Cost Benefit Analysis on Fuel Economy: Thailand & The Philippines

Peerawat SAISIRIRAT

Renewable Energy Laboratory
National Metal and Materials Technology Center (MTEC)
&
The ASEAN – German Technical Cooperation Programme
"Cities, Environment and Transport"
Transport and Climate Change

The 2nd APEC Workshop on Policy Dialogue on Fuel Economy Platform
&
The 4th Forum of the ASEAN Fuel Economy Platform

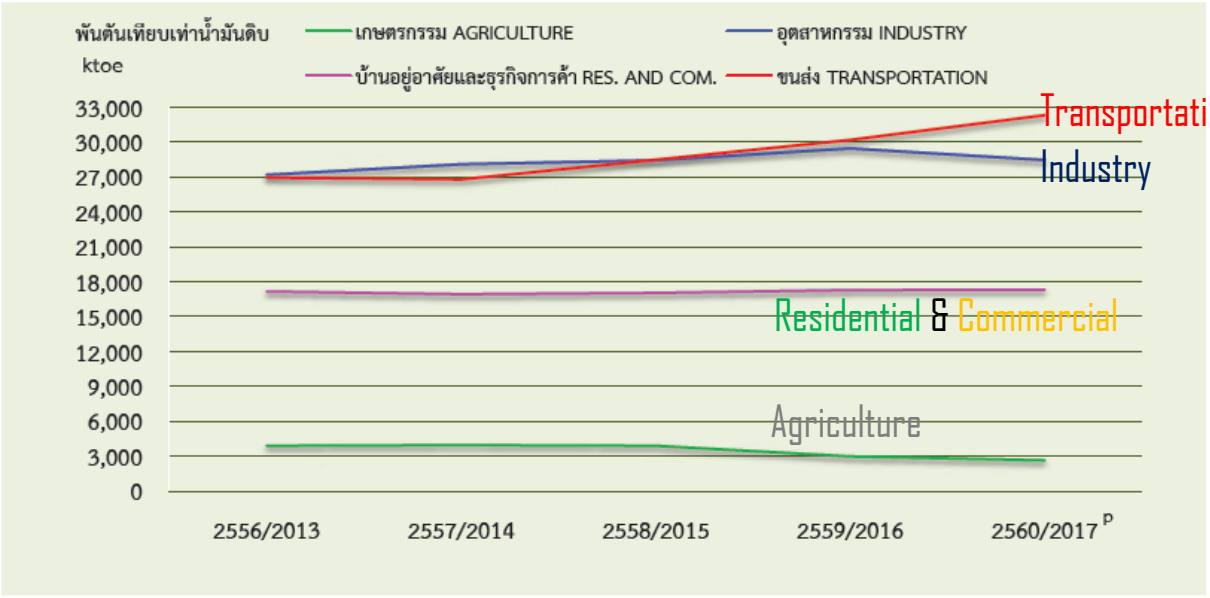
Outline:

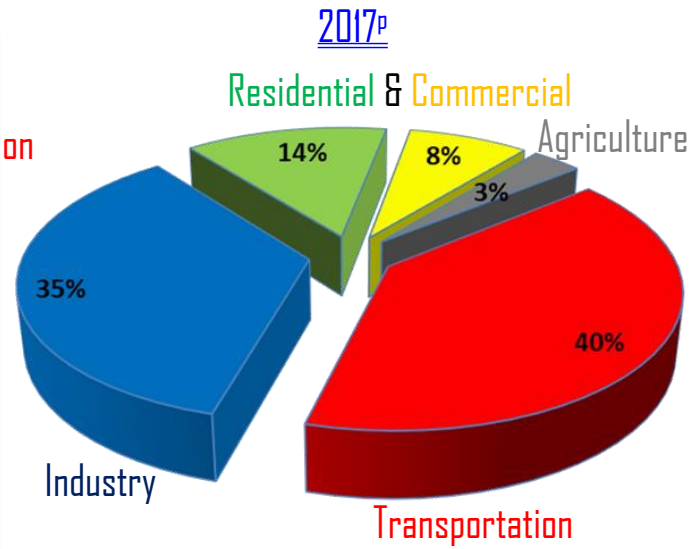
- Rationales and introduction
- Cost benefit analysis of fuel economy improvement in Thailand
- Results in customer's viewpoint (Total Cost of Ownership)
- Results in government's viewpoint
- Impacts of fuel economy improvement in the Philippines
- Updated recent government's efforts on FE improvement (Thailand & Philippines)

Rationale: Thailand final energy consumption

- Transportation sector begins to exceed industry sector since 2015
  - Energy efficiency is the key

FIGURE 1 TRENDS OF FINAL ENERGY CONSUMPTION BY ECONOMIC SECTORS

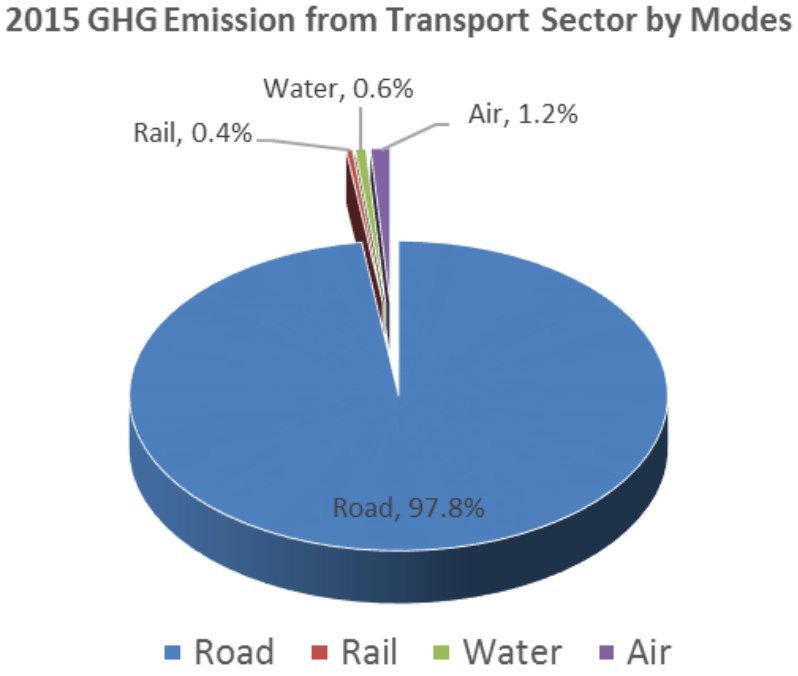


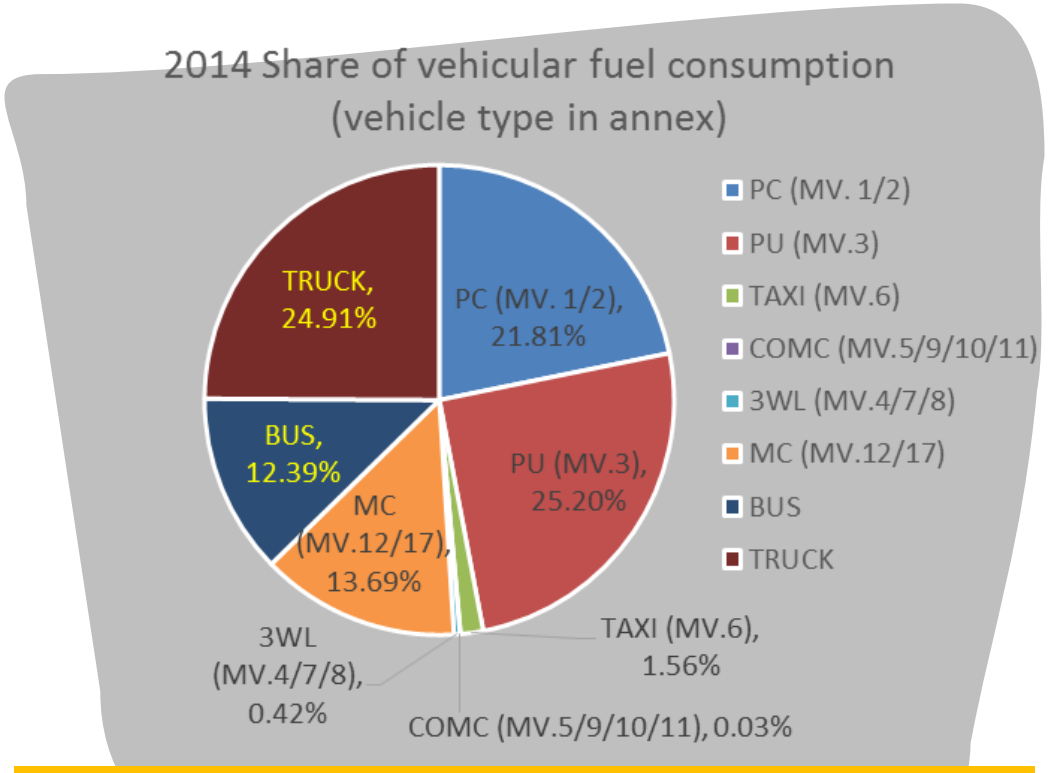


หมายเหตุ : อุตสาหกรรมประกอบด้วย อุตสาหกรรมการผลิต เหมืองแร่ และก่อสร้าง Note : Industry sector includes manufacturing, mining, and construction.

DEDE (2017), Energy Balance of Thailand 2560/2017, http://www.dede.go.th/download/state_61/Energy Balance of Thailand 2017.pdf
EPPO (2017), Final Energy by Sector (Graph), http://www.eppo.go.th/index.php/en/en-energystatistics/summary-statistic?orders[publishUp]=publishUp&issearch=1, http://www.eppo.go.th/epposite/images/Energy-Statistics/energyinformation/Energy_Statistics/Summary/T01_02_04.ppt

Impacts of road transport by vehicle type in Thailand

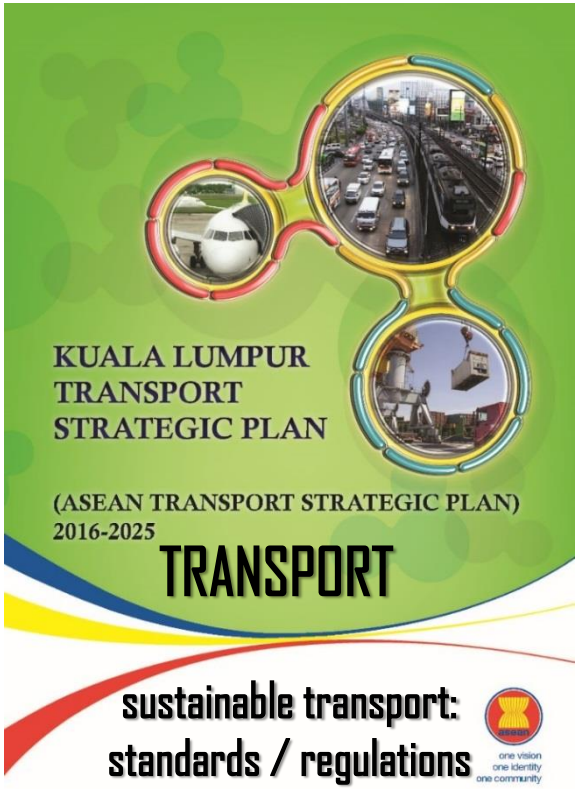


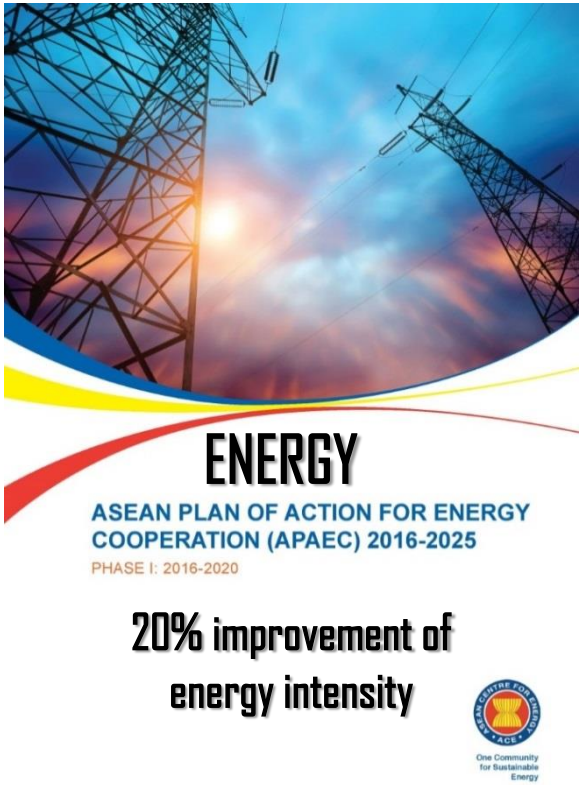


Passenger Light Duty Vehicles (PLDV)

share large contribution in road transport

FE Policy in ASEAN & Thailand





แผนพัฒนาเศรษฐกิจและสังคมแห่งชาติ

ฉบับที่สิบสอง

พ.ศ. ๒๕๖๐ - ๒๕๖๔

National Economic and Social Development Plan

improve energy efficiency by introducing CO_2-based excise tax

สำนักงานคณะกรรมการพัฒนาการเศรษฐกิจและสังคมแห่งชาติ

สำนักนายกรัฐมนตรี

ASEAN Cooperation in Transportation Fuel Economy

http://www.asean.org/storage/2016/01/11/publication/KUALA_LUMPUR_TRANSPORT_STRATEGIC_PLAN.pdf
http://www.aseanenergy.org/wp-content/uploads/2015/12/HighRes-APAEC-online-version-final.pdf
http://www.ratchakitcha.soc.go.th/DATA/PDF/2559/A/115/1.PDF

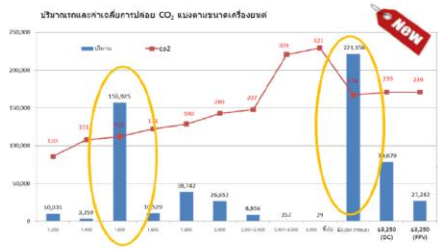
Thailand policy on fuel economy: NDC & EEP

EEP: Energy Efficiency Plan

สำนักงานนโยบายและแผนพลังงาน กระทรวงพลังงาน

มาตรการที่ 7 (2)

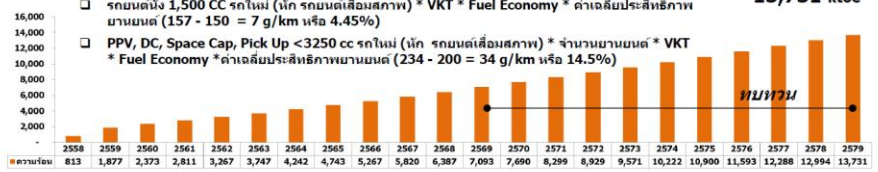
(7-2) ปรับโครงสร้างภาษีสรรพสามิตรถยนต์



ข้อมูล กรมสรรพสามิต

- ตั้งแต่วันที่ 1 มกราคม 2559 ผู้ผลิตและผู้นำเข้ารถยนต์ใหม่ ต้องติด Eco Sticker แสดงข้อมูลรถยนต์ที่ผ่านการทดสอบมาตรฐาน เพื่อให้ประชาชนใช้เป็นข้อมูลตัดสินใจเลือกซื้อรถยนต์
- รถยนต์นั่ง 1,500 CC รถใหม่ (นัก รถยนต์เสื่อมสภาพ) * VKT * Fuel Economy * ค่าเฉลี่ยประสิทธิภาพยานยนต์ (157 - 150 = 7 g/km หรือ 4.45%)
- PPV, DC, Space Cap, Pick Up <3250 cc รถใหม่ (นัก รถยนต์เสื่อมสภาพ) * จำนวนยานยนต์ * VKT * Fuel Economy *ค่าเฉลี่ยประสิทธิภาพยานยนต์ (234 - 200 = 34 g/km หรือ 14.5%)

13,731 ktoe



	2558	2559	2560	2561	2562	2563	2564	2565	2566	2567	2568	2569	2570	2571	2572	2573	2574	2575	2576	2577	2578	2579
ตามร่อน	813	1,877	2,373	2,811	3,267	3,747	4,242	4,743	5,267	5,820	6,387	7,093	7,690	8,299	8,929	9,571	10,222	10,900	11,593	12,288	12,994	13,731

p.18

GHG reduction in transportation sector

ตารางที่ ๕ – ๙ มาตรการ เทคโนโลยี และผลการลดก๊าซเรือนกระจกในภาคขนส่ง

มาตรการ/เทคโนโลยีเสนอแนะ	ปริมาณการลดก๊าซเรือนกระจก (kt-CO_2eq)																		
พ.ศ.	๒๕๕๘	๒๕๕๙	๒๕๖๐	๒๕๖๑	๒๕๖๒	๒๕๖๓	๒๕๖๔	๒๕๖๕	๒๕๖๖	๒๕๖๗	๒๕๖๘	๒๕๖๙	๒๕๗๐	๒๕๗๑	๒๕๗๒	๒๕๗๓
ค.ศ.	๒๐๑๕	๒๐๑๖	๒๐๑๗	๒๐๑๘	๒๐๑๙	๒๐๒๐	๒๐๒๑	๒๐๒๒	๒๐๒๓	๒๐๒๔	๒๐๒๕	๒๐๒๖	๒๐๒๗	๒๐๒๘	๒๐๒๙	๒๐๓๐
๑. มาตรการเพิ่มประสิทธิภาพการใช้พลังงานในการคมนาคมขนส่ง																
มาตรการเพิ่มประสิทธิภาพการใช้เชื้อเพลิงเครื่องยนต์เบนซิน	๕๐๓	๑,๒๐๙	๑,๖๒๕	๑,๘๖๑	๑,๘๗๑	๒,๕๐๖	๓,๕๑๓	๔,๔๒๓	๔,๙๐๘	๕,๐๒๙	๕,๗๕๔	๖,๙๑๔	๗,๙๕๘	๘,๕๑๕	๘,๖๕๔
มาตรการเพิ่มประสิทธิภาพเครื่องยนต์ดีเซล	๗๐๐	๑,๒๓๗	๒,๐๙๖	๒,๘๖๙	๓,๒๘๑	๓,๓๘๕	๔,๓๗๕	๕,๙๖๐	๗,๓๘๗	๘,๑๕๘	๘,๓๓๘	๙,๕๕๐	๑๑,๕๖๒	๑๓,๑๙๓	๑๔,๑๑๖	๑๔,๓๕๖

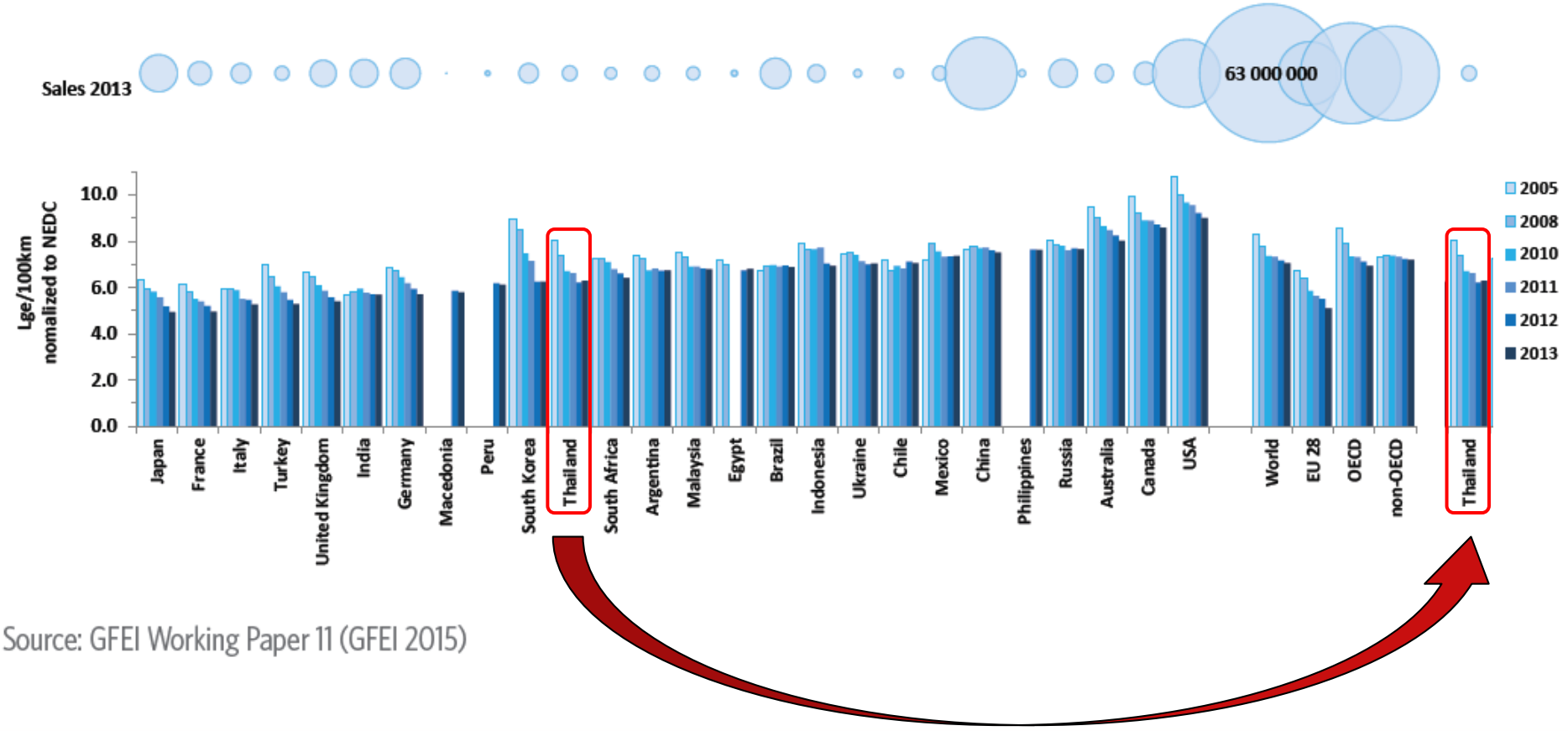
NDC: Nationally Determined Contribution

โดย สำนักงานนโยบายและแผนทรัพยากรธรรมชาติและสิ่งแวดล้อม
กระทรวงทรัพยากรธรรมชาติและสิ่งแวดล้อม

แผนที่นำทางการลดก๊าซเรือนกระจกของประเทศ
ปี พ.ศ. ๒๕๖๔ – ๒๕๗๓
(Thailand's Nationally Determined Contribution Roadmap on Mitigation 2021 -2030)

คณะรัฐมนตรีเห็นชอบเมื่อวันที่ ๒๓ พฤษภาคม ๒๕๖๐
คณะกรรมการนโยบายการเปลี่ยนแปลงสภาพภูมิอากาศแห่งชาติเห็นชอบเมื่อวันที่ ๑๐ กุมภาพันธ์ ๒๕๖๐

Thailand position in the world and possibility to improve vehicle FE



Source: GFEI Working Paper 11 (GFEI 2015)

Government activities to improve FE of new vehicles

- Thailand vehicle excise tax structure

APPROVED
Dec 2012
for implementation
on 1 Jan 2016

Categories Of Vehicle	Tax Structure Before Jan'2016				Tax Structure Eff 1 Jan 2016			
	Engine Capacity (Horse Power)	Tax Rate (%)			CO_2	Tax Rate (%)		
		E10	E20	E85		E10/E20	E85/NGV	Hybrid
Passenger Vehicles -Passenger Vehicles and, Vans less than 10 seats	≤2,000 CC	30	25	22*	≤ 100 g/km	} 30*	} 25	10
	2,001-2,500 CC	35	30	27	101-150g/km			20
	2,501-3,000 CC	40	35	32	151-200 g/km	35	30	25
					>200 g/km	40	35	30
	>3,000 CC (เกิน 220 HP)	50	50	50	>3,000 CC	50	50	50
PPV / DC /Space Cab/Pick Up	≤3,250 CC	20/12/ - /3,18			≤ 200 g/km	25*/12/5/3,18		
					>200 g/km	30/15/7/5,18		
	>3,250 CC	50			>3,250 CC	50		
Eco Car (Benzine/Diesel) / E85	1,300/1,400 CC	17			≤100 g/km	14*/12		
					101-120 g/km	17/17		
Electric Vehicle /Fuel Cell/ Hybrid	≤ 3,000 CC	10				10		
		10				**		
	>3,000 CC	50			>3,000 CC	50		
NGV-OEM	≤ 3,000 CC	20				**		
	>3,000 CC	50			>3,000 CC	50		

NEW
HEV-PPV ≤175 g/km= 23%
HEV-DC ≤175 g/km= 10%
Updated on 20 June 2018

NEW
EV tax=2%
Hybrid tax ÷ 2
Updated on 20 June 2018

Remarks * : Assign safety standard for Active Safety (ABS+ESC) for Passenger Vehicles and, Vans less than 10 seats must obtain CO_2 ≤150 g/km / PPV must obtain CO_2 ≤200 g/km / Eco Car must obtain CO_2 ≤100 g/km

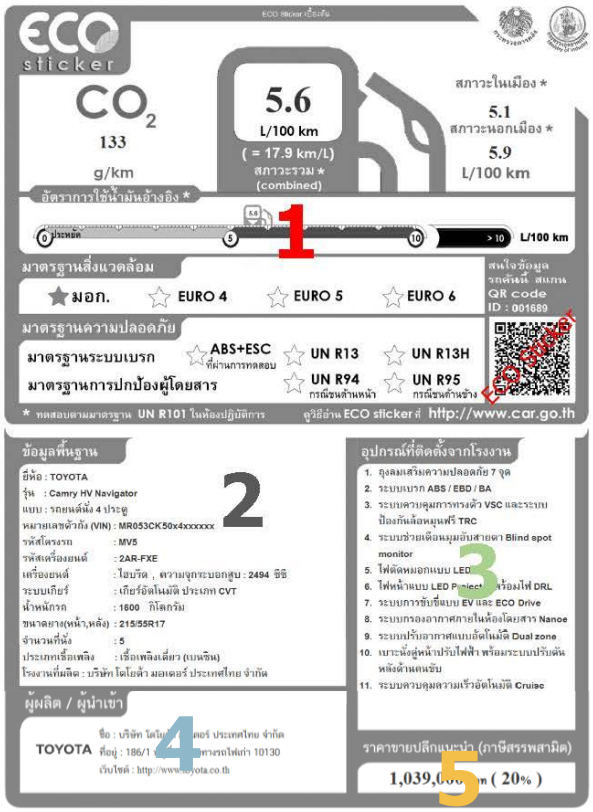
** Depend on CO_2 emission

* less than 1,780 CC but not over 2,000 CC

4

Government activities to improve FE of new vehicles

ECO Sticker



1) **ECO Label ... Sustainability**

Mobility Performance:

- **Clean:** CO_2 & Emission Standard
- **Efficient:** Fuel Consumption
- **Safe:** Active & Passive Safety Standard

2) **Car Specification:**
Model, Type, VIN, Engine, Transmission, Weight, Tire size, No. of seats, Fuel type, Manufacturing Plant

3) **Factory Installed Equipments:**

4) **Manufacturer/Importer:**
Logo, Name, Address, Website

5) **Suggested Price (Excise Tax Rate)**

New

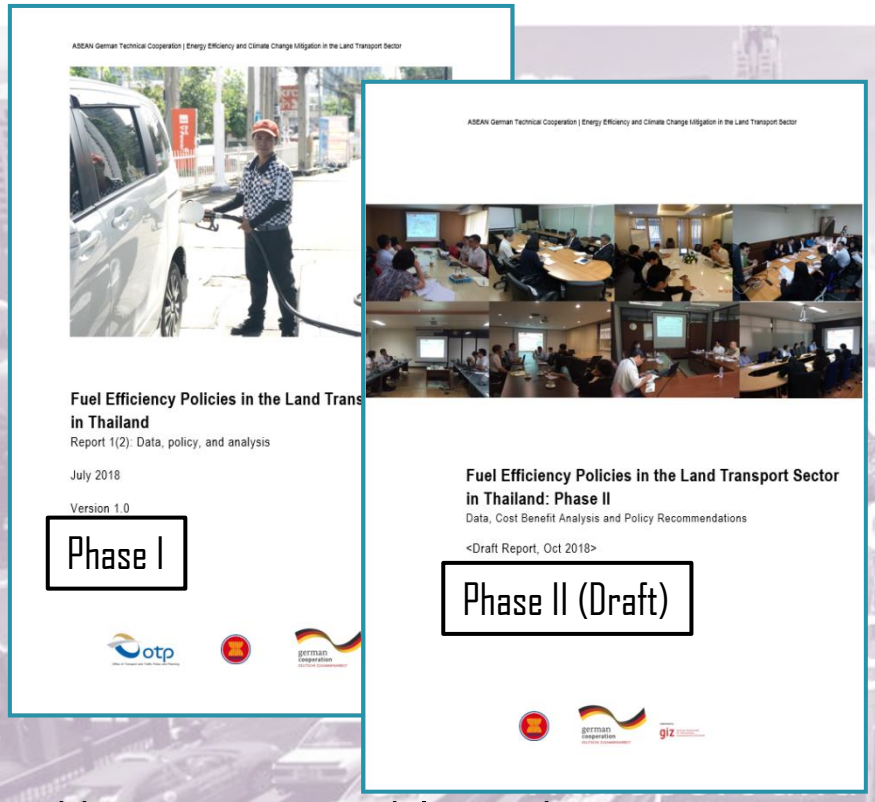
Updated on
16 September 2017

Fuel Efficiency Policies in the Land Transport Sector in Thailand

- A study of the Transport and Climate Change (TCC)

TCC Transport & Climate Change
Energy Efficiency & Climate Change Mitigation in the Land Transport Sector in the ASEAN Region

About | Implementation | Topics | News and Events | Resources



Phase I

1. To collect necessary data and conduct a policy inventory related to fuel efficiency policies and measures;
2. To use this policy inventory to conduct a gap analysis of what is missing for increased energy efficiency for PCs and MCs;
3. To identify key issues, barriers, opportunities, and recommendations for advancing fuel efficiency policies in Thailand.

Phase II

1. To create a template for FE data collection, to update the data (up to year 2017) and the policies/measures related to fuel efficiency, and to analyse the impact of existing FE policies and to provide the recommendations for FE improvement.
2. To analyse COST-BENEFIT OF FE POLICIES/MEASURES implementation and model the IMPACTS OF POSSIBLE SCENARIOS and create recommendations/key considerations on implementing proposed FE policies/measurements and improving the FE technology.
3. To create common understanding and good cooperation among stakeholders; including government, private sector and customer groups, regarding the improvement of fuel efficiency of passenger cars and motorcycles in Thailand.
4. To push forward advance FE policies/measures to actual implementation.

https://www.transportandclimatechange.org

Scenario definition of FE development 2016 → 2030

According on current situation / nominal improvement rate / GFEI Target

- Current: NO FE improvement

- BAU: FE improvement of 1.0% annual rate

According to GFEI Global Target

- GFEI Target - FE improvement of 3.1% annual rate

Annual improvement rate calculation	Global FE Target (2030)
Target value [Lge/100km]	**4.4** (in 2030)
Compare to Thailand FE (current 2016: 6.81, passenger car & pickup truck)	**-3.1%** for New Vehicle

Projection toward 4.4 Lge/100km at 2030 (market average for PC & PU) then assume FE improvement at constant rate of 1.0% annually

3 Proposals of Fuel Economy Improvement measures

- Improve Eco-sticker
- Revise the Excise tax scheme for new vehicles
- Revise Fuel tax /Annual registration tax

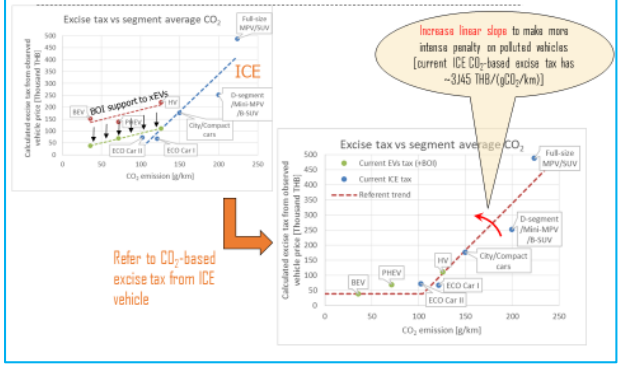
Aims of "Cost Benefit Analysis"

- ✓ To analyze cost benefit of proposed FE policy/measure implementation
- ✓ To model the impacts of possible scenario and
- ✓ To create recommendations/key considerations on implementing proposed FE policy/measures and improving the FE technology

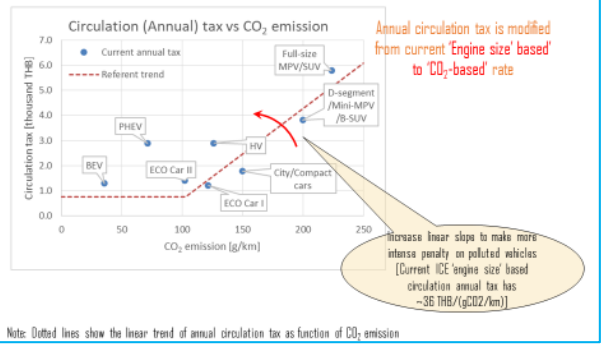
Required FE policy toward desired FE target

- Focusing on 3 Proposals of Fuel Economy Improvement measures

Revise how Excise tax change with CO_2

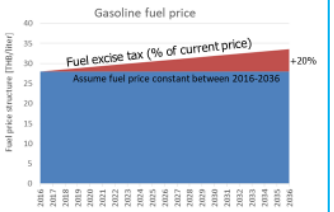


Revise how Annual registration tax change with CO_2



Revise Fuel price and Fuel tax

- Assumption of fuel price:
  - Fuel price is assumed to be constant as current value (December 2017) in BAU scenario
- Fuel excise tax:
  - Therefore the additional increment of BAU fuel price is defined as benefit in fuel excise tax.



Assumption		BAU	Assumptions for GFEI target scenario
Industry baseline for FC improvement rate		1.00%	1.00%
Impact of eco-sticker on FC improvement rate		-	0.1%
Linear slope of excise tax [THB/(gCO_2/km)]	Passenger car	3,145*	4,029
	Pickup truck	1,044*	1,999
Linear slope of annual registration tax [THB/(gCO_2/km)]	Passenger car	As a function of engine size	110
	Pickup truck	As a function of vehicle curb weight	132
Fuel tax increase (%)		Static fuel price	20%

Target	2016	2030
PC	5.68	3.66
PU	7.67	4.94
Average	6.81	4.38

Methodology of the COST BENEFIT ANALYSIS

- Impacts projection of FE policy by using FEPIT* (Fuel Economy Policy Implementation Tool)
  - ➢ OUTPUT ➔ Policy intensive level {Excise tax / Circulation tax / Fuel tax toward the desired FE target}
    ➔ Projection of Market share
    ➔ Projection of Fuel Consumption for Passenger car & Pickup truck
- Determine impacts on Owner (customer) 's viewpoint (comparing by Net Present Value in 20 years)
  - ➢ By variations of ➔ Capital cost: Vehicle price at factory gate (with improvement of Fuel Economy†)
    ➔ Capital cost: Excise tax change
    ➔ Annual registration tax change
    ➔ Fuel expense: decrease with FE improvement / change with fuel price
    ➔ Maintenance cost: depended on technology (cost for EV is higher for battery replacement)
- Determine impacts on government 's viewpoint (e.g. fuel saving, CO_2 reduction, government income: taxes)

*FEPIT Tool – Fuel Economy Implementation Tool, ICCT (International Council on Clean Transportation)

†Cost curve with FE improvement – mainly from ICCT

Updated FE database for new Passenger Light Duty Vehicle (PLDV)

Weight Average FE of Passenger Light Duty Vehicles (PLDV) sales during 2013-2017

Vehicle types	New sale (Top 10 ranked vehicles)					Weighted-average FC (Lge/100 km)				
	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017
1: Eco car	187,429	118,519	87,745	114,095	156,234	4.88	4.89	4.88	4.75	4.76
2: City car, subcompact : Sedan & Hatchback	271,018	167,522	117,548	76,447	86,200	5.99	5.98	5.78	5.85	5.82
3: Compact car C-segment : Sedan Hatchback Coupe Roadster	89,975	66,586	40,624	47,820	53,797	6.45	6.51	6.55	6.19	6.14
4 : D-segment full size sedan	34,363	19,343	16,407	12,312	9,118	7.22	7.33	7.11	7.25	7.25
5 : mini-MPV and B-SUV	42,046	41,046	50,690	39,417	40,293	7.44	6.95	6.62	6.25	6.25
6 : SUV and MPV	10,307	10,617	14,332	13,790	22,974	8.83	7.74	7.59	7.74	7.48
7 : PPV	58,942	48,646	69,063	60,683	59,576	9.52	9.17	8.43	8.15	8.15
8 : Single cab pickup	75,024	51,325	50,851	48,127	44,485	7.65	7.66	7.60	7.40	7.36
9 : Extra cab pickup	278,019	206,130	168,236	176,758	186,727	7.69	7.70	7.69	7.40	7.44
10 : 4 doors pickup	164,650	114,385	107,986	108,602	157,299	8.55	8.56	8.58	7.96	7.91
Sub-total vehicle (% share of total vehicle registration)	1,211,773 (93.25%)	844,119 (93.28%)	723,482 (90.88%)	698,051 (86.02%)	816,703 (88.79%)					
DLT new registers	1,299,508	904,969	796,089	811,518	919,820					
Annual weighted-average FC						6.98	7.01	7.08	6.81	6.75
FC change							0.4%	0.9%	-3.8%	-0.9%

PHASE 1 PHASE 2

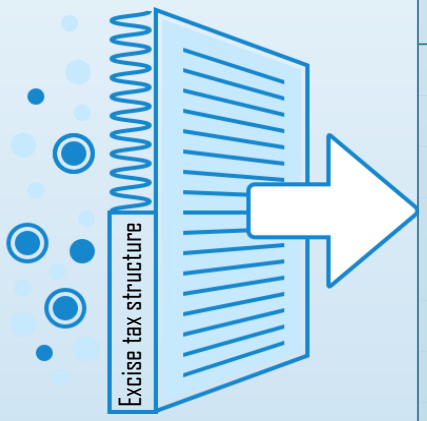
$$FE = \frac{\sum_i^n Sales_i \times FE_i}{\sum_i^n Sales_i}$$

	2013	2014	2015
	5.4	5.9	5.8
	6.9	7.9	7.7
	7.1	7.6	7.6

Ref: GIZ study based on data from Department of Land Transport
http://www.fiafoundation.org/media/45112/wp11-iea-report-update-2014.pdf
https://www.globalfueleconomy.org/media/418761/wp15-ldv-comparison.pdf

Vehicles classification for FEPIT tool

2016 Data Vehicle types	Corrected data: Weighted-average FC (Lge/100 km)
Passenger car	2016 average (5.68)
1: Eco car	4.75
2: City car, subcompact	5.85
3: Compact car C-segment	6.19
4 : D-segment full size sedan	7.25
5 : mini-MPV and B-SUV	6.25
6 : SUV and MPV	7.74
Pickup based (single/space/double cabs & PPV)	2016 average (7.67)
7 : PPV	8.15
8 : Single cab pickup	7.40
9 : Extra cab pickup	7.40
10 : 4 doors pickup	7.96
PLDV average	6.81



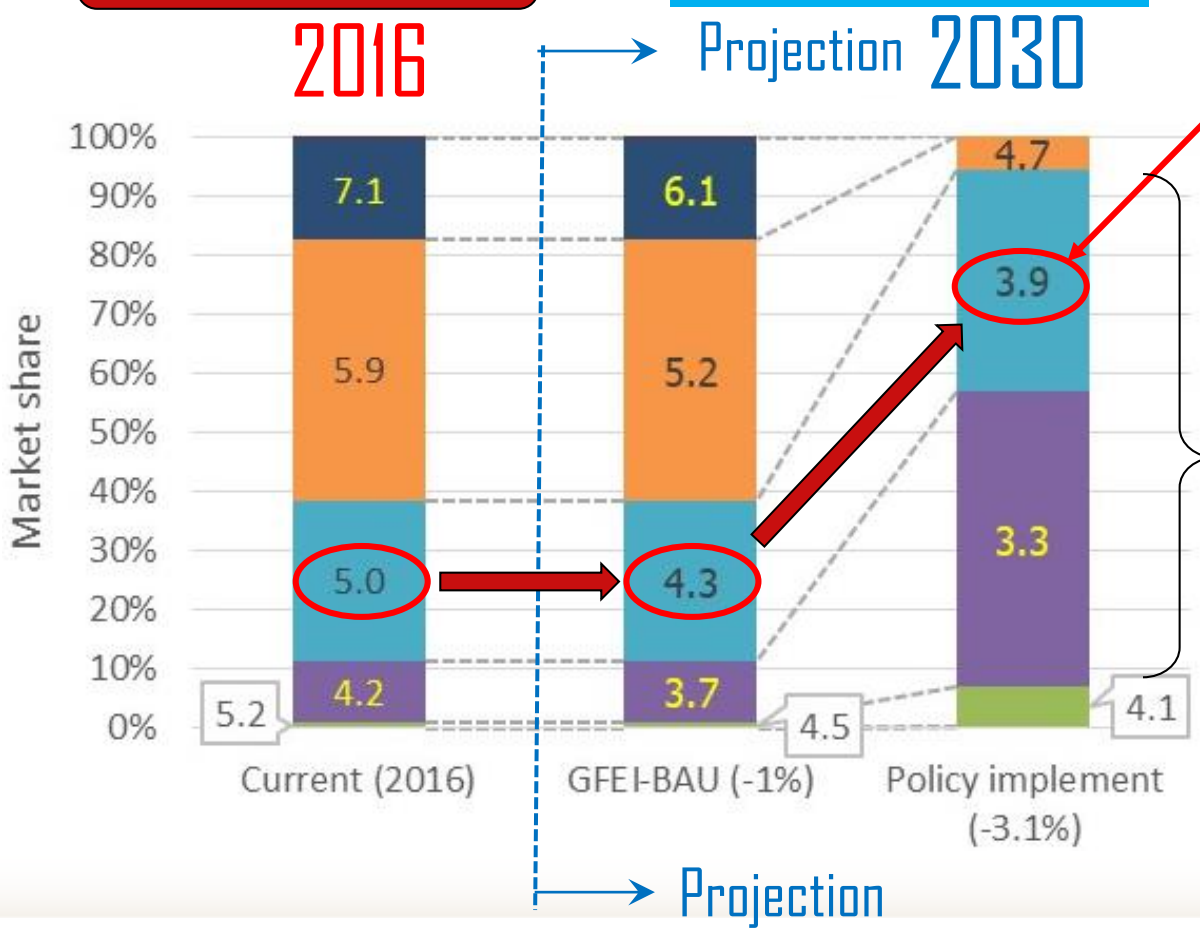
- Thai excise tax rate use different criteria between passenger car (tougher) and pickup truck (more lenient)
- Even within pickup truck with same CO_2 emission/km, excise tax rates are different: 1 < 1.5 < 2 compartments

Prepared data for FEPIT input: Vehicle class	FC range (Lge/100km)	CO_2 range (gCO_2/km)
BEV	1.5	35.7
PHEV	3.0	71.4
HEV	5.3	126.1
ECO Car 2	< 4.3	< 102.3
Eco Car 1	4.3 – 5.1	102.3 – 121.3
Compact car	5.1 – 6.3	121.3 – 149.9
Mini-MPV / B-SUV	6.3 – 8.4	149.9 – 199.8
SUV / Full size MPV	> 8.4	> 199.8
BEV	2.638	62.75
PHEV	4.475	106.45
HEV	6.313	150.15
ICE1	< 5.1	< 121.3
ICE2	5.1 – 6.3	121.3 – 149.9
ICE3	6.3 – 7.4	149.9 – 176.0
ICE4	7.4 – 8.4	176.0 – 199.8
ICE5	> 8.4	> 199.8

FEPIT prediction of new passenger car mix and segment ave FE

Passenger car

5.68 ➔ 3.66 Lge/100km
(2016) (2030)



Label shows average FE [Lge/100km] in that vehicle segment which improved with FEPIT estimation.

- MPV / SUV / Van (> 200)
- D-Segment / Mini MPV / B-SUV (151 - 200)
- City car / Compact car (121 - 150)
- ECO Car 1 (101 - 120)
- ECO Car 2 (<= 100)
- HEV (126.06)
- PHEV (71.36)
- BEV (35.68)

Market dominators

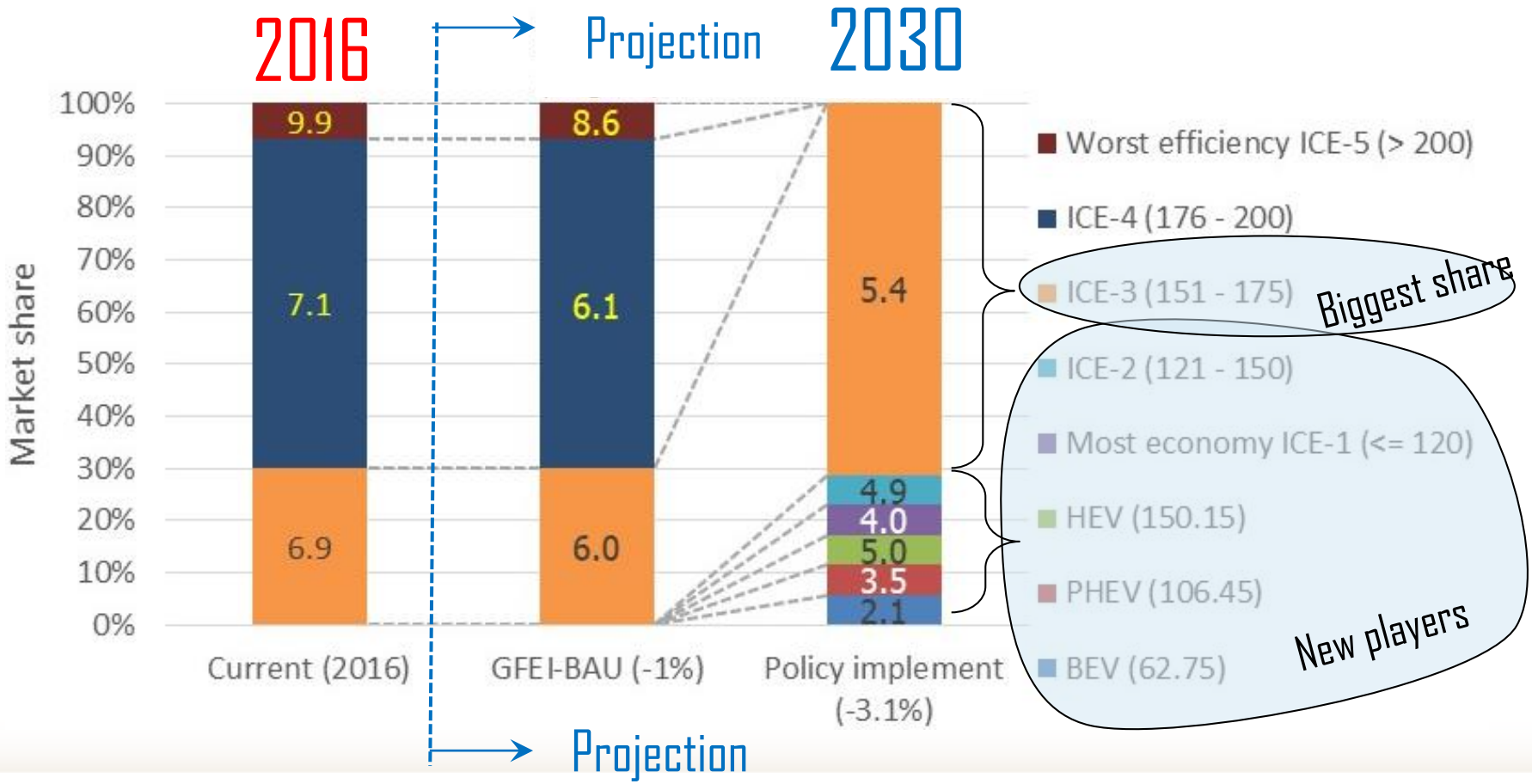
Impacts

- ✓ Vehicle share shifts to better FE segment
- ✓ Segment average FE improves in all class

FEPIT prediction of new pickup truck mix and segment ave FE

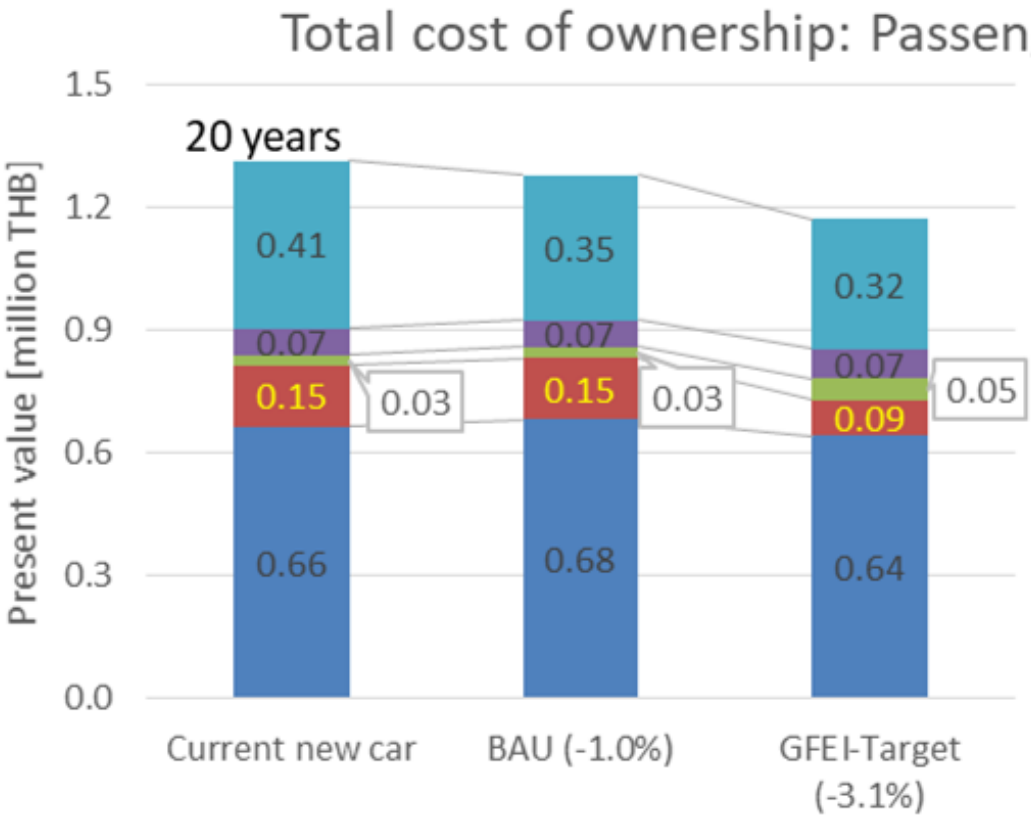
Pickup based (Single/Space/Double Cabs & PPV)

7.67 ➔ 4.94 Lge/100km
(2016) (2030)



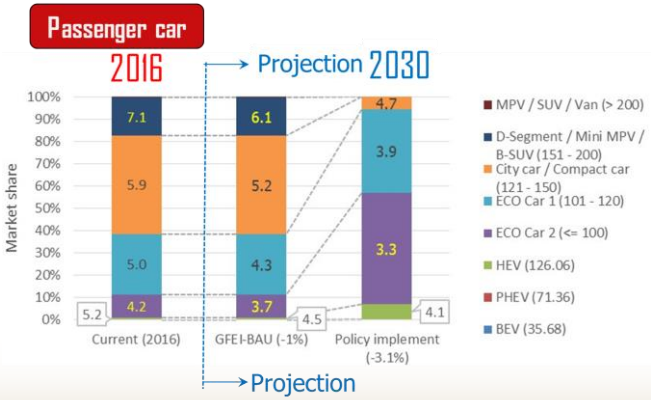
Results of Cost Benefit Analysis:
Total Cost of Ownership (Customer's viewpoint)

TCO Results: Customer's viewpoint



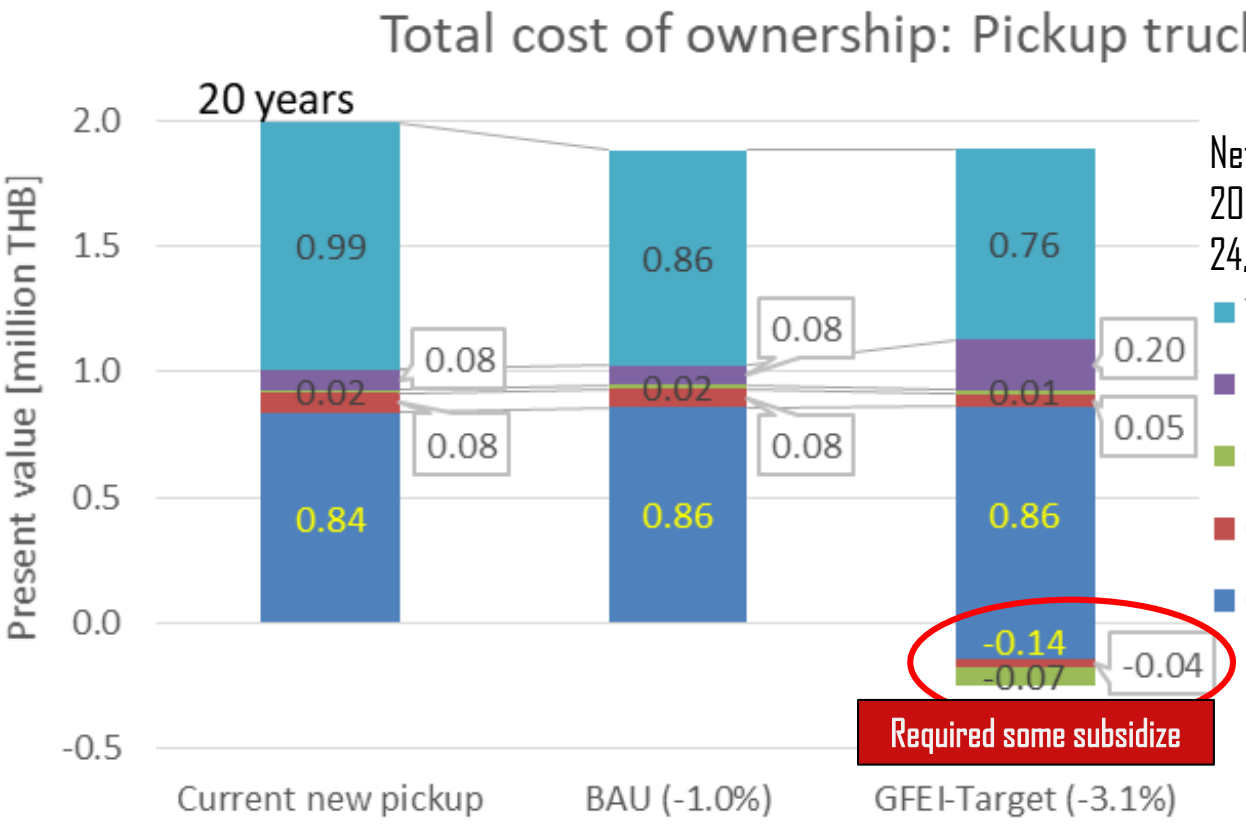
Market average

Net Present Value
20 Years @ 4.65% discount rate
20,000 km/year



Note: Vehicle price is averaged from market survey, excepted the xEV which is followed PTT EV study
Battery cost is also followed PTT EV study (around 22% of vehicle gate price) and schedule for replacing every 8 years
Maintenance cost of ICE is the engine overhauling expense (50,000 THB estimated) for every 10 years
Energy expense = fuel expense (refer to considered fuel price) + electric charging for BEV/PHEV (assume 4 THB/kWh)

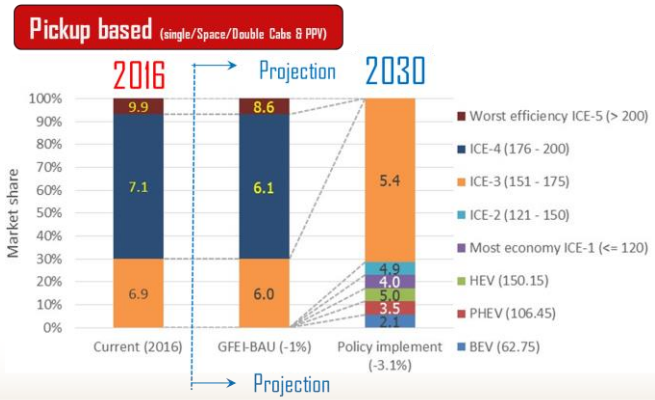
TCO Results: Customer's viewpoint



Net Present Value
20 Years @ 4.65% discount rate
24,000 km/year

- Total energy expense
- Maintenance cost
- Circulation tax
- Capital cost: Excise tax
- Capital cost: Factory gate

Market average



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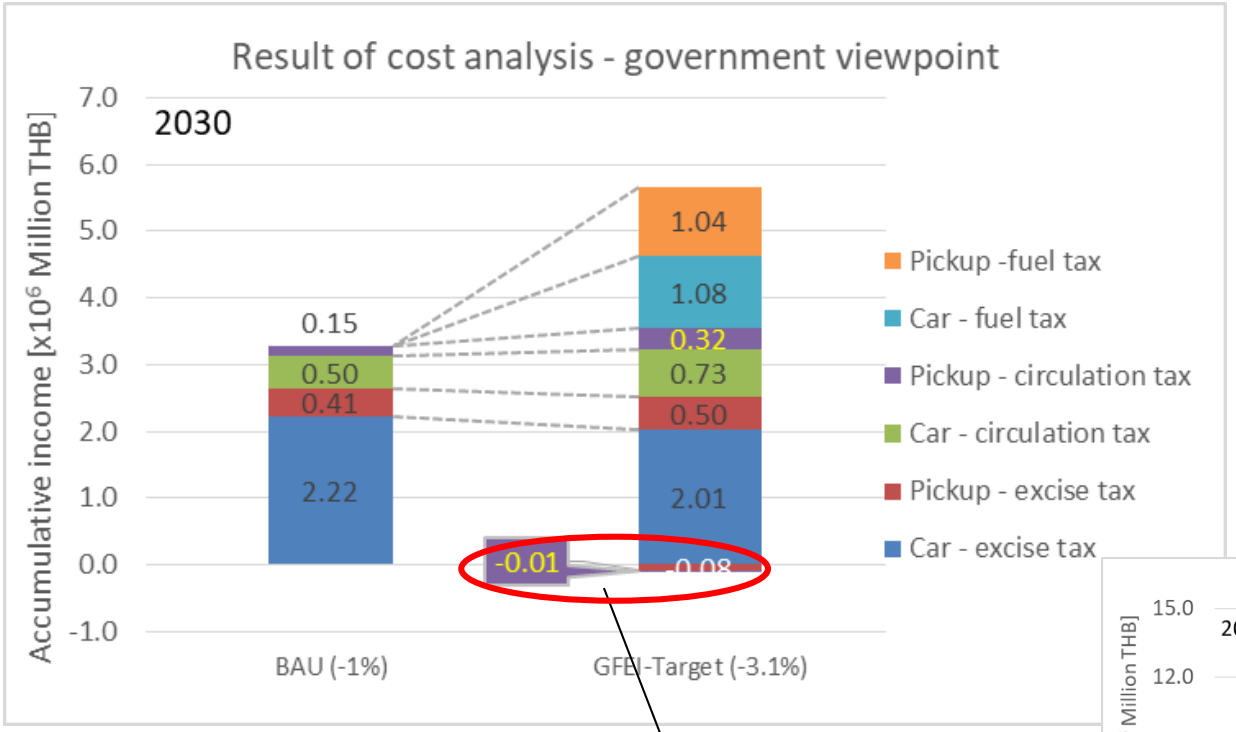
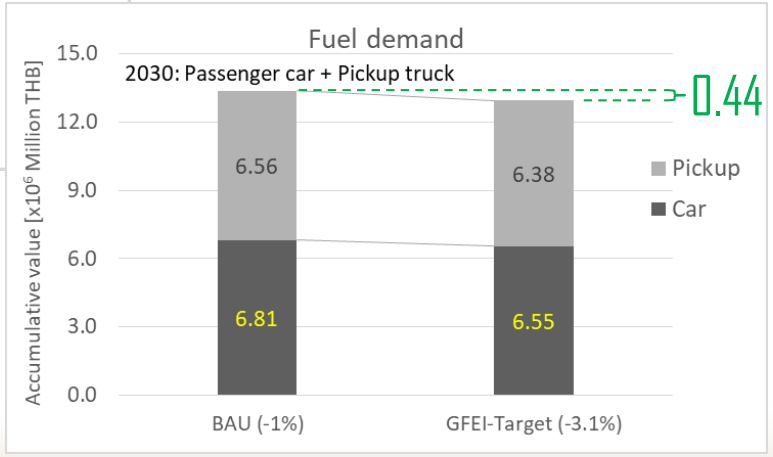
Results of Cost Benefit Analysis: Impacts in Government's Viewpoint

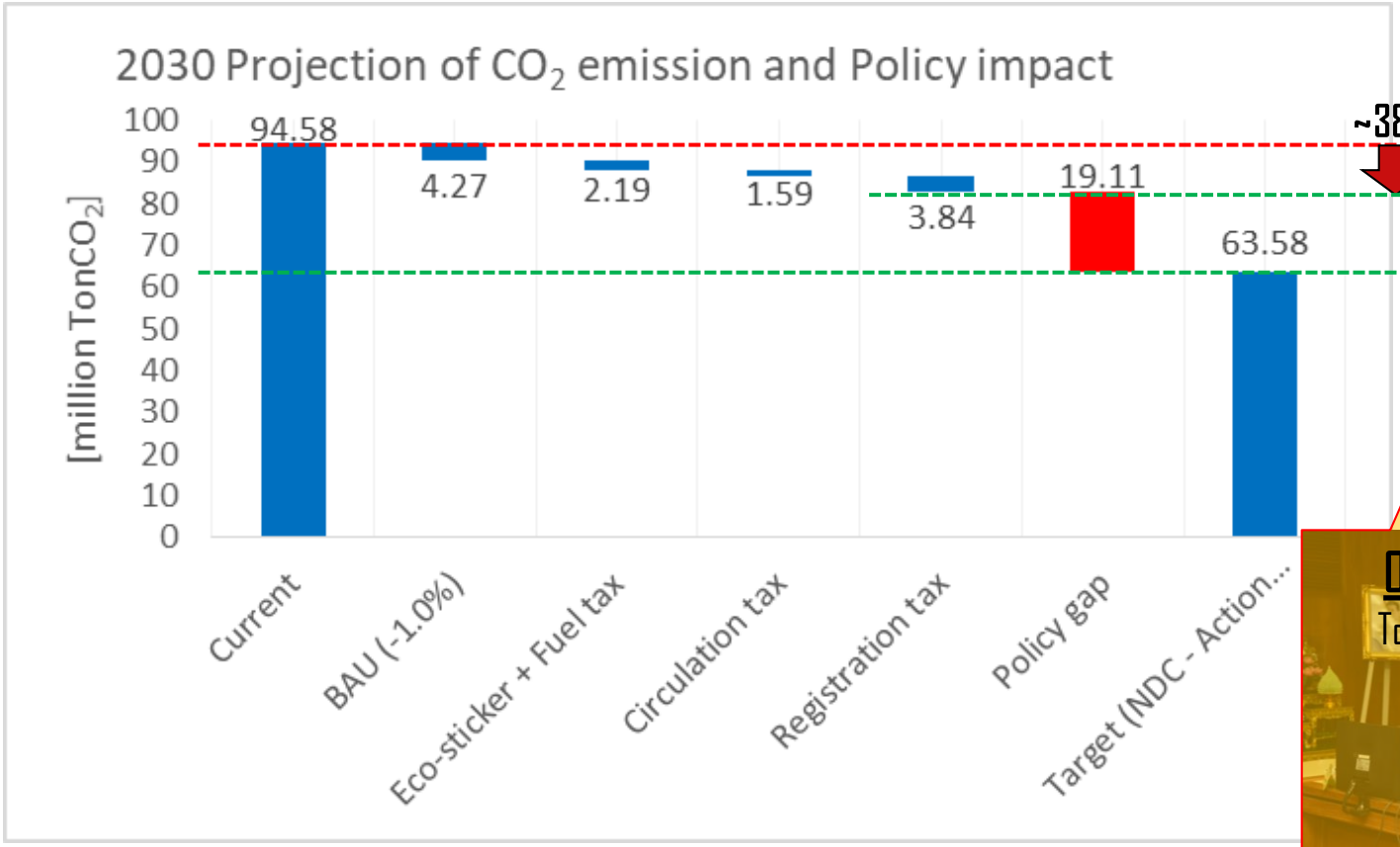
Results: Government viewpoint @2030



Required subsidize for pickup truck



Impact on CO_2 emission reduction



* 31 October 2018, OTP – NDC Action Plan, http://www.otp.go.th/index.php/post/view?id=2826

Results discussion from Thailand' study

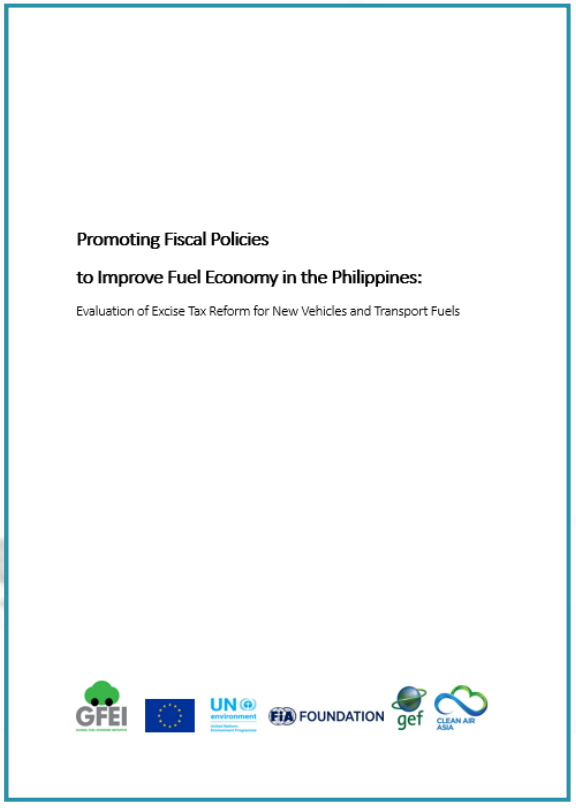
- Total Cost of Ownership for FE improvement of new PLDV
  - Car (Gasoline): Lower TCO in 'GFEI Target' scenario without government support
  - Pickup (Diesel): Similar with government subsidy in 'GFEI Target' scenario
- Cost benefit in Government's viewpoint
  - Government income will increase since increasing of annual registration tax and fuel excise tax
  - Pickup truck subsidize is required to encourage FE improvement for pickup truck market but less evident compared to income increase
  - FE improvement of new PLDV can help reduce about 38% from total CO_2 mitigation target of the Nationally Determined Contribution (NDC) plan for Transport sector

Energy and Environmental Impacts of the EXCISE TAX Reform for New Vehicle Registration, and Transportation Fuels in The PHILIPPINES

Alex Körner
Alex_koerner@gmx.de
Consultant for
Clean Air Asia

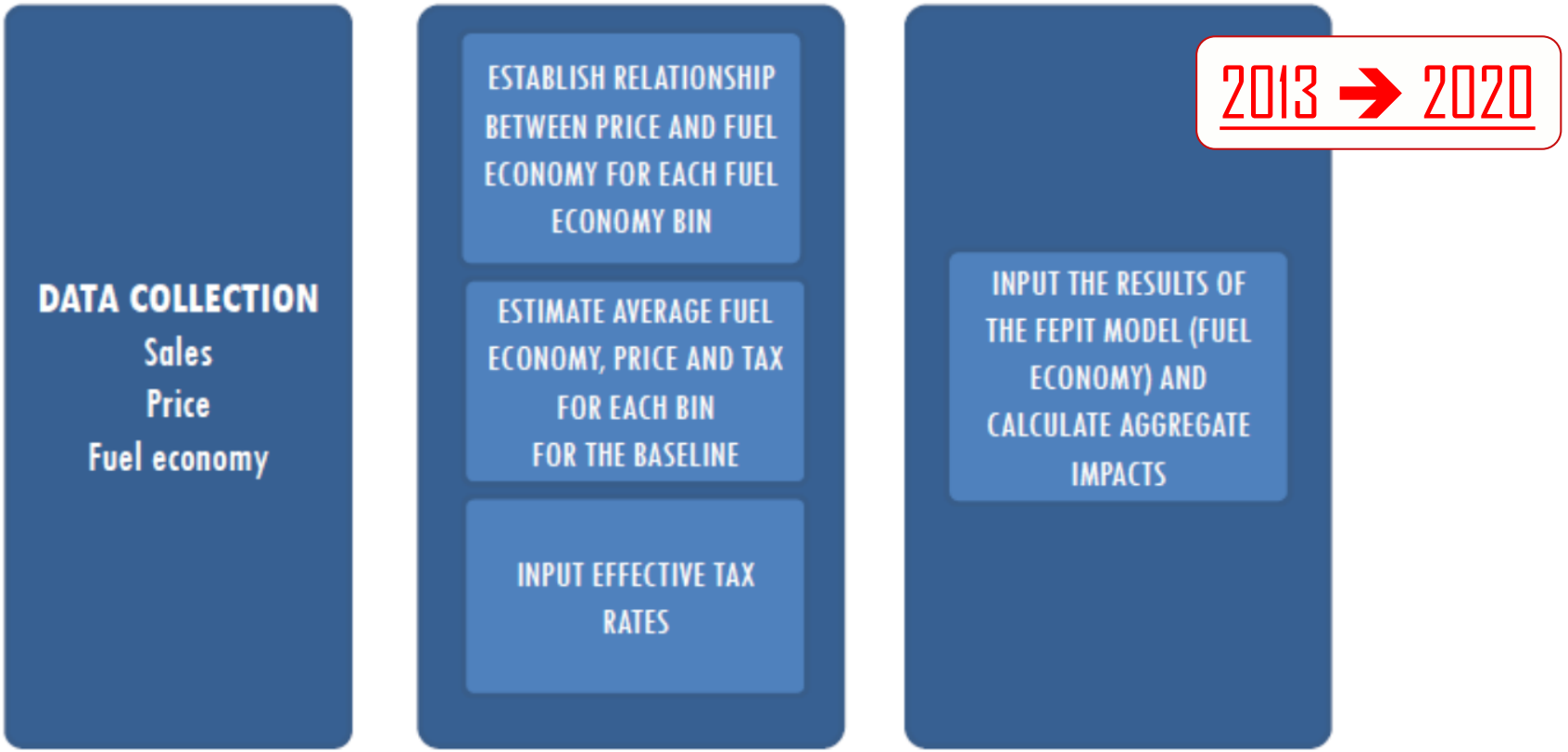
Alvin Mejia &
Kathleen Dematera
Clean Air Asia

Bert Fabian
UN Environment



Clean Air Asia, 2017, http://cleanairasia.org/

Methodology



[a] International Energy Agency (2015), Fuel Economy Policies Implementation Tool (FEPIT): https://www.iea.org/topics/transport/gfei

[b] Asian Development Bank (2017), Transport DataBank. Manila: ADB, http://www.transportdata.net/en.

Clean Air Asia, 2017, http://cleanairasia.org/

Results for new average LDV fuel consumption

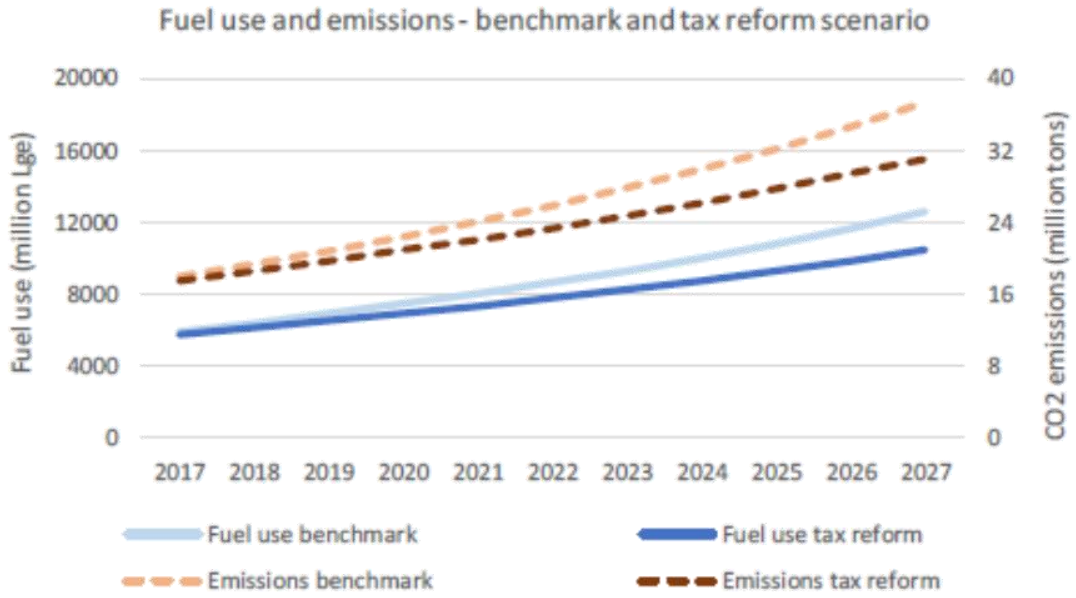
FEPIT results Scenario 1: Excise tax on vehicle purchase	Average CO2 emissions per km (g CO2/km)	Average fuel economy (Lge/100km)
Base year	188	7.8
Projection year	150	6.2
Annual reduction	-3.2%	
FEPIT results Scenario 2: Excise tax on fuel	**Average CO2 emissions per km (g CO2/km)**	**Average fuel economy (Lge/100km)**
Base year	188	7.8
Projection year	162	6.7
Annual reduction	-2.1%	

Results based on the proposed vehicle and fuel excise tax reforms for the target year 2020

- **Vehicle** excise tax reform = new LDV fuel consumption of about 6.2 Lge/100km by that time, therefore leading to an annual fuel economy improvement rate of about **3.2% between 2013 and 2020.**
- **Fuel** excise tax reform together with the assumed increase of the crude oil price of about 60% = an annual improvement rate of **2.1%**, leading to a new LDV fuel consumption of about **6.7 Lge/100km by 2020**.

Clean Air Asia, 2017, http://cleanairasia.org/

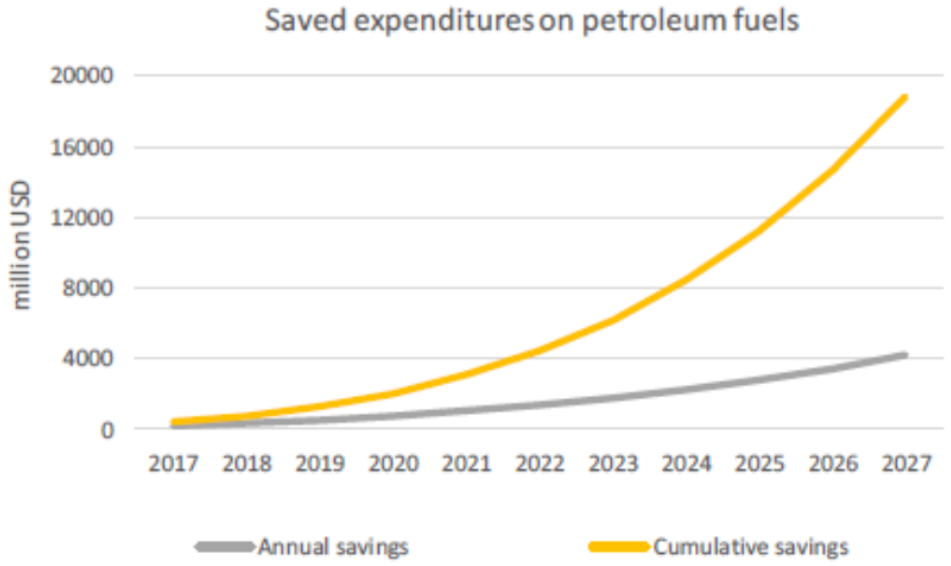
Results – Fuel use and emissions in the Tax Reform Scenario



- The assumed fuel economy improvement results in significant reductions in **fuel use** and **emissions** within the LDV segment, especially over the longer 10-year time-frame until the year 2027
- Fuel use could be reduced by 7% in 2020 and by 17% in 2027 compared to the benchmark scenario
- By 2020 1.5 $MtCO_2$ emissions of could be saved annually, growing to 6.2 $MtCO_2$ by 2027
  - **In theory, the tax reform could lead to significant fuel and emissions savings**

Clean Air Asia, 2017, http://cleanairasia.org/

Results – Fuel cost in the Tax Reform Scenario



- The assumed 3% annual fuel economy improvement rate for LDVs result in an estimated reduction of annual fuel costs of about USD 250 million by 2020, increasing up to USD 2.5 billion by 2027.
- By 2020 USD 770 million p.a. could be saved due to less fuel use, by 2027 this could grow to USD 4.2 billion p.a.
- Reduced fuel expenditures accumulate to USD 1.8 billion by 2020 and USD 18.7 billion by 2027
- **In total, 0.7% of the 2015 GDP of the Philippines could be saved until 2020. Cumulative savings could grow up to 7% of the 2015 GDP of the Philippines by 2027.**

Clean Air Asia, 2017, http://cleanairasia.org/

Results discussion from the Philippines' study

- According to the analysis, increasing the excise tax of vehicles based on vehicle price can have an effect on vehicle fuel economy
- In reality, since the vehicle excise tax is based on price – and not directly on fuel economy – the effect of the tax reform on fuel economy will be much less than the estimated 3% annual improvement.
- This is due to the fact that the consumer does not make the link between excise tax and fuel economy.
- Due to the excise tax increase he will eventually buy a slightly cheaper and therefore smaller and somewhat more efficient vehicle, but the excise tax reform based on vehicle price provides no inherent incentives to choose more efficient cars.

Clean Air Asia, 2017, http://cleanairasia.org/

Updated recent government's efforts: Thailand

- October 31, 2018 >> The meeting of Coordinating Committee on Policy and Actions for Climate Change Mitigation and Sustainable Transport proposed some FE Policies to be approved soon by the Ministry of Transport (tentatively **November 19**)

FE Policy

Existing/Near term measures

- Restructure excise tax for new PLDV (Former: Engine size ➔ Current: CO_2 based)
- Restructure excise tax for new Motorcycle (Engine size ➔ CO_2 based)
- Revise annual registration tax to CO_2-based scheme

Proposed measures

- Strengthening CO_2-based excise tax scheme
- Use fuel price mechanism for efficient vehicle used

http://www.otp.go.th/index.php/post/view?id=2826

Updated recent government's efforts: Philippines

- January 1, 2018 >> New excise taxes on cars and fuels

Efficient vehicle subsidize

Revising fuel excise tax

NEW AUTO EXCISE TAX RATES

	CURRENT	NEW	CURRENT RATE	NEW RATE	HYBRID	PICK-UPS	ELECTRIC VEHICLES
TIER 1	up to Php600,000	up to Php600,000	2%	4%	2%	0%	0%
TIER 2	over Php600,000 to Php1,100,000	over Php600,000 to Php1,000,000	Php12,000 + 20% of remaining value over Php600,001	10%	5%	0%	0%
TIER 3	over Php1,100,000 to Php2,100,000	Php1,000,001 to Php4,000,000	Php112,000 +40% of remaining value over Php1,100,000	20%	10%	0%	0%
TIER 4	Over Php2,100,000	Over Php4,000,000	Php512,000 +60% of remaining value over Php2,100,000	50%	25%	0%	0%

NEW EXCISE TAX RATES FOR FUEL

FUEL TYPE	CURRENT	2018	2019	2020
GASOLINE	Php4.35	Php7.00	Php9.00	Php10.00
DIESEL	0	Php2.50	Php4.50	Php6.00
AUTO LPG	0	Php2.50	Php4.50	Php6.00
KEROSENE	0	Php3.00	Php5.00	Php6.00

https://www.autoindustriya.com/auto-industry-news/new-excise-taxes-on-cars-fuel-effective-january-1-2018.html


THANK YOU