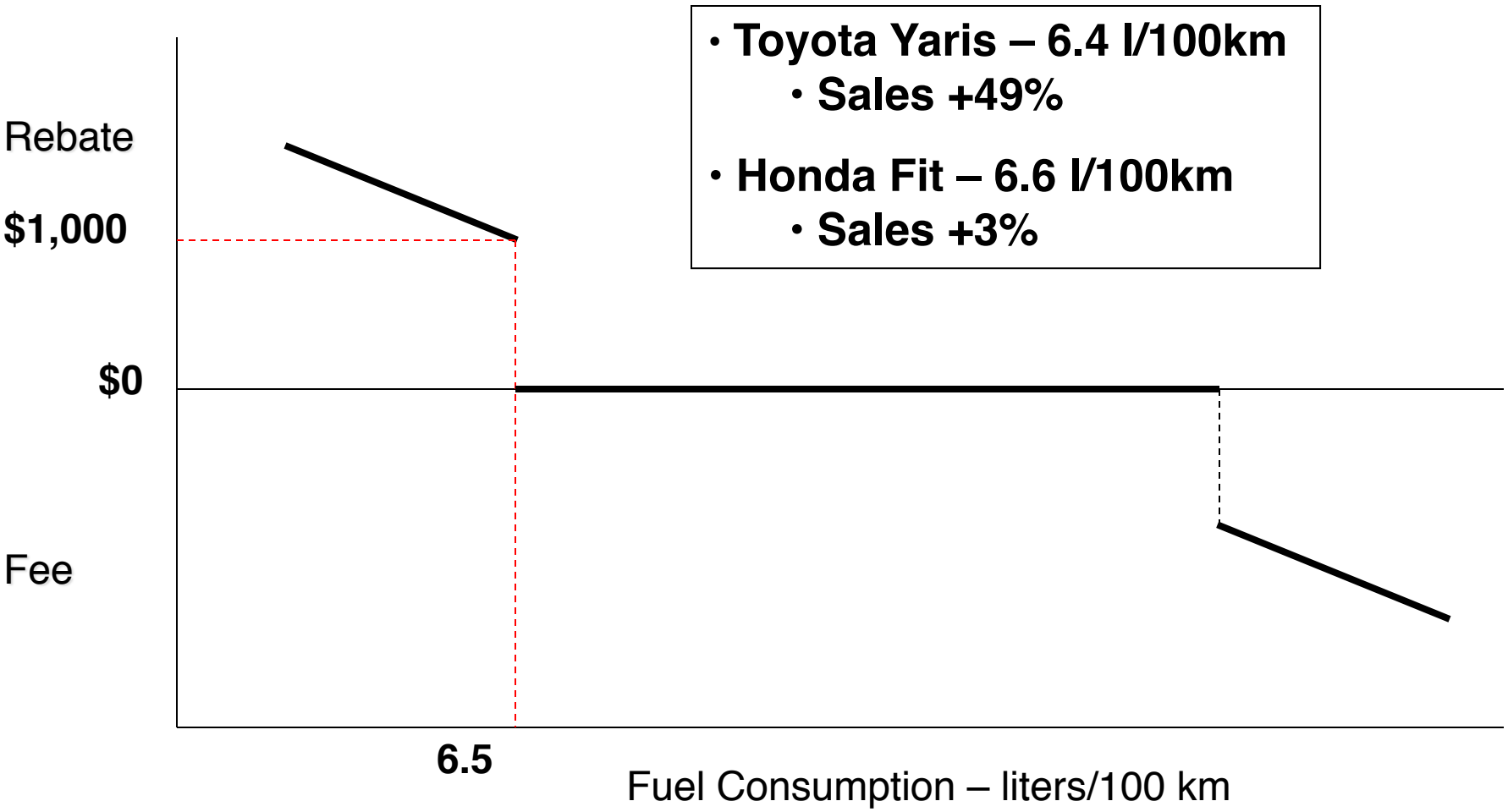
	CO_2 emissions	Engine features	Vehicle features	Price	Fuel
Austria		Engine power			
Belgium	CO_2 emissions				Fuel type
Bulgaria		Engine power	Age		
Croatia		Engine power	Age		
Cyprus	CO_2 emissions				
Czech Republic		Engine capacity			
Denmark	Fuel consumption		Weight		Fuel type
Estonia					
Finland	CO_2 emissions				
France	CO_2 emissions				
Germany	CO_2 emissions	Cylinder capacity			Fuel type
Greece	CO_2 emissions	Engine capacity			
Hungary		Engine capacity	Age		
Iceland	CO_2 emissions				
Ireland	CO_2 emissions				
Italy	Euro standards	Engine power			
Latvia	CO_2 emissions				
Liechtenstein			Weight		
Lithuania					
Luxembourg	CO_2 emissions				Fuel type
Malta	CO_2 emissions		Age		
Netherlands	CO_2 emissions		Weight		Fuel type
Norway					Fuel type
Poland					
Portugal	CO_2 emissions	Cylinder capacity			Fuel type
Romania		Engine capacity			
Slovakia		Cylinder capacity	Age		
Slovenia		Cylinder capacity			
Spain		Engine power			
Sweden	CO_2 emissions				Fuel type
Switzerland		Cylinder capacity, enigne power	Weight		
Turkey		Engine capacity	Age		
United Kingdom	CO_2 emissions			Price	Fuel type
Number of countries	17	15	10	1	9

CO_2-based fee, rebate, or feebate program

- Feebates = fee + rebate
  - Higher efficiency vehicles receive rebates
  - Lower efficiency vehicles pay fees



Canadian fiscal system that did not work well



Canada discontinued rebates early – ran out of money because too many vehicles were shifted to < 6.4 l/100km

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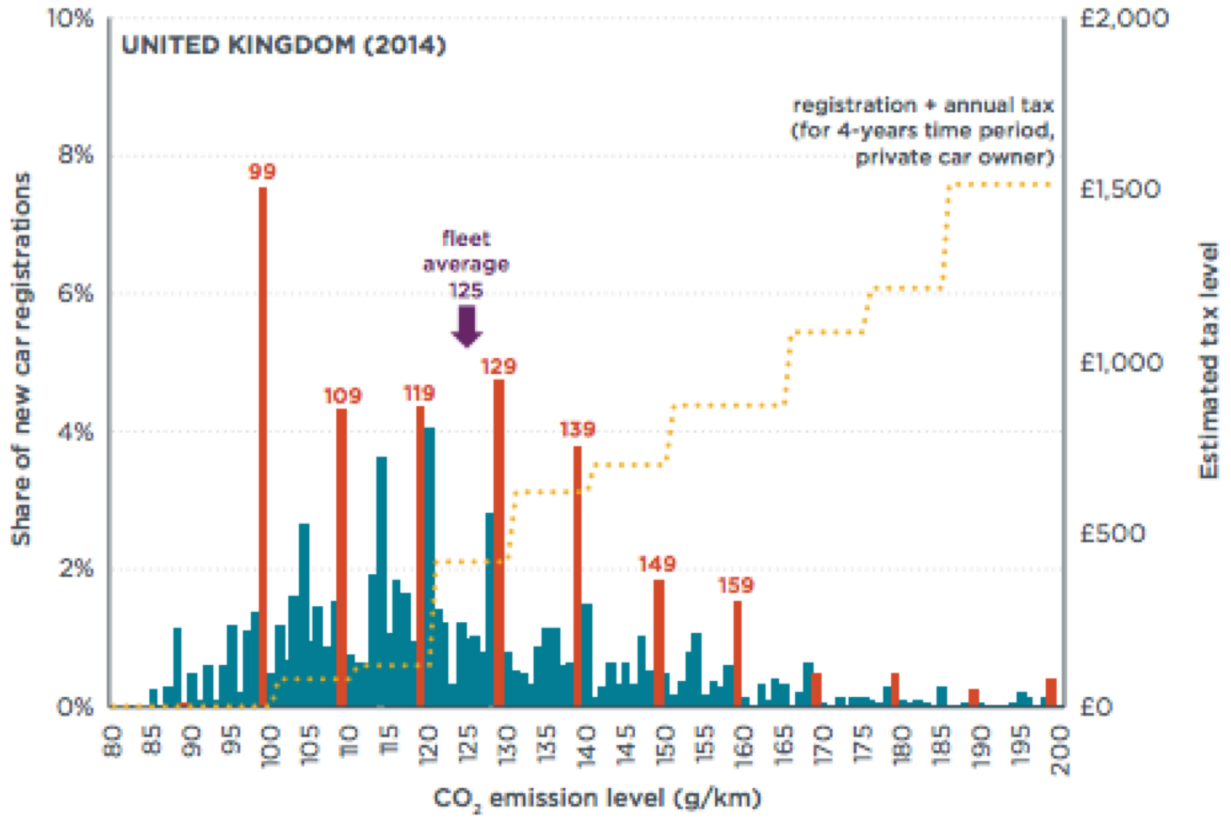
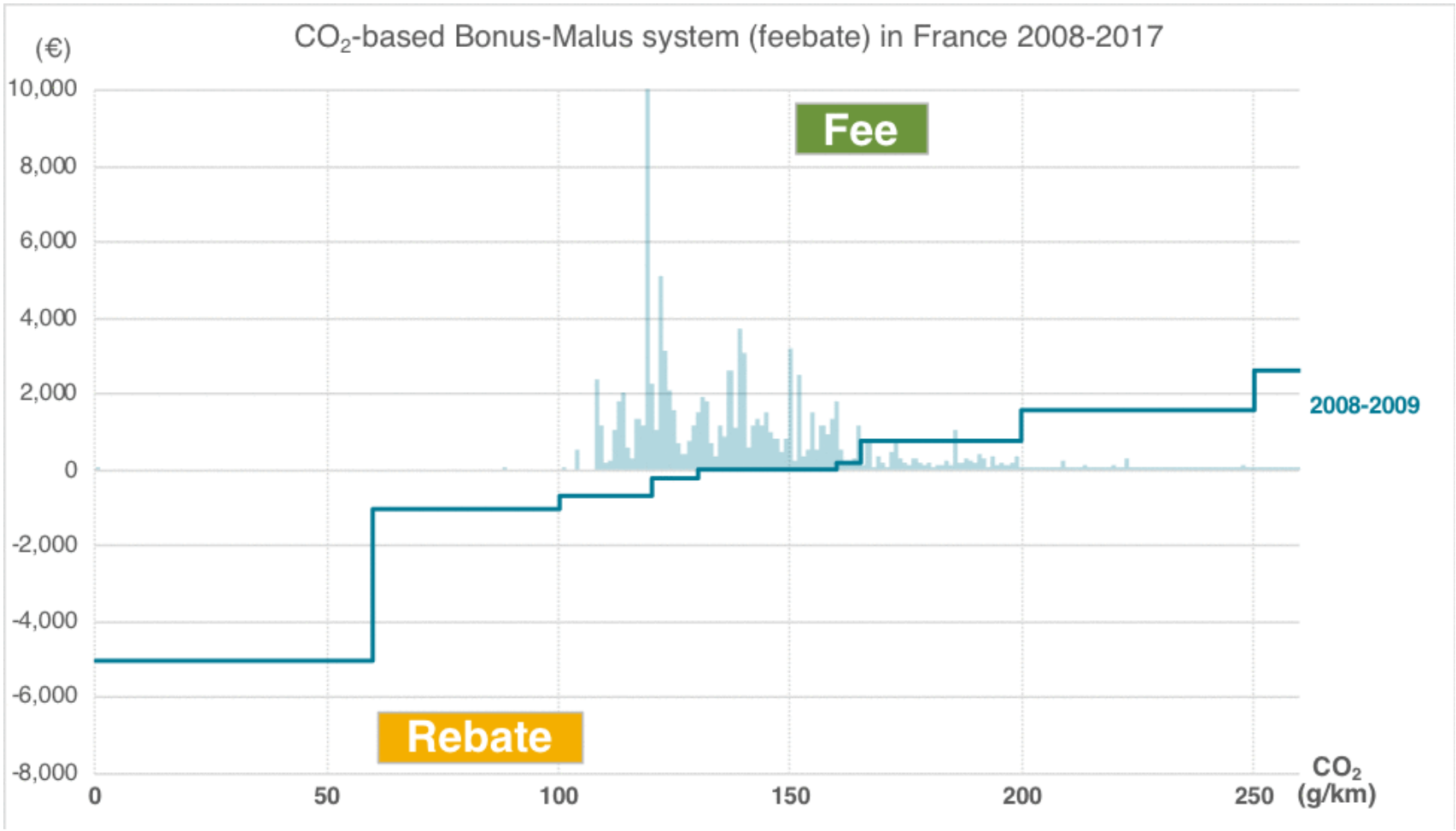
The design of the rebate influences how manufacturers response

- **Tax-optimized vehicles**

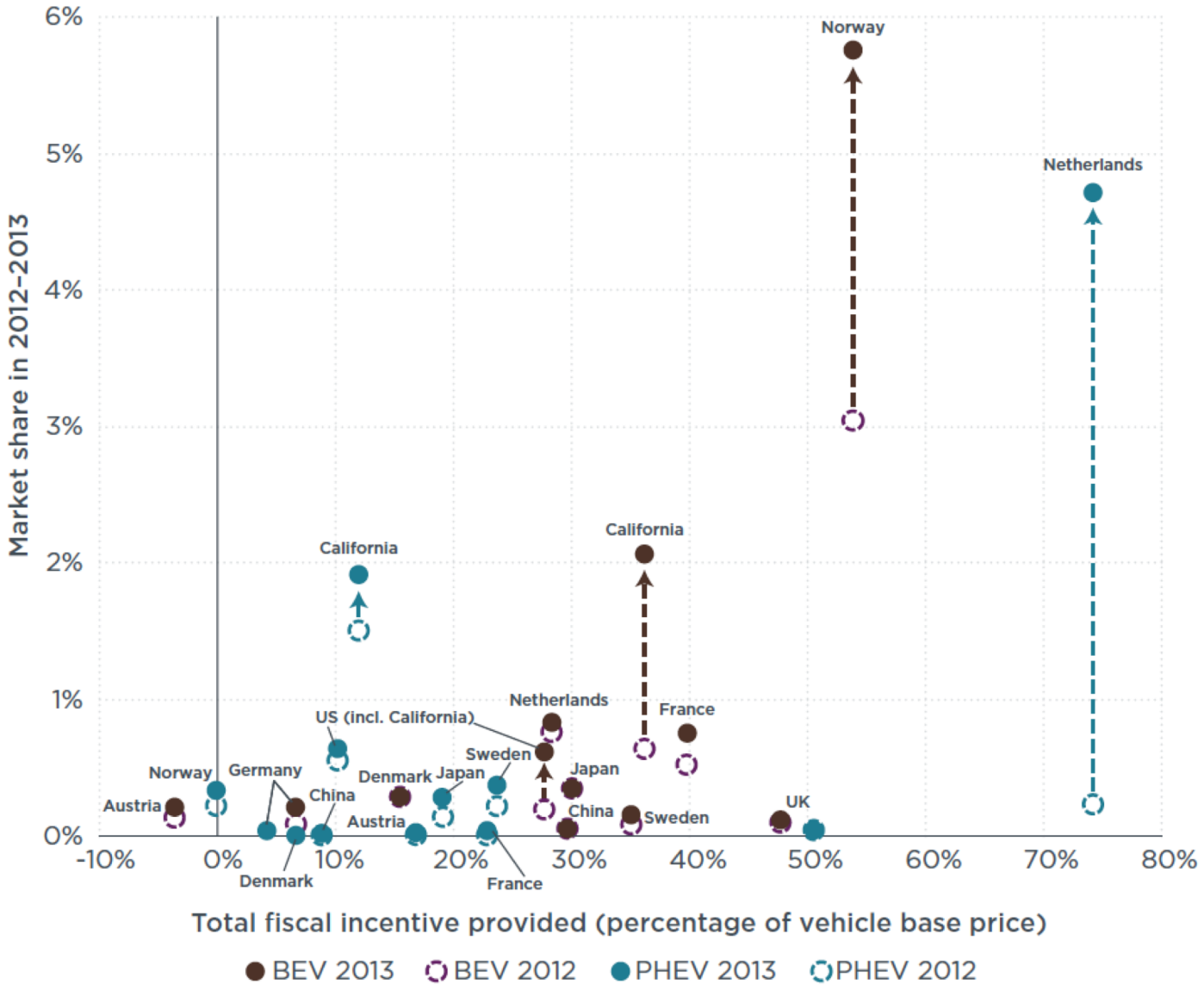


Link to the report: Optimizing to the last digit: how taxes influence vehicle CO2 emission level
http://www.theicct.org/sites/default/files/publications/Tax_Step_Analysis_201510.pdf

Gradually optimized system



High incentive level leads to high sales – **necessary but not sufficient!**



http://www.theicct.org/driving-electrification-global-comparison-fiscal-policy-electric-vehicles

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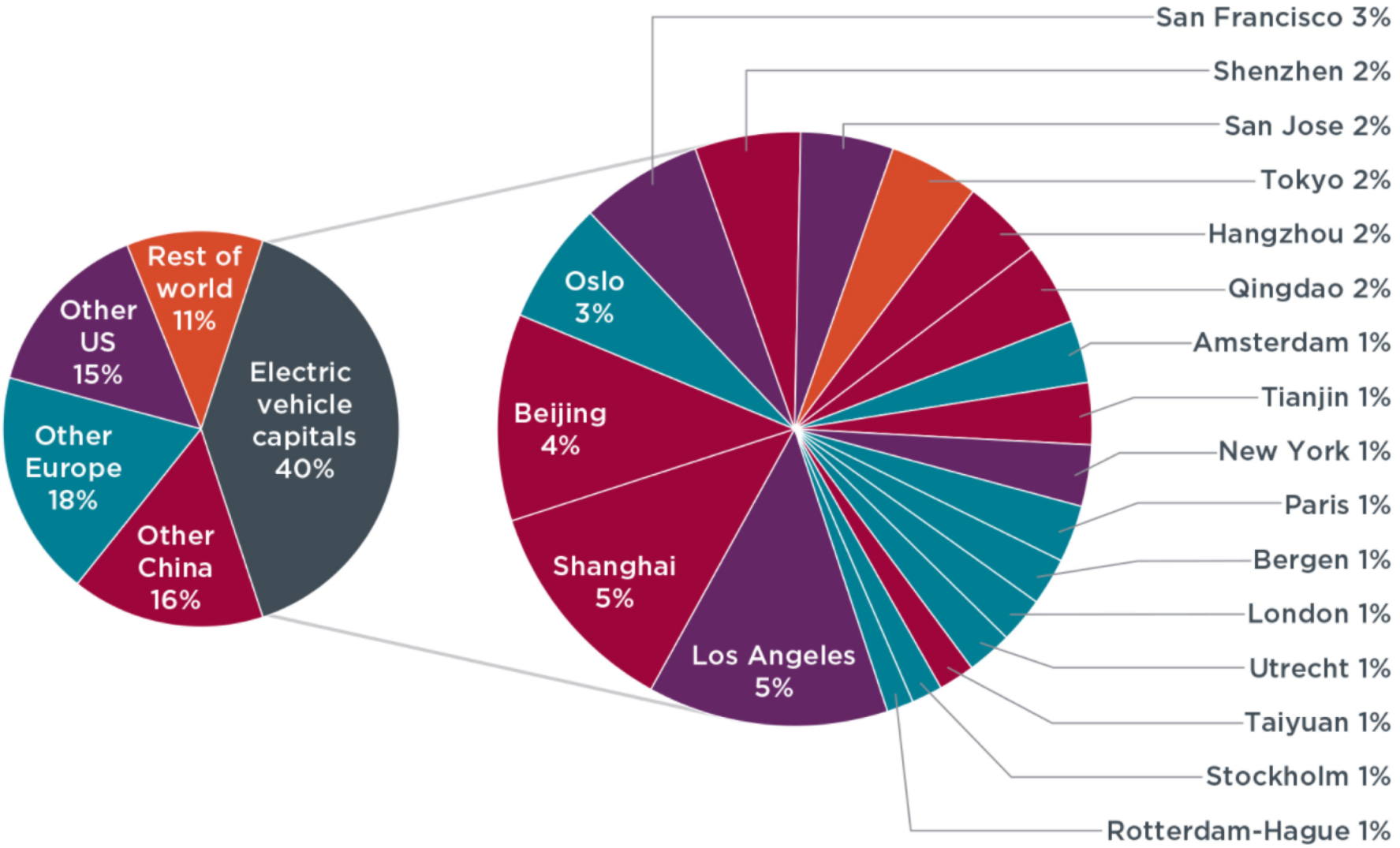
Emerging electric vehicle capitals



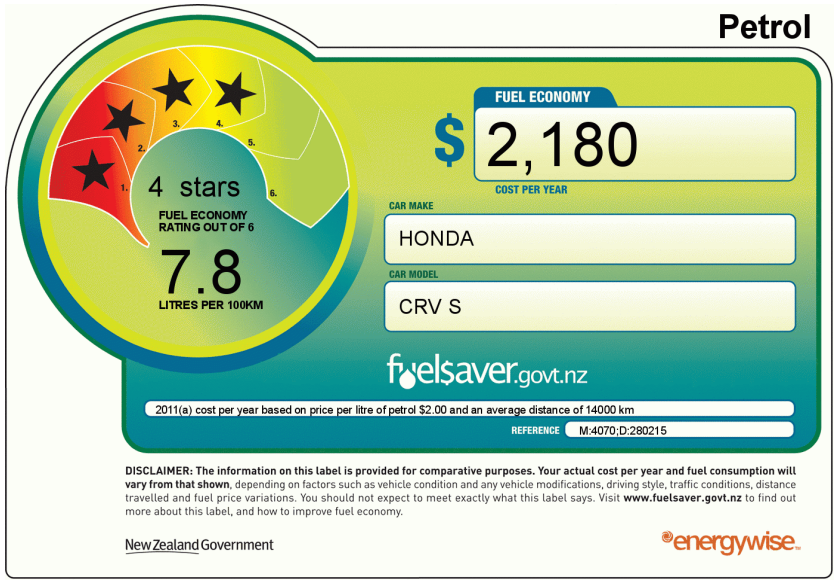
https://www.theicct.org/publications/EV-capitals-of-the-world-2017

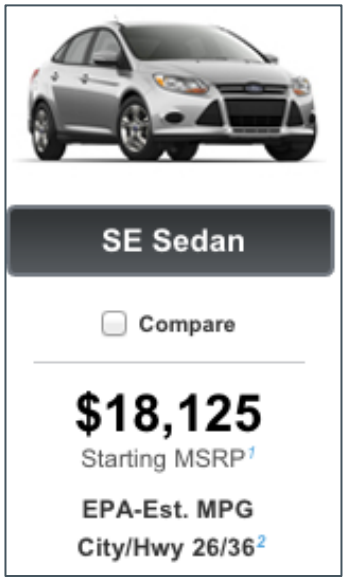
4 Fuel efficiency labeling

Vehicle fuel economy labeling schemes

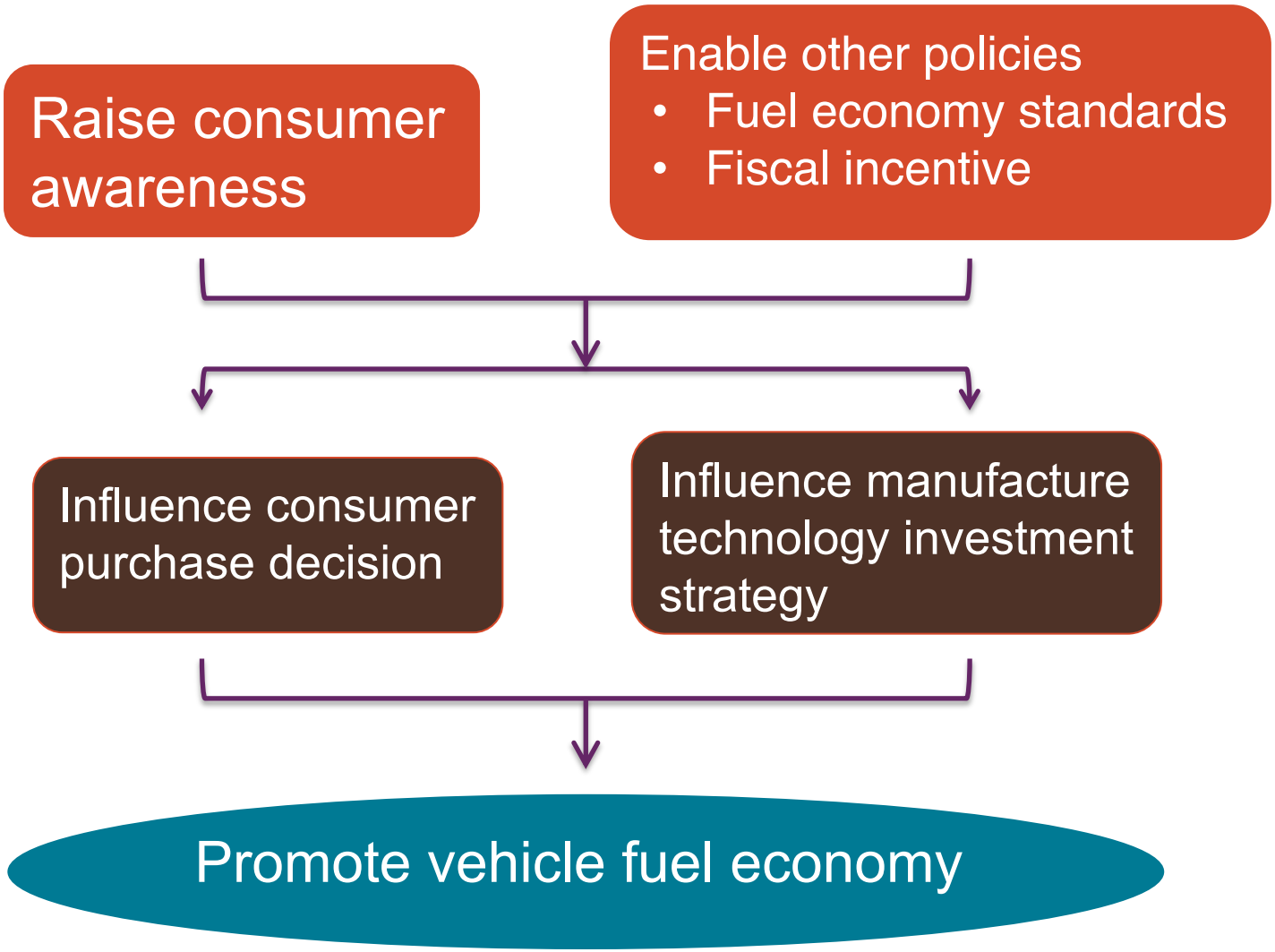
VFEL schemes include

- The “fuel economy label” referring information that is displayed about the car in the showroom, online or through other media
- Associated consumer information campaign





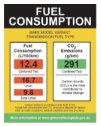
Vehicle fuel economy labeling (VFEL) makes an impact



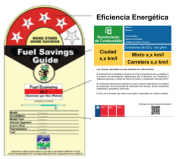
https://www.theicct.org/publications/review-and-evaluation-vehicle-fuel-efficiency-labeling-and-consumer-information

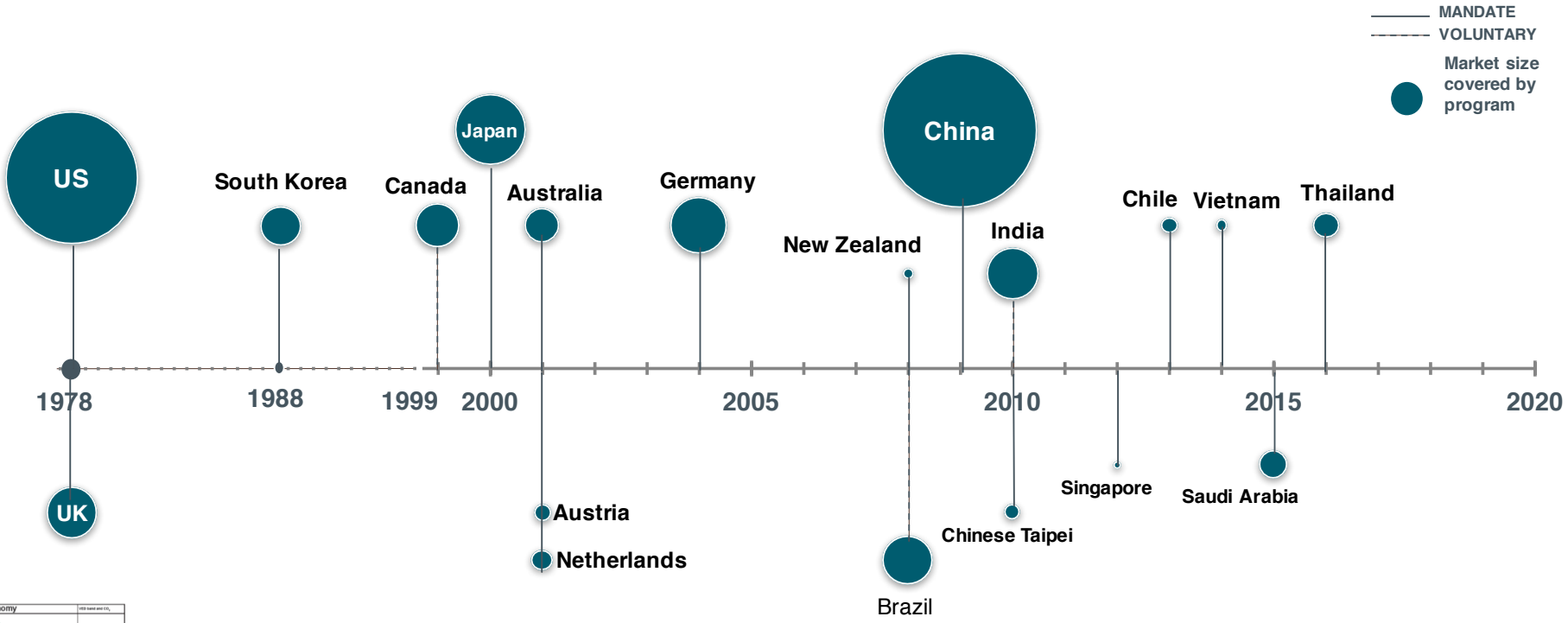
Implementation of vehicle fuel economy labeling scheme

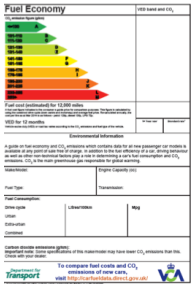
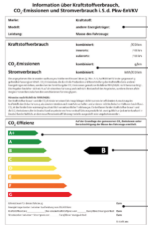


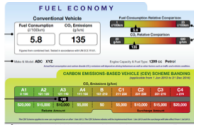





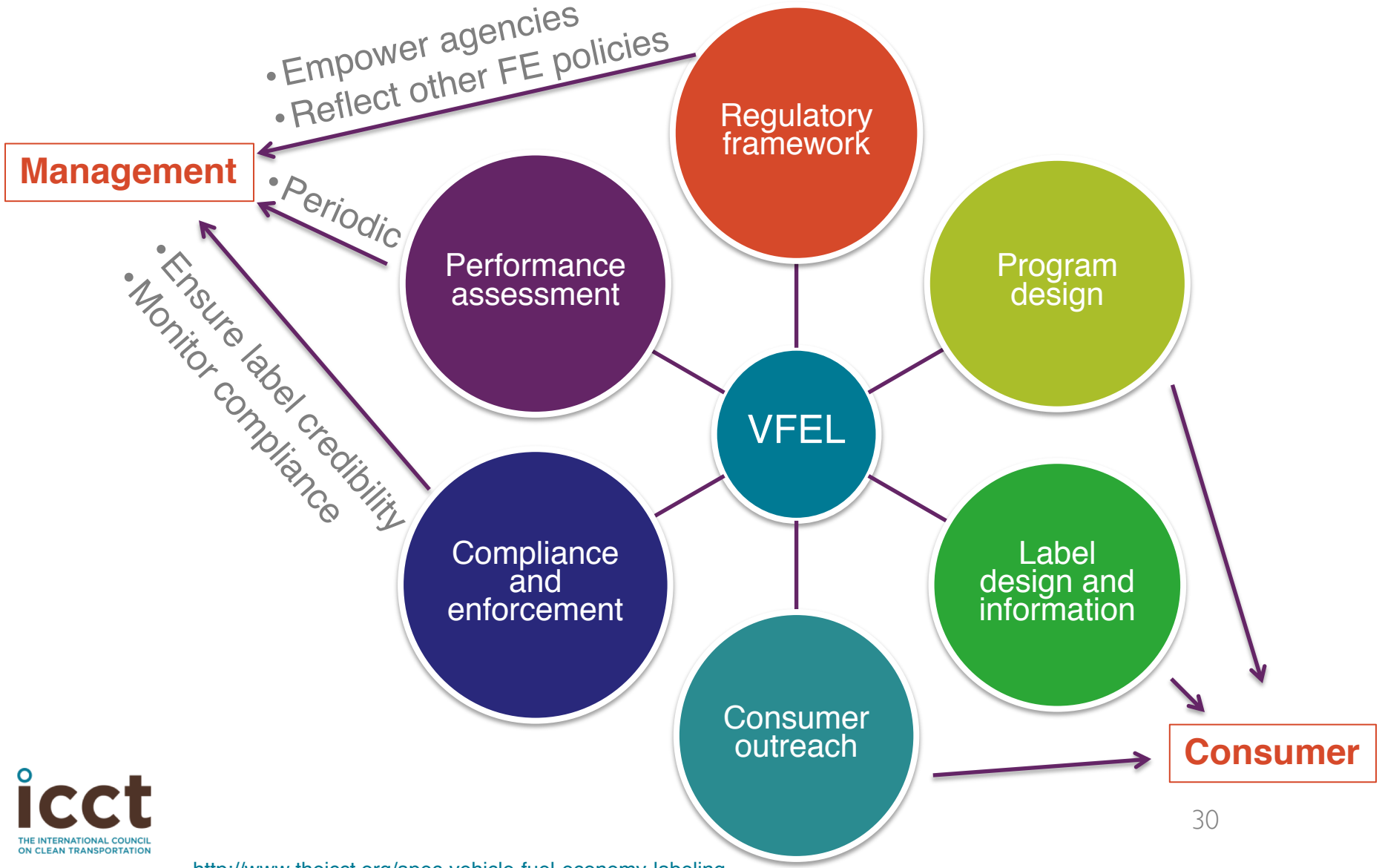





Six key elements for VFEL programs

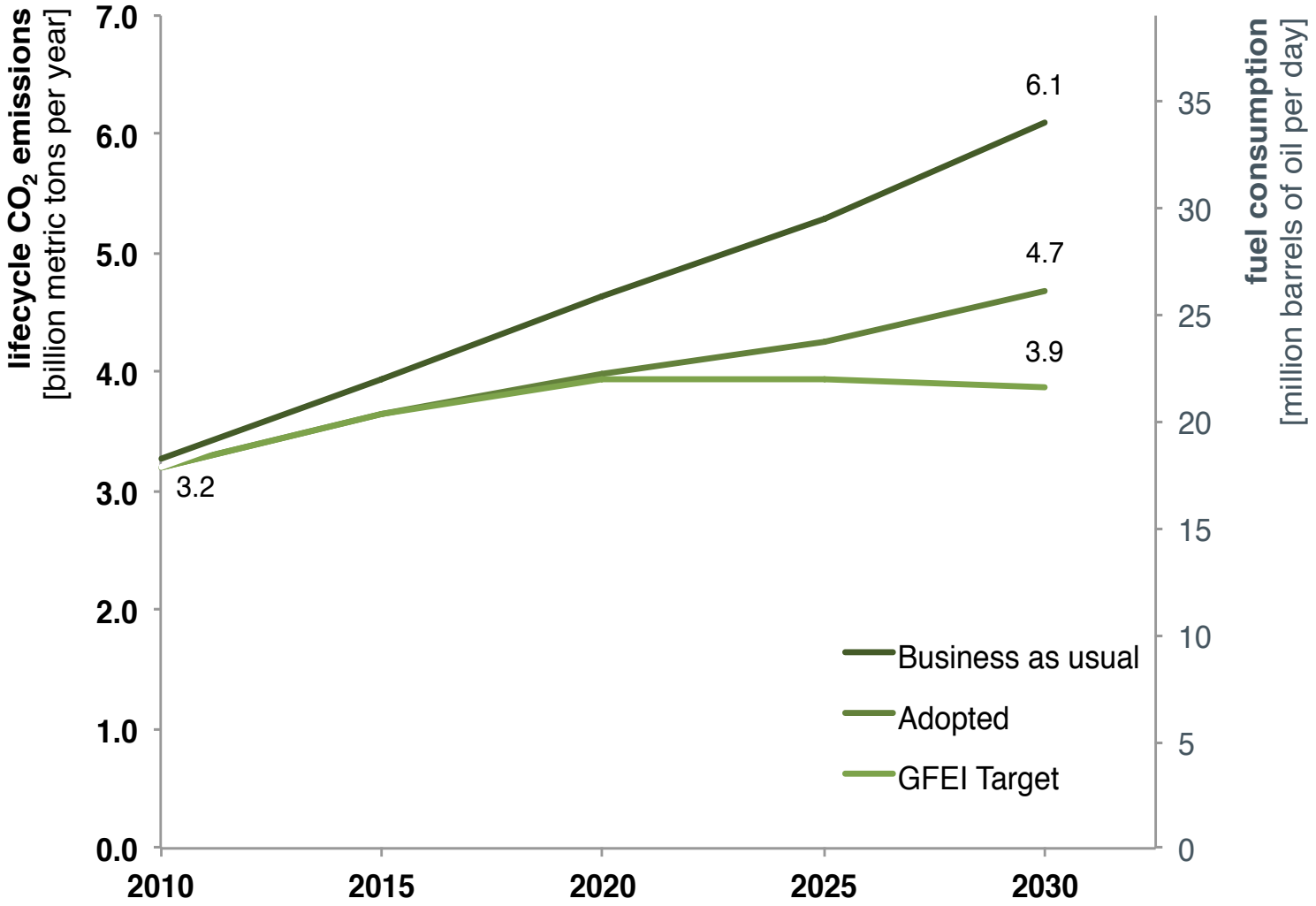


http://www.theicct.org/apec-vehicle-fuel-economy-labeling

Conclusions

- Fuel economy standards are one of the most cost effective and politically attractive carbon mitigation measures
- Emerging markets are considering adopting fiscal measures such as feebates (which are easier to development and implement), especially in the context of promoting EVs
- Fuel efficiency labeling is widely spread in many markets
- Nations may want to consider regional collaborations to develop and implement policy actions across a wider market.

How are we doing against GFEI target to double fuel economy for new passenger vehicles by 2030?



*Estimated using ICCT's Global Transportation Roadmap model (Facanha, et al., 2012). **Business as usual** = vehicle efficiency remains at 2005 levels. **Adopted** = currently adopted policies. **GFEI Target** = countries adopt standards that reduce average fuel consumption of new vehicles to 50% below 2005 levels by 2030 (GFEI, 2014).*

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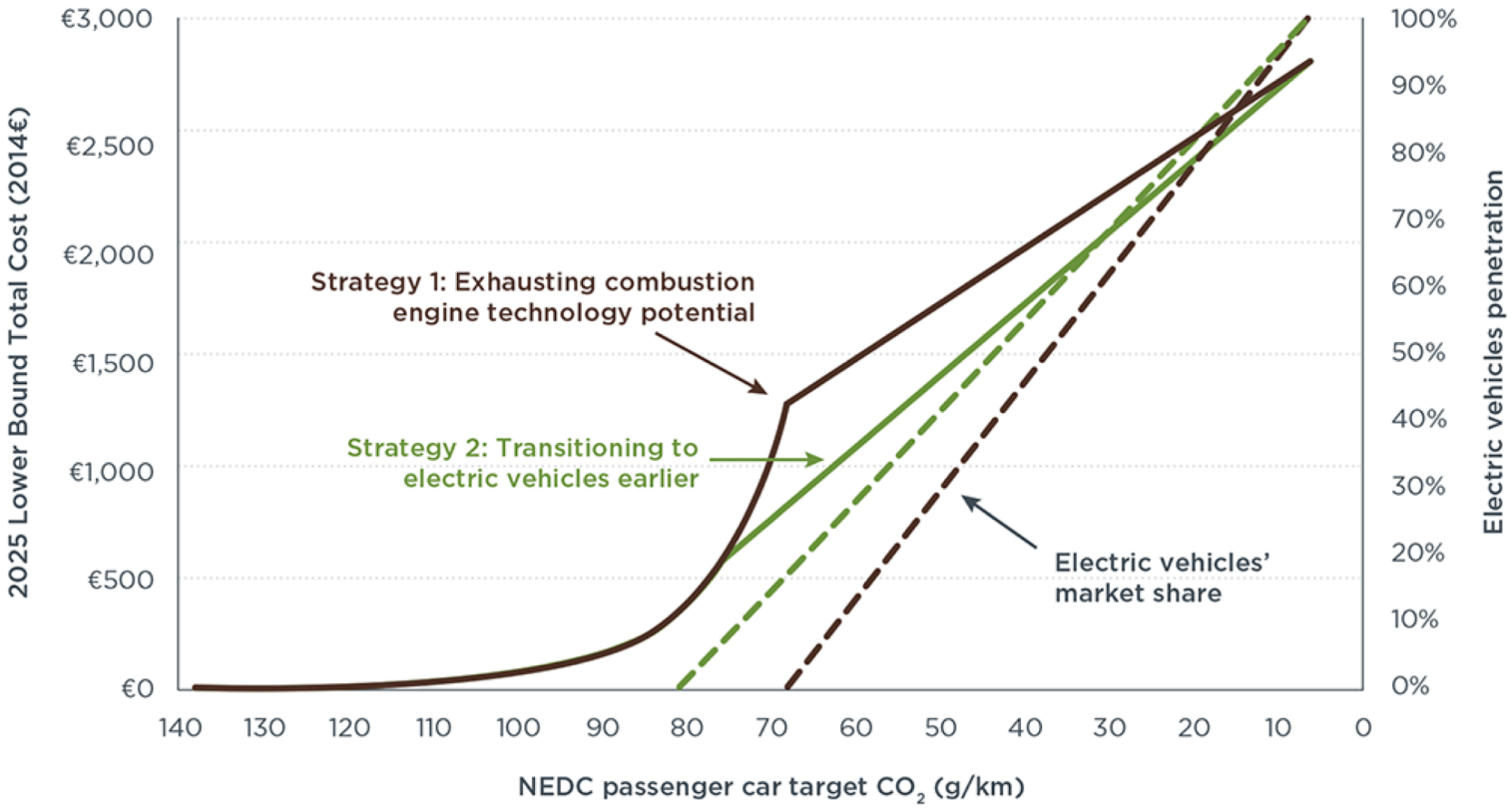
A ~70 g/km (NEDC) target by 2025 can be achieved cheaper if transitioning to electric vehicles earlier



CO_2 target (NEDC)	Total cost (2014€)		Electric vehicles' market share
	2025	2030	
80 g/km	€300 - €1,350	€250 - €1,100	4 - 17%
70 g/km	€650 - €1,900	€500 - €1,550	17 - 28%
60 g/km	€1,000 - €2,450	€750 - €1,950	30 - 39%
50 g/km	€1,300 - €2,950	€1,000 - €2,350	43 - 51%
40 g/km	€1,650 - €3,500	€1,250 - €2,750	56 - 62%

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Source: http://www.theicct.org/2020-2030-co2-standards-cars-lcvs-eu-briefing-nov2016