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44th APEC EGEE&C meeting

Asia-Pacific Economic Cooperation

Vehicle Fuel Economy Regulation in Chinese Taipei

2014/10/20

OUTLINE

1. Background Overview
2. History of Chinese Taipei Vehicle FE Regulation
3. Chinese Taipei Vehicle FE Regulation
4. Future Trends of Vehicle FE Regulation
5. Conclusion

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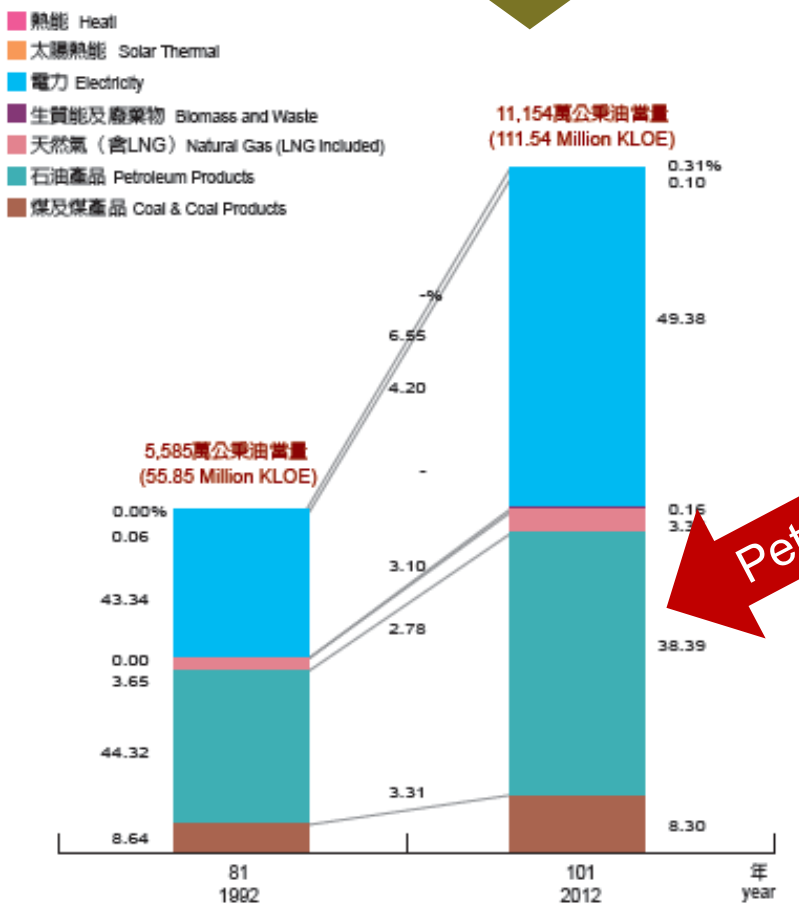
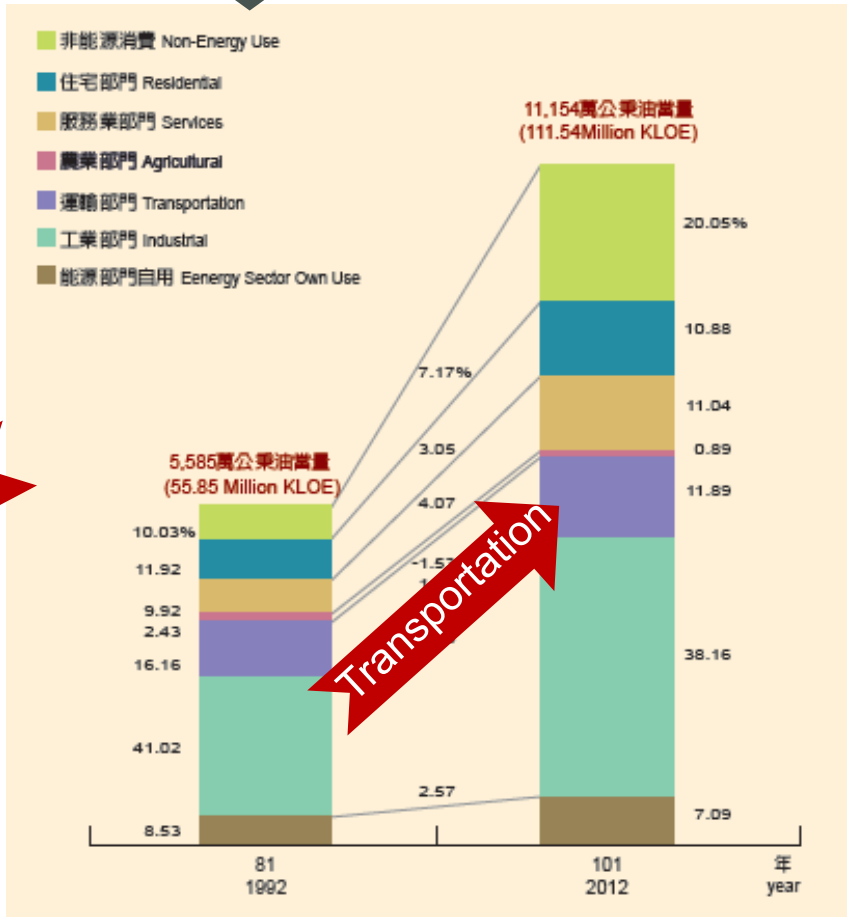
1 Background Overview

Structure of Total Domestic Consumption

By Energy Form



By Sector



Petrol

Transportation

- **Energy consumption grows significantly in residential, services, and transportation sectors.**

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Chinese Taipei New Vehicle Certification Agencies

Environmental Protection Administration, (EPA)

Emission and Noise Control

行政院環境保護署
Environmental Protection Administration
Executive Yuan, R.O.C. (Taiwan)

Bureau of Energy, Ministry of Economic Affairs, (BOE,MOEA)

Fuel Economy

經濟部能源局
Bureau of Energy ,
Ministry of Economic Affairs

Ministry of Transportation and Communications, (MOTC)

Safety Type Approval

MOTC MINISTRY OF TRANSPORTATION AND COMMUNICATIONS R.O.C.

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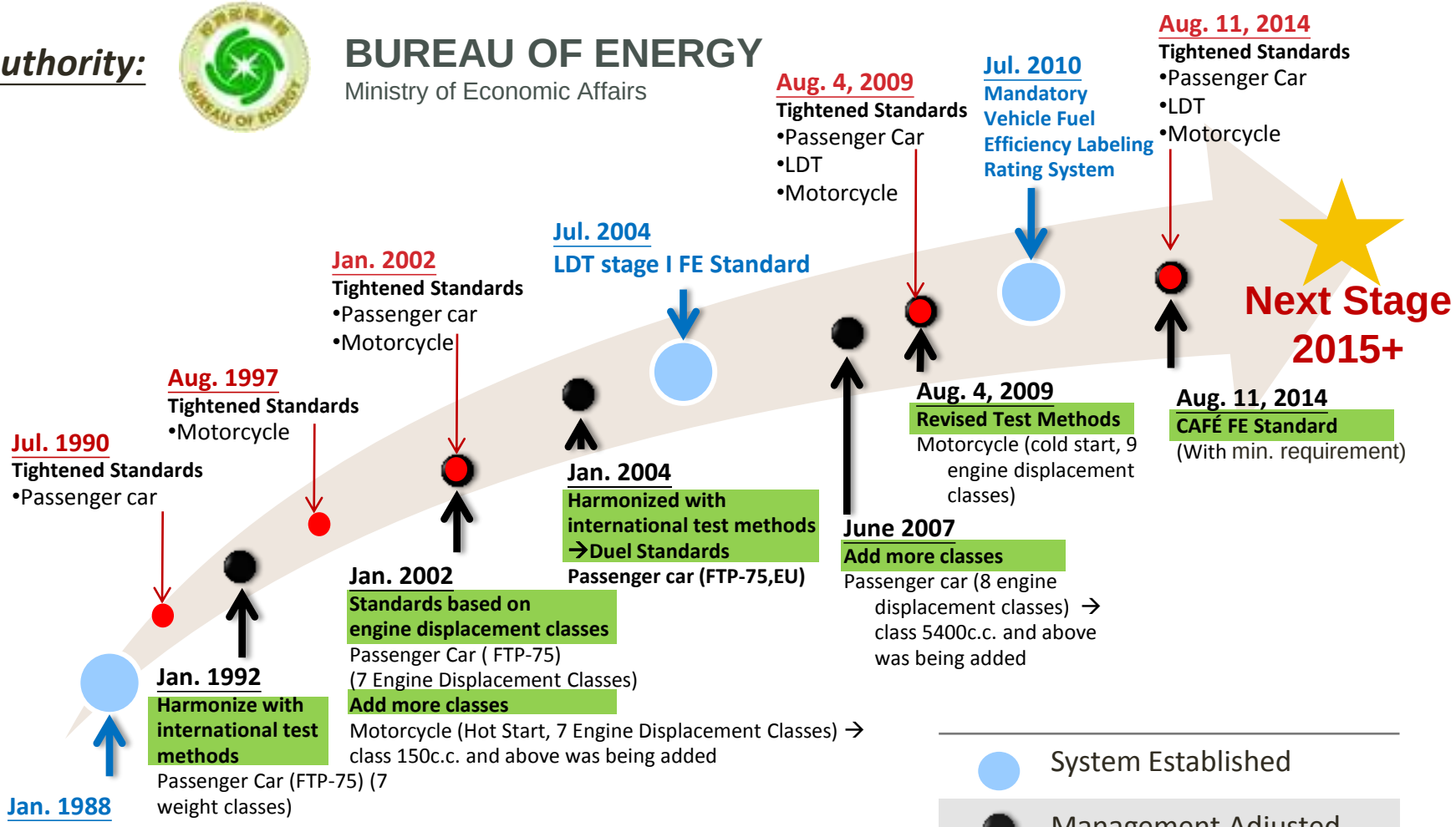
2 History of Chinese Taipei Vehicle FE Regulation

History of Chinese Taipei Vehicle Fuel Economy Regulation

Authority:

BUREAU OF ENERGY
Ministry of Economic Affairs



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3 Chinese Taipei Vehicle Fuel Economy Regulation

Chinese Taipei Vehicle Fuel Economy Regulation

Vehicle Type


Passenger Car

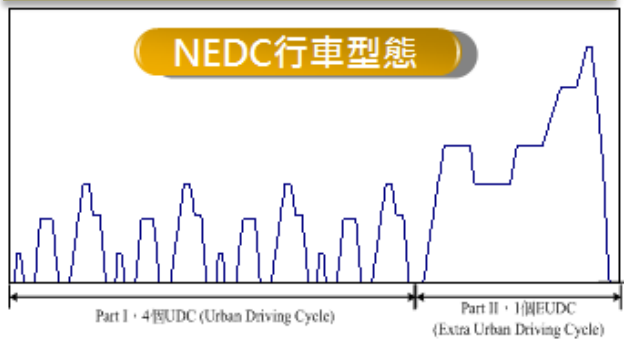

LDT


Motorcycle

1. Objects & Principle

2. Fuel Economy Testing

Federal Test Procedure (FTP-75) of the United States



Directive 1999/100/EC and subsequent amendments

Competent Authority

- Bureau of Energy, Ministry of Economic Affairs

Source of the regulation

- Article 15 of the Energy Management Law

Contents

- Vehicles which fail to conform to the permit standards of energy consumption set up by the central competent authority should be prohibited from importing or selling in the domestic market.

Any vehicle (exclude motorcycle) shall get one of following FE testing Methods, and meet the FE standard.

- **NEDC**
- **FTP-75**

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Chinese Taipei Vehicle Fuel Economy Standards

Engine Displacement (c.c.)	Passenger Car		LDT	
	2011 FE Standard (min. requirement) (km/L) **Federal Test Procedure (FTP-75) of the United States**	2011 FE Standard (min. requirement) (km/L) **Directive 1999/100/EC and subsequent amendments**	2011 FE Standard (min. requirement) (km/L) **Federal Test Procedure (FTP-75) of the United States**	2011 FE Standard (min. requirement) (km/L) **Directive 1999/100/EC and subsequent amendments**
Below 1200	16.2	14.1	10.9	9.5
Over 1200 to 1800	13.0	11.3	9.9	8.6
Over 1800 to 2400	11.4	9.9	8.9	7.7
Over 2400 to 3000	10.0	8.7	8.6	7.5
Over 3000 to 3600	9.2	8.0	7.6	6.6
Over 3600 to 4200	8.5	7.4	7.0	6.1
Over 4200 to 5400	7.2	6.3	6.7	5.8
Over 5400	6.5	5.7	6.1	5.3

Motorcycle	
Engine Displacement (c.c.)	2011 FE Standard (min. requirement) (km/L)
Below 50	48.2
Over 50 to 100	40.6
Over 100 to 150	38.0
Over 150 to 250	28.0
Over 250 to 500	21.1
Over 500 to 750	16.6
Over 750 to 1000	15.8
Over 1000 to 1400	14.7
Over1400	13.1

Fuel Economy Test — Driving Cycle

Federal Test Procedure (FTP-75) of the United States

- FTP-75
- HWFET

$$FE(\text{gasoline, 單位mpg}) = \frac{5174\times10^4\times CWF\times SG}{[(CWF\times HC)+(0.429\times CO)+(0.273\times CO_2)]\times[(0.6\times SG\times NHV)+5471]}$$

Testing Value $= \dfrac{1}{\dfrac{0.55}{city\ FE}+\dfrac{0.45}{hwy\ FE}}$

Directive 1999/100/EC and subsequent amendments

- NEDC

$$FC(\text{gasoline, 單位為L/100km}) = \frac{0.1154}{D}\times[(0.749\times HC)+(0.429\times CO)+(0.273\times CO2)]$$

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Chinese Taipei Vehicle Fuel Economy Regulation

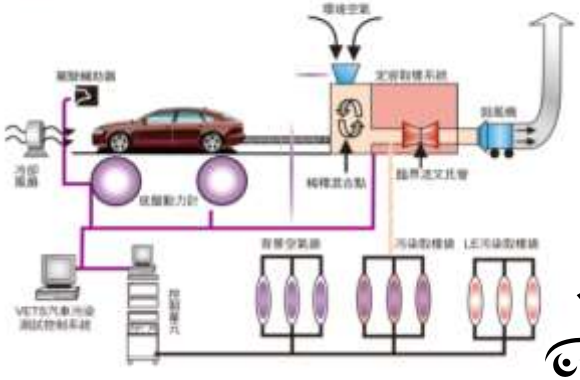
new vehicle random testing : new vehicles were being random selected and performed compliance tests.

3. Fuel Economy Labeling

4. Conformity of Production Management

5. Vehicle Homologation Laboratory Management

FE labeling in showroom



污染排放分析儀　　汽車污染及油耗測試

Qualified Vehicle FE Homologation Lab

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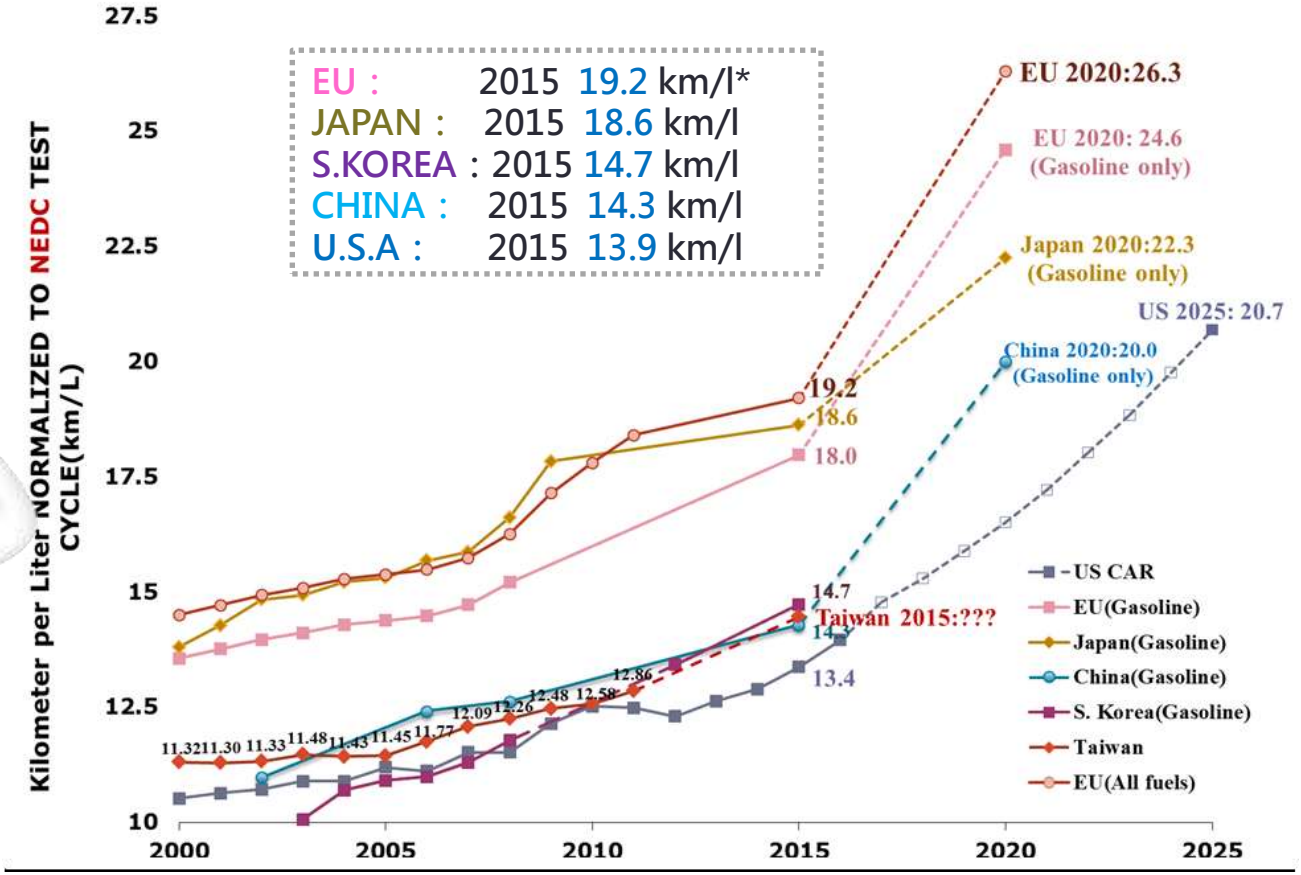
4 Future Trends of Vehicle FE Regulation

Chinese Taipei 2015
New Vehicles Fuel Efficiency Improve Objective

- Global warming and greenhouse gas emission issues.
- Chinese Taipei: fuel efficiency increase 25% in 2015. (base on 2008)
- Corporate Average Fuel Economy (CAFE) measures had been widely adopted by major countries



Chinese Taipei 2015 CAFE Fuel Economy Standard (Passenger Car)

2011 FE Standard (Passenger Car) → Fuel Efficiency Improve → **2015 FE Standard (incl. CAFE) (Passenger Car)**

min. requirement

Any passenger car manufactured or imported by any entity shall comply with the following Fuel Economy Standards:

Engine Displacement (c.c.)	2015 FE Standard (min. requirement) (km/L) Federal Test Procedure (FTP-75) of the United States	2015 FE Standard (min. requirement) (km/L) Directive 1999/100/EC and subsequent amendments
Below 1200	16.2	14.1
Over 1200 to 1800	13.0	11.3
Over 1800 to 2400	11.4	9.9
Over 2400 to 3000	10.0	8.7
Over 3000 to 3600	9.2	8.0
Over 3600 to 4200	8.5	7.4
Over 4200 to 5400	7.2	6.3
Over 5400	6.5	5.7

CAFE

Reference Weight (Kg)(NEDC)	2015 CAFE Average fuel economy limits(km/L)(NEDC)
RW≦850	19.2
850 < RW≦965	18.2
965 < RW≦1080	17.4
1080 < RW≦1190	16.6
1190 < RW≦1305	15.7
1305 < RW≦1420	15.0
1420 < RW≦1530	14.1
1530 < RW≦1640	13.3
1640 < RW≦1760	12.5
1760 < RW≦1870	11.8
1870 < RW≦1980	11.2
1980 < RW≦2100	10.5
2100 < RW≦2210	9.7
2210 < RW≦2380	9.3
2380 < RW≦2610	8.4
2610 < RW	7.2

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Key Points of Chinese Taipei Next stage CAFE Fuel Economy Standard

Effective from Jan.1, 2017

- For manufactured or imported motorcycles by any entity to apply for fuel economy certificates shall comply with the requirements

AFEV ≧ AFETV

- The average fuel economy value of the manufacturer sold vehicles shall be higher than the required average fuel economy target value.

How to Calculate

$$\text{AFETV} = \frac{\sum_{i=1}^{n} Annual\ sales}{\sum_{i=1}^{n}\left(\frac{Annual\ sales}{AFE\ limits}\right)}$$

$$\text{AFEV} = \frac{\sum_{i=1}^{n} Annual\ sales}{\sum_{i=1}^{n}\left(\frac{Annual\ sales}{FE\ testing\ value}\right)}$$

Electric vehicle multiplied by 2.5

- Its fuel economy test value may be multiplied by 2.5 as the fuel economy value and being used in the average fuel economy calculation

NEDC Test Procedure Only

- Be tested in accordance with the test procedures prescribed in the European directive 1999/100/EC and its subsequent revisions.

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5 Conclusion

Conclusion

- Vehicles plays an important role in Chinese Taipei society.
  - Chinese Taipei government has well experience and good command handling vehicle fuel economy regulated issue.
  - Energy crisis and greenhouse gas issues push Chinese Taipei government to set up more strict fuel economy regulation for vehicles.
- Incorporate CAFE system and more flexible administration scheme will help us achieve government energy saving goal without sacrificing local manufacturers' competitiveness.

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THANKS for YOUR ATTENTION

For further information, please feel free to contact with us by e-mail. wdtseng@itri.org.tw

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Chinese Taipei Next stage CAFE Fuel Economy Standard

- Effective from Jan.1, 2017 for manufactured or imported motorcycles by any entity to apply for fuel economy certificates shall comply with the following requirements:

The average fuel economy value of the manufacturer annual sold vehicles shall be higher than the required average fuel economy target value.

$$AFEV \geqq AFETV$$

- The average fuel economy value and average fuel economy target values shall be calculated by using the following formula:

$$\text{Average Fuel Economy Value (km/liter)} = \frac{\sum_{1}^{N} V_i}{\sum_{1}^{N} \frac{V_i}{FC_i}}$$

i: manufactured or imported vehicle type's sequence number.
FCi: fuel economy test value (km/liter) for manufactured or imported vehicle type i.
Vi: sales number (units) of manufactured or imported vehicle type i.

$$\text{Average Fuel Economy Target Value (km/liter)} = \frac{\sum_{1}^{N} V_i}{\sum_{1}^{N} \frac{V_i}{T_i}}$$

i: manufactured or imported vehicle type's sequence number.
Ti: average fuel economy limit (km/liter) of the manufactured or imported vehicle type i in accordance with 5.3.3 of this Article.
Vi: sales number (units) of manufactured or imported vehicle type i.

Electric vehicle sold by the vehicle entity, its fuel economy test value may be multiplied by 2.5 as the fuel economy value and being used in the average fuel economy calculation

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Other Details in Chinese Taipei Next stage CAFE

Calculation by Annual Sales

- Use annual sales number for the AFE calculation.
- Vehicle entities with annual sales number over 100 units or values over 100 million NT dollars.
- Being approved by the central competent authority.

Combined for Calculation

- Different manufacturers may be combined for their average fuel economy value calculation.
- Being approved by the central competent authority.

End of Combined

- Vehicle entities may consent to end their combined calculation of AFE value.
- The previous earned credits from exceed the required target value may continue to be used by the assigned manufacturer through agreement.
- The deficiency from under their target value shall be managed in accordance with regulation.

Earn Credits for Next 3 Year

- When calculated AFE is over the target value
- The earned credits may be accumulated for the calculation of next 3 year's AFE values.

Limitation of Sale

- When AFE values are under required target values at specific year
- The subsequent market sold vehicles must comply with the average fuel economy limits value until the difference of calculated and target values are being complemented

Credit Trading

- Credits could be trade for AEF calculation.
- Calculation by their annual sales numbers.

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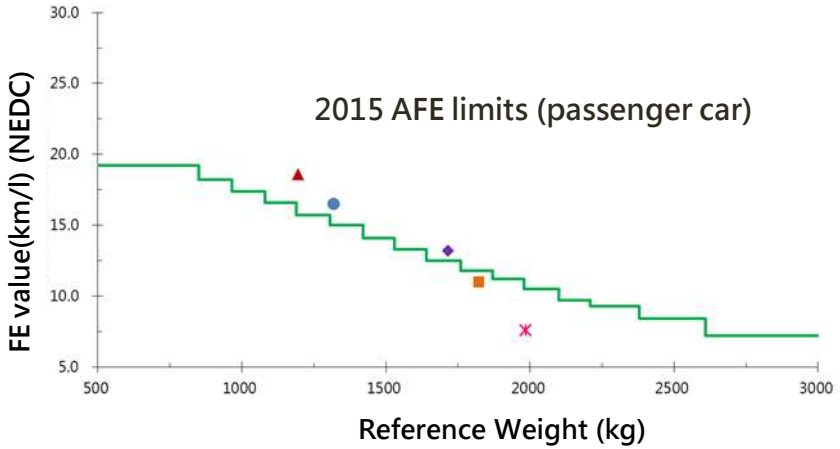
Example

- **Manufacturer: A**
- Year:2017

Model (type)	Annual Sales	Engine Displacement (c.c.)	Reference Weight (kg)	FE testing Value (NEDC) (km/L)	2015 Average fuel economy limits (km/L)
●A	18	1495	1319	16.5	15
■B	40	2996	1822	11	11.8
✱C	45	3999	1985	7.6	10.5
▲D	18	1497	1195	18.6	15.7
◆E	12	2494	1715	13.2	12.5



$$AFETV = \frac{\sum_{i=1}^{n} Annual\ sales}{\sum_{i=1}^{n}\left(\frac{Annual\ sales}{AFE\ limits}\right)}$$

$$AFEV = \frac{\sum_{i=1}^{n} Annual\ sales}{\sum_{i=1}^{n}\left(\frac{Annual\ sales}{FE\ testing\ value}\right)}$$

AFEV ≧ AFETV

- Year end date:2017/12/31
- Mfr. A AFETV : 12.1 km/l
- Mfr. A AFEV : 10.6 km/l
- Credits:- 1.5 (km/l)*133(vehicle)=-199.5

When Credits<0, need to be controlled

- 2018 sales: Model A:15；Model D:32；Model E:9
- Mfr. A AFETV :12.8 km/l
- Mfr. A AFE V:11.9km/l
- Credits:-0.9(km/l)*189(vehicle)=-170.1

- 2018 sales: Model A:75；Model D:99；Model E:63
- Mfr. A AFETV :13.6km/l
- Mfr. A AFEV:13.7km/l
- Credits:+0.1(km/l)*370(vehicle)=37

Re-settlement

2017/12/31 — 2018/1/17 — 2018/6/5 — 2019/01/01

Only model A,D,E could be sold during this period.

All models could be sold when credits > 0

Exceptions ⟸ Light duty vehicle only

The previous year sales of a brand by the vehicle entity were less than 300 units and the brand's world annual production is less than 10,000 units.

A proposal for its fuel economy improvement.

→ **The proposal be submitted and being approved by the central competent authority.**

→ **To execute its improvement project announced by the central competent authority.**

↓

And not applicable for the average fuel economy limits prescribed herein.

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