The ASEAN – German Technical Cooperation Programme
"Cities, Environment and Transport"

Transport and Climate Change

ASEAN Fuel Economy Platform Meeting

Alex Körner

alex_koerner@gmx.de

GIZ consultant

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Implemented by

Content

- Understanding the past: Development of the Fuel Economy Baseline
  - Data
  - Methodology
- Key aspects for the implementation of different fuel economy measures
  - Fuel economy/CO_2 emission standards
  - Tax incentives – Feebate scheme
  - Fuel taxation

Development of the fuel economy baseline

Data – development of fuel economy baseline

- Effective fuel economy policies needs to be based on good knowledge of the average fuel consumption (L/100km) of the current vehicle fleet
  - In a first step: vehicles entering the market (i.e. new sales or used imported)
  - In second step: entire rolling vehicle stock
  - **Possible barriers**

    → *Availability*: What data is available – national car registration? What institutional framework is needed to continuously collect and develop data?

    → *Accessibility:* Who is in charge of the data? Can the data be shared?

    → *Vehicle market structure*: Is the share of used imported vehicles significant?

    → *Data gaps:* How to get FE data? How to convert FE data based on different test cycles?

FE Baseline – minimum data requirement

Number of sales in at least one past year by:

- Vehicle make and model (e.g. Toyota Corolla) ✓
- Model production year (important for used imports) ✓
- Engine displacement (liters or cubic centimeters) ✓
- Engine power (kW or HP) ✓
- Fuel type (e.g. gasoline, diesel, LPG, CNG, electricity) ✓
- Rated fuel economy (Lge/100km, alternatively CO_2 emission, gCO_2/km) and test cycle basis (NEDC, FTP, JC08) ?
  - FE data sources: http://www.theicct.org/info-tools/official-pv-fuel-economy-data-sources

Sales weighted average new vehicle FE

SUM =SUMPRODUCT(J2:J16,K2:K16)/SUM(J2:J16)

SUMPRODUCT(**array1**, [array2], [array3], [array4], ...)

	A	B	C	D	E	F	G	H	I	J	K
1	Country	Year	Vehicle Type	Model	Engine ccm	Engine kW	Fuel type	Transmission type	Emission standard	Vehicles registered	Final FE data, lge/100km
2	xxx	2013	Pass.	VW Polo	1199	55	Diesel	Manual	EURO5	614	4.1
3	xxx	2013	Pass.	VW Polo	1199	55	Diesel	Manual	EURO5	511	3.7
4	xxx	2013	Pass.	Renault Clio	1461	55	Diesel	Manual	EURO5	1474	3.9
5	xxx	2013	Pass.	Renault Clio	1461	55	Diesel	Manual	EURO5	1448	4.1
6	xxx	2013	Pass.	Renault Clio	1461	55	Diesel	Manual	EURO5	1140	4.3
7	xxx	2013	Pass.	Suzuki Grand Vitara	1870	95	Diesel	Manual	EURO5	217	7.5
8	xxx	2013	Pass.	Jaguar XF	2967	180	Diesel	Automatic	EURO5	20	5.8
9	xxx	2013	Pass.	Audi A7	2967	180	Diesel	Automatic	EURO5	31	6.5
10	xxx	2013	Pass.	Audi A7	2967	180	Diesel	Automatic	EURO6	29	6.4
11	xxx	2013	Pass.	BMW 535	2993	230	Diesel	Automatic	EURO6	1	6.0
12	xxx	2013	Pass.	BMW 535	2993	230	Diesel	Automatic	EURO5	1	6.2
13	xxx	2013	Pass.	Jeep Grand Cherokee	2987	160	Diesel	Automatic	EURO5	97	8.1
14	xxx	2013	Pass.	BMW X6	2993	180	Diesel	Automatic	EURO5	61	8.0
15	xxx	2013	Pass.	Citroen C5	1560	84	Diesel	Manual	EURO5	280	5.2
16	xxx	2013	Pass.	Citroen C5	1560	84	Diesel	Automatic	EURO5	247	4.8
17											
18	Total average									6185	4.4
19											
20	<4									1986	3.8
21	4 to 5									3449	4.2
22	5 to 6									306	5.2
23	6 to 7									69	6.4
24	>7									375	7.7

$$FE = \frac{\sum_i^n Sales_i \times FE_i}{\sum_i^n Sales_i}$$

- Targeted FE data coverage: 85% of the newly registered cars
- Identification of the best selling 50 to 100 models (based on above criteria)
- Match with FE data sources

Key aspects of FE policy development and implementation

Key elements of FE standard development

- Establishment of the fuel economy base-line: **Necessary for all FE policies!**
- Definition of long-term target based on comparative assessment and cost-benefit analysis
- Establishment of the methodology: footprint or weight based corporate average target, incorporation of additional measures to foster the uptake of alternative fuel vehicles (e.g. super credits for EVs/PHEVs), selection of underlying test protocol – e.g. WLTP
- Setup of institutional framework
  - Annual reporting of data – data format, selection of institution in charge of the process
  - Set-up of control mechanisms: in-use FE testing
  - Enforcement – definition of fines, selection of institution in charge of the process, who is getting fined: manufacturers, importers?
- Phase in of the FE standard over a defined period

FE Standard: Definition of long-term target

Comparative assessment of absolute targets and relative improvement rates in countries with FE standards around the world:

- **EU** – 2021 target of 95gCO2/km (~4.1 Lge/100km); ∅ -3.5% annual reduction of gCO_2/km between 2007 and 2014
- **U.S.** – 2025 target of 49 MPG by 2025 (~4.8 Lge/100km [NEDC]); ∅ -2.7% annual reduction of fuel consumption between 2008 and 2014
- **Japan** – 2020 target of 5.2 Lge/100km (NEDC); ∅ -3.4% annual reduction of fuel consumption between 2000 and 2013
- **China** – 2020 target of 5.0 Lge/100km (NEDC); ∅ -1.9% annual reduction of fuel consumption between 2002 and 2014
- **India** – 2020 target of Lge/100km (NEDC); ∅ -1.9% annual reduction of fuel consumption 2006-2012
- **GFEI** target – reducing fuel consumption by 50% by 2030 to 4.2 Lge/100km (WLTC); ∅ -3.6% annual reduction of fuel consumption

The target needs to be sufficiently long-term, at least 2025, to provide investment security as well as adequate time for car makers to deploy technologies in regular model cycles

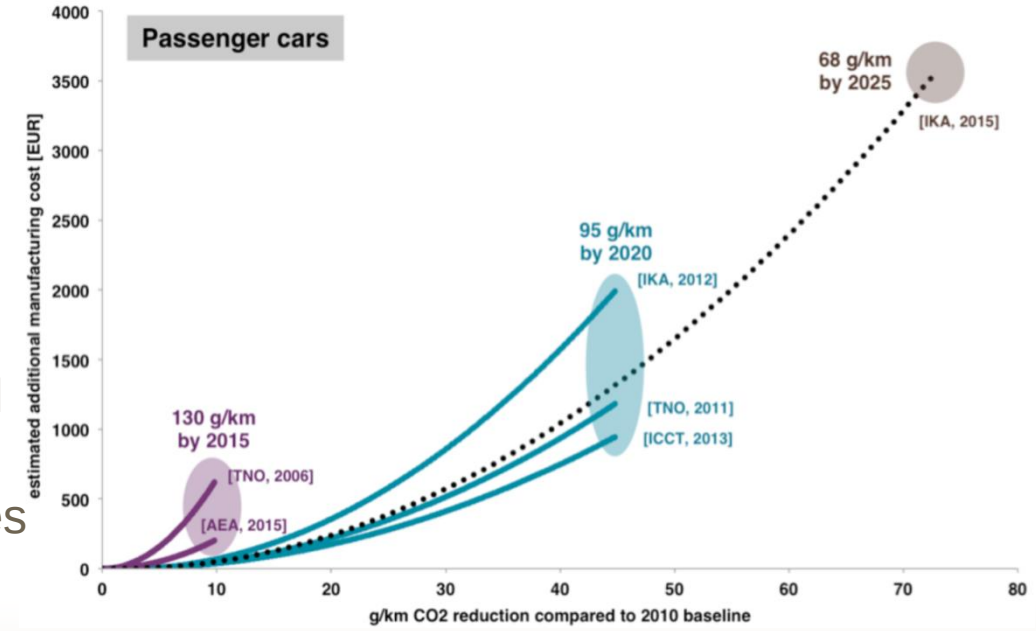
FE standard: Cost-benefit analysis

Assessment of region-specific technology costs to achieve the FE target based on:

- the baseline FE
- estimates of additional costs per vehicle by predominant size/powertrain classes
- projected vehicle sales and estimated size class distribution

Assessment of savings due to reduced fuel use based on:

- the targeted FE development of new vehicles over time
- projected vehicle sales
- Assumptions on average annual driving distance per car
- Assumptions on future fuel prices



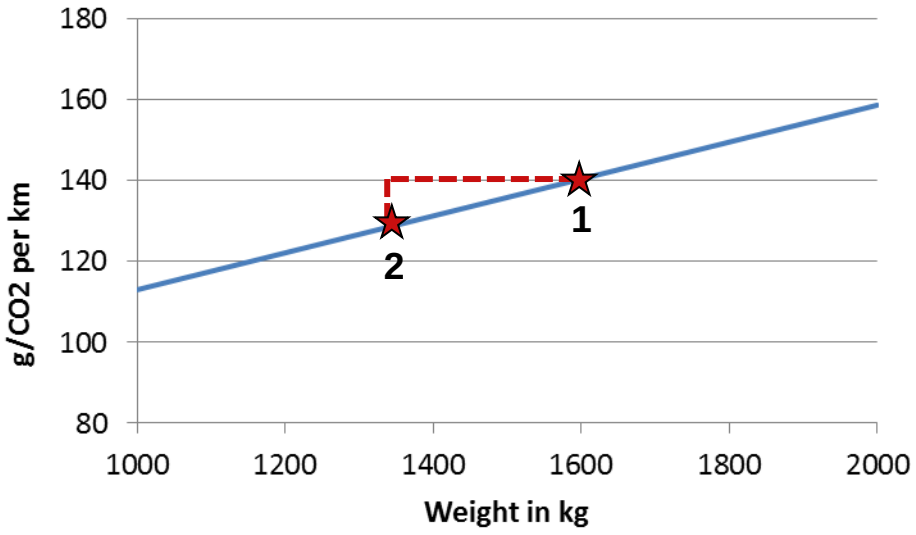
Source: ICCT

FE standard: Methodology

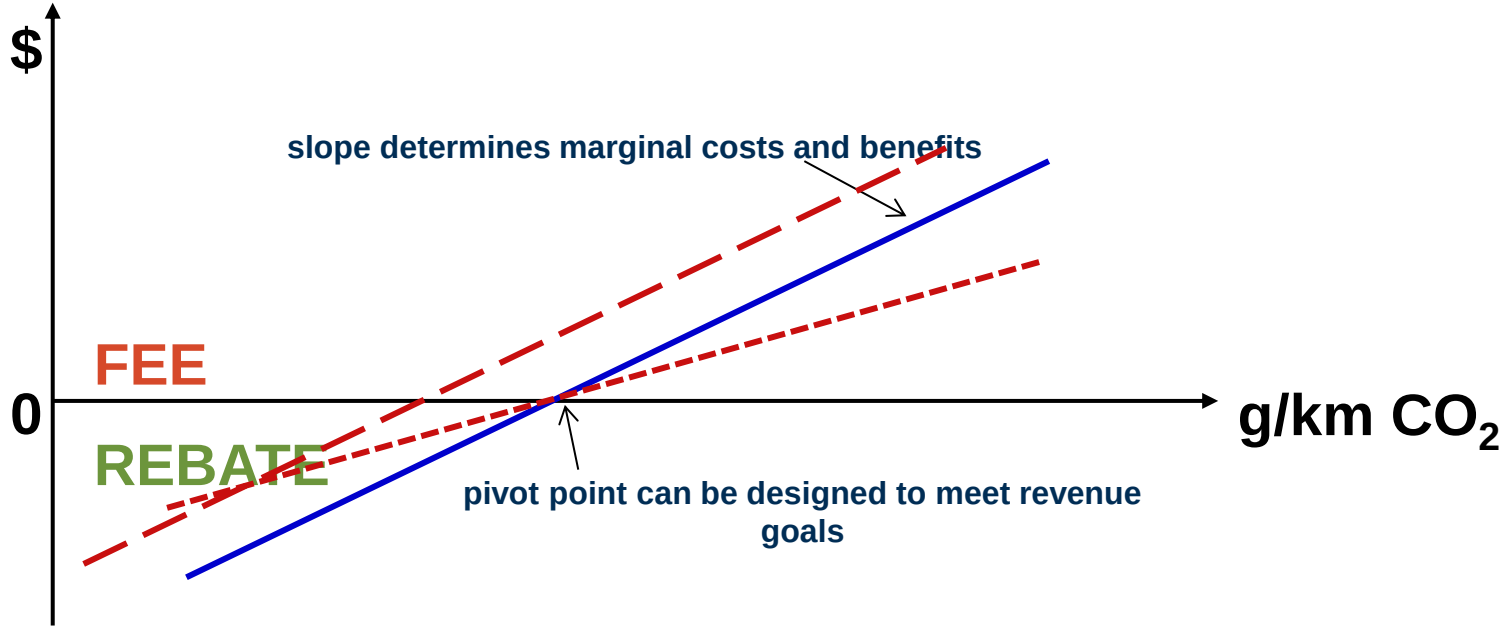
- FE standards simply based on sales weighted corporate average FE without taking into account further attributes like size or weight would be most efficient, but lack political support
- Footprint based manufacturer specific FE target is preferable over weight based system since it rewards vehicle light-weighting
- Why? – example EU:

Specific emissions of CO_2 = 130 + a × (M – M_0)

M	is the average mass of the manufacturer's fleet in kilograms (kg)
M_0	is the reference mass (1 372.0 kg)
a	is 0.0457



Key elements of a feebate



- The slope of the function determines the incentive to shift towards fuel efficient vehicles
- The position of the pivot point on the x-axis determines whether the policy is revenue generating, revenue neutral or whether it creates costs to the government
- The pivot point needs to be periodically adjusted = shifted to the left to keep the intended budgetary effect with evolving FE improvement

Comparison standard/feebate

FE standard

- "Standards require detailed knowledge of the vehicle fleet, current technology composition, future technology development, technology costs and benefits, lead-time, and models to assess the combined impact of all these factors" (http://www.theicct.org/best-practices-feebate-program-design-and-implementation)

Feebate requirements

- Fuel economy baseline
- The marginal cost value upon the fuel consumption/CO_2 reductions (slope of the function)
- The decision whether to use one single function or manufacturer adjusted systems taking into account additional attributes like weight or size
- The decision whether to design a cost neutral, a revenue generating or a subsidy scheme
- Consumer vs. manufacturer based program (http://www.theicct.org/best-practices-feebate-program-design-and-implementation)
- A feebate system requires far less institutional prerequisites

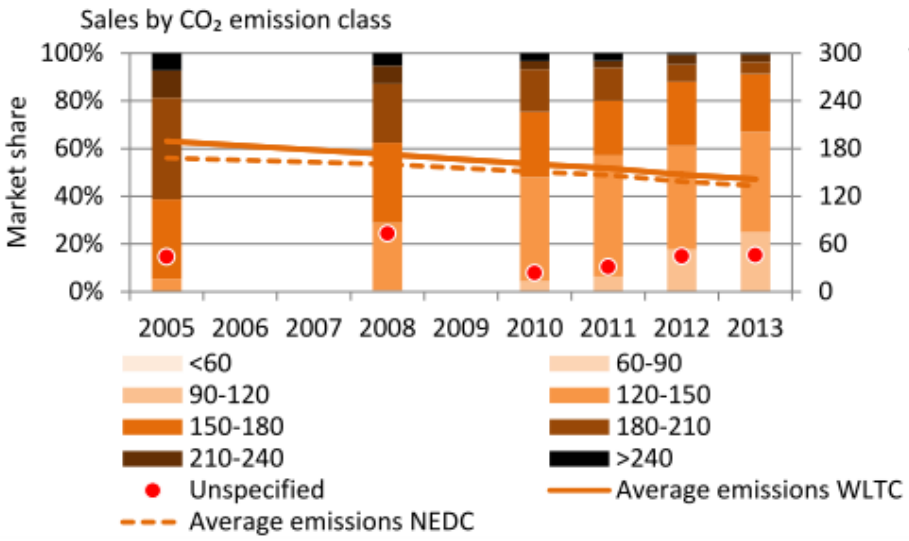
Fuel taxation

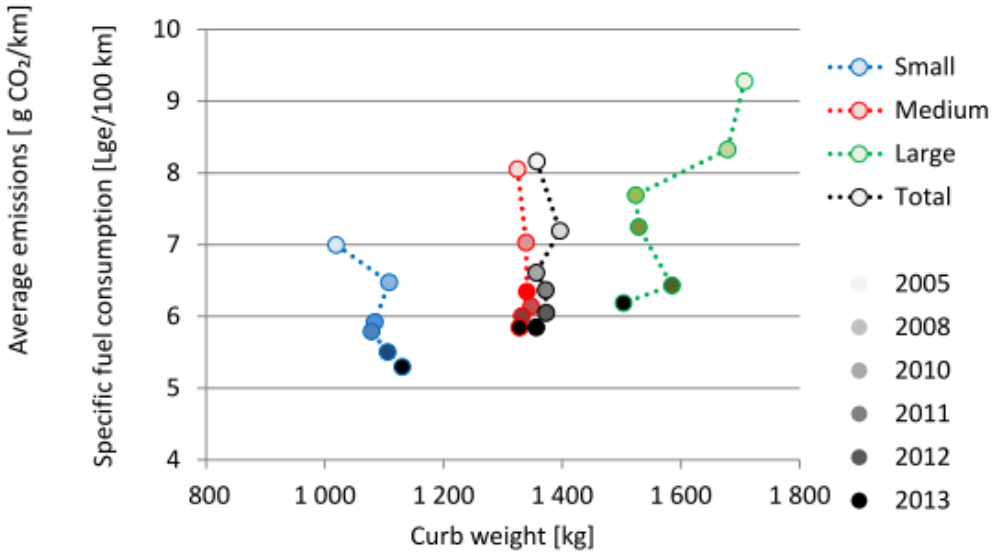
- Represents the most correct implementation to price externalities of using petroleum fuels:
  - No rebound effect since driving (and not attributes of the vehicle) is taxed
  - Does not only focus on energy conservation but also takes into account fatalities (less driving = less accidents), congestion and pollutant emissions (e.g. through differentiated taxation of gasoline and diesel)
- Provides similar incentive to manufacturers to produce more efficient vehicles like a feebate scheme
- Is easy to transpose in reality

BUT:

- FE taxation is a regressive measure – lower income households spent a higher share of disposable income on fuels than higher income households
- Consumers do generally not well in anticipating future fuel savings when making a purchase decision
- Politically unpopular

Fuel taxation: Turkey





Source: GFEI WP12

- Turkey's new vehicle fleet is amongst the most efficient in the world, although there are almost no or even contradictory FE policies
- Between 2005 and 2013 the sales weighted average weight of the Turkish new vehicle fleet decreased
- The high fuel price (2014: ~USD 1.90/L) suggests its significant effect on the consumers decisions to buy efficient vehicles

Last but not least: three helpful sources

- **Fuel Economy Policy Impact Tool (FEPIT)** – A tool to test the impact of various FE policies on future average FE of new sold LDVs https://www.iea.org/topics/transport/subtopics/globalfueleconomyinitiativegfei/fepit/
- **Transportpolicy.net** – great overview about fuel economy, pollutants and fuel quality policies around the world http://transportpolicy.net/index.php?title=Main_Page
- **FE data sources** compiled by ICCT: http://www.theicct.org/info-tools/official-pv-fuel-economy-data-sources

THANKS!