



經濟部能源局
Bureau of Energy

49th APEC EGEE&C Meeting

Economy Update for Chinese Taipei

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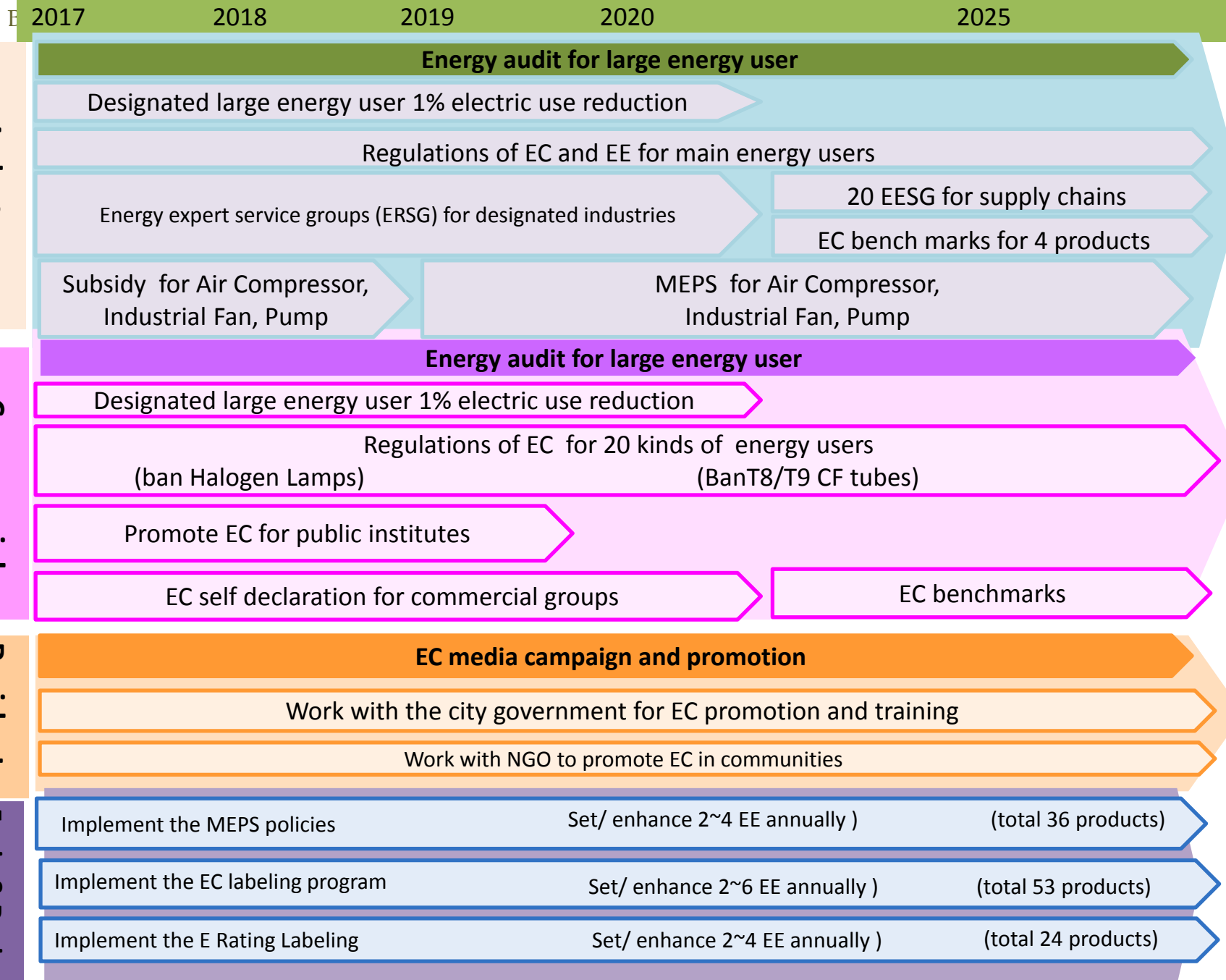
The Policy Tools of Energy Efficiency Management in Chinese Taipei

■ Mandatory Programs

- ✓ Minimum energy performance standard (MEPS)
- ✓ Energy efficiency ranking labeling
- ✓ Energy management and audit

■ Voluntary programs

- ✓ Energy conservation labeling
- ✓ Public awareness, education & promotion
- ✓ Incentives programs



Current Status of Mandatory and Voluntary Energy Efficiency management Programs in Chinese Taipei



MEPS



Energy Efficiency Rating Label





Mandatory Energy Efficiency Management Programs

Policy	Minimum Efficiency Performance Standard(MEPS)	Energy Efficiency Rating Label
Promoting Date	December, 1981	July, 2010
Purpose	Manufacturers and importers are obliged to apply in advance for compliance certification	Provide consumers with useful information when they choose among various models
Item	24 product categories	14 product categories
Product	<ol style="list-style-type: none"> Air Conditioners (change EER to CSPF) Refrigerators Dehumidifiers Fluorescence Lamps Ballast for Fluorescent Lamps Compact florescent lamps Fluorescent Lamps with embedded ballasts Incandescent bulbs Electric Hot Water Pots Electric Storage Tank Water Heaters Warm-Hot Drinking Water Dispensers Chilled-Warm-Hot Drinking Water Dispensers Vehicles Motorcycles Fishing vessel engines Low-voltage single-phase induction motors Low-voltage three-phase squirrel-cage induction motors LED Lamps Air-condition systems Boilers Warm-Hot Drinking Water Dispensers Chilled-Warm-Hot Drinking Water Dispensers Warm-Hot Drinking Water Fountain Chilled-Warm-Hot Drinking Water Fountain 	<ol style="list-style-type: none"> Air Conditioners (2010.7.1) Refrigerator/Freezer (2010.7.1) Automobiles (2010.7.1) Motorcycles (2010.7.1) Dehumidifiers (2011.3.1) Self-ballasted fluorescent lamps (2011.7.1) Instantaneous Gas Water Heaters (2012.12.6) Gas Stoves(2012.12.06) Electric hot water pots (2015.01.01) Electric Storage Tank Water Heaters (2015.10.01) Warm-Hot Drinking Water Dispensers (2016.12.01) Chilled-Warm-Hot Drinking Water Dispensers (2016.12.01) Warm-Hot Drinking Water Fountain (2018.01.01) Chilled-Warm-Hot Drinking Water Fountain (2018.01.01)





Voluntary Energy Efficiency Management Program

Policy	Energy Conservation Label	
Promoting Date	December, 2001	
Purpose	Encourage consumers to buy high-efficiency products and to enhance market penetration of high-efficiency products	
Item	47 product categories	
Product	<ol style="list-style-type: none"> 1. Air Conditioners 2. Refrigerators 3. Dehumidifiers 4. Circulation Fans 5. Washing Machines 6. Clothes Dryers 7. Fluorescence Lamps 8. Hand Dryers 9. Hair Dryers 10. Warm-Hot Drinking Water Dispensers 11. Chilled-Warm-Hot Drinking Water Dispensers 12. Chilled-Warm-Hot Water Fountain Machines 13. Warm-Hot Water Fountain Machines 14. Vehicles 15. Motorcycles 16. Fluorescent Lamps with embedded ballasts 17. Gas burning cooking appliances 18. Instantaneous Gas Burning Water Heaters 19. Electric Cookers 20. Electric Storage Tank Water Heaters 21. Electric Hot Water Pots 22. Exit Lights and Emergency Direction Lights 23. Televisions 24. Displays 	<ol style="list-style-type: none"> 25. DVD Recorder and Player 26. Indoor Light Fixtures 27. Integrated Stereos 28. Compact Fluorescent Lamps 29. Copy machines 30. Printers 31. Air Cleaners 32. Luminaires for road and street lighting 33. Ventilating Fans for Bath Room Use 34. Ventilating Fans for Window Type 35. Notebook Computers 36. Desktop Computers 37. Air Source Heat Pump Water Heater 38. Range Hoods 39. Microwave Ovens 40. Axial flow Fans 41. Centrifugal fan 42. Ballast for Fluorescent Lamps 43. Electric Ovens 44. Electric Storage Tank Boiling Water Heaters 45. LED planar lamp 46. LED Lamps 47. VFI UPS 48. High bay Luminaire





MEPS for Self-ballasted LED bulbs

➤ History:

Self-ballasted LED lamps standard took effect
in **July 01 2014**.



➤ Test method:

CNS 15630 Self-ballasted LED lamps for general lighting services
with supply voltages > 50 V – Performance requirements

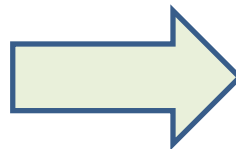
➤ Energy Efficiency Standard: (MEPS)

Minimum lamp efficacy (lm/W)	Non-directional Self-ballasted LED lamps			Directional Self-ballasted LED lamps	
	Light Output >200 Lumens	Light Output ≤200 Lumens, and > 50 Lumens	Light Output ≤50 Lumens	Lamps diameter > 50.8 mm	Lamps diameter ≤ 50.8mm
F2700 F3000 F3500	70.0	65.0	40.0	60.0	55.0
F4000 F5000 F6500	75.0	70.0	40.0	65.0	60.0



Non-ducted Air Conditioners

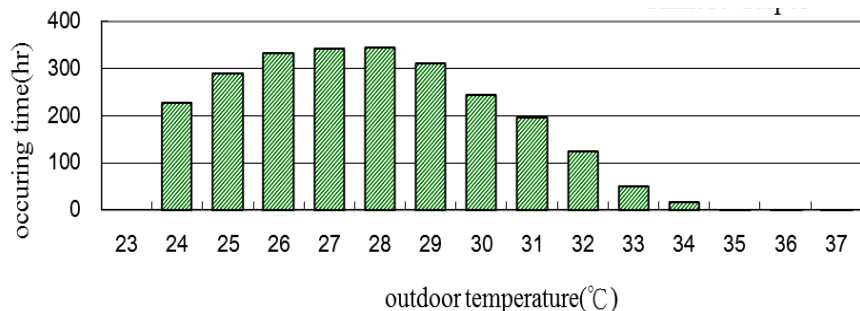
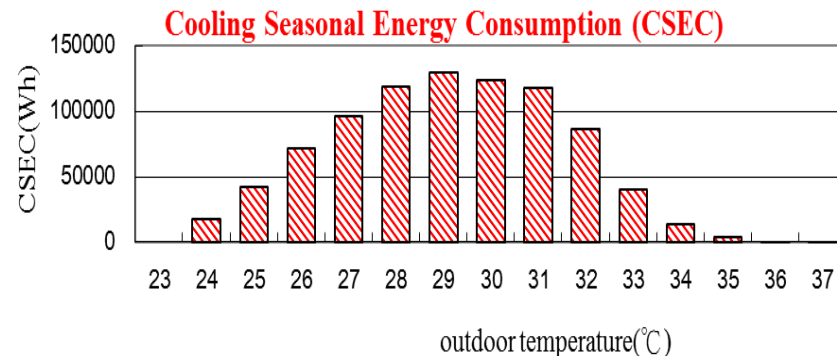
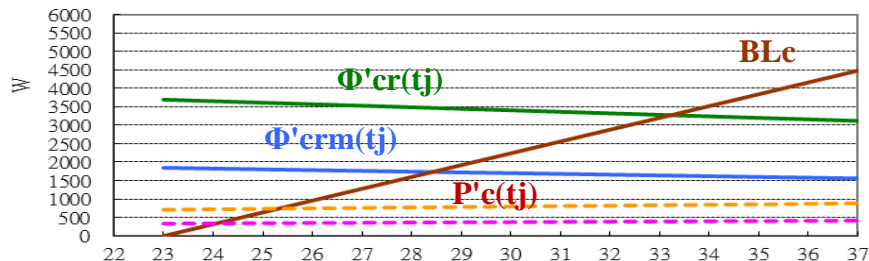
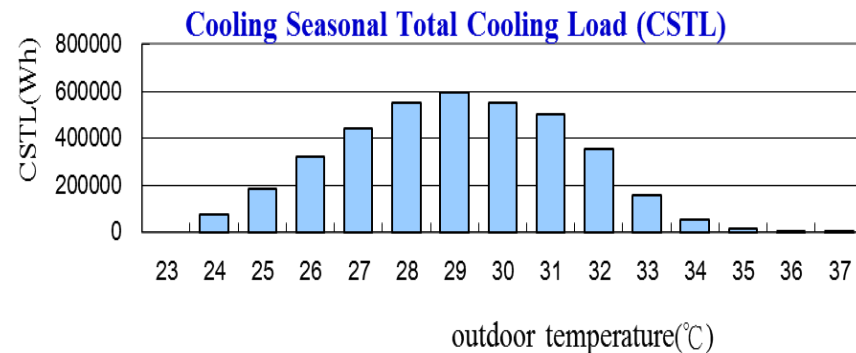
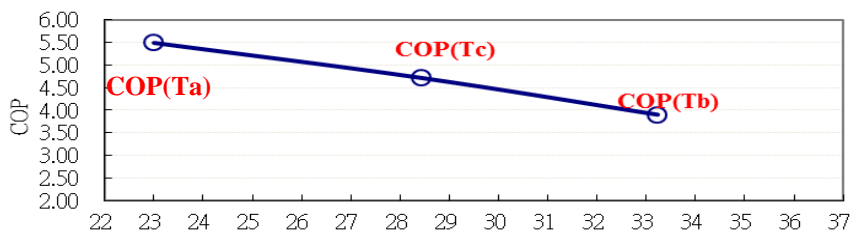
EER



CSPF

$$EER = \frac{\text{Cooling Capacity (W)}}{\text{Power Consumption (W)}}$$

$$CSPF = \frac{\text{CSTL (Wh)}}{\text{CSEC (Wh)}}$$





Non-ducted Air Conditioners

EER

Ending for EER

CSPF

Jan. 01, 2016

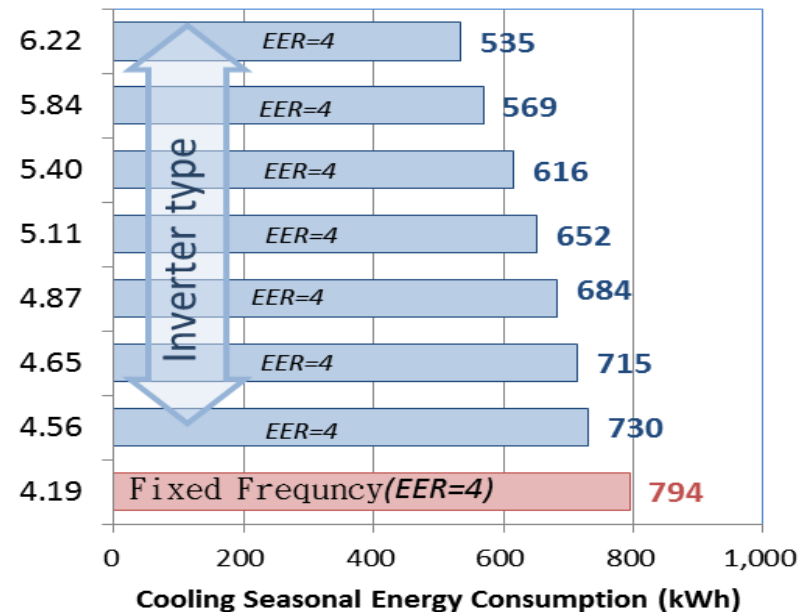
Jan. 01, 2017

Aug. 11, 2015

Announcement for MEPS
& Energy Efficiency
Rating Label

Comparison for the annual energy consumption between fixed and inverter air conditioners based on EER & CSPF

CSPF Cooling Capacity=2.8kW ; power=0.7kW





Non-ducted Air Conditioners

Minimum energy performance standard requirements for
non-ducted air conditioners (took effect in 2016.00.01)

Type		Rated cooling capacity, Q_c (kW)	Cooling seasonal performance factor, CSPF (kWh/kWh)
Air cooled	Unitary (Window type)	$Q_c \leq 2.2$	3.40
		$2.2 < Q_c \leq 4.0$	3.45
		$4.0 < Q_c \leq 7.1$	3.25
		$7.1 < Q_c \leq 71.0$	3.15
	Split type	$Q_c \leq 4.0$	3.90
		$4.0 < Q_c \leq 7.1$	3.60
		$7.1 < Q_c \leq 10.0$	3.45
		$10.0 < Q_c \leq 71.0$	3.40
Water cooled		All	4.50



Non-ducted Air Conditioners

Energy efficiency rating standard requirements for non-ducted air conditioners
(took effect in 2016.00.01)

Type		Rated cooling capacity, Qc (kW)	Cooling seasonal performance factor, CSPF (kWh/kWh)				
Energy Efficiency Rating			Class 5	Class 4	Class 3	Class 2	Class 1
Air cooled	Unitary (Window type)	$Q_c \leq 2.2$	$3.40 \leq \text{CSPF} < 3.64$	$3.64 \leq \text{CSPF} < 3.88$	$3.88 \leq \text{CSPF} < 4.11$	$4.11 \leq \text{CSPF} < 4.35$	$\text{CSPF} \geq 4.35$
		$2.2 < Q_c \leq 4.0$	$3.45 \leq \text{CSPF} < 3.69$	$3.69 \leq \text{CSPF} < 3.93$	$3.93 \leq \text{CSPF} < 4.17$	$4.17 \leq \text{CSPF} < 4.42$	$\text{CSPF} \geq 4.42$
		$4.0 < Q_c \leq 7.1$	$3.25 \leq \text{CSPF} < 3.48$	$3.48 \leq \text{CSPF} < 3.71$	$3.71 \leq \text{CSPF} < 3.93$	$3.93 \leq \text{CSPF} < 4.16$	$\text{CSPF} \geq 4.16$
		$7.1 < Q_c \leq 71$	$3.15 \leq \text{CSPF} < 3.37$	$3.37 \leq \text{CSPF} < 3.59$	$3.59 \leq \text{CSPF} < 3.81$	$3.81 \leq \text{CSPF} < 4.03$	$\text{CSPF} \geq 4.03$
	Split type	$Q_c \leq 4.0$	$3.90 \leq \text{CSPF} < 4.41$	$4.41 \leq \text{CSPF} < 4.91$	$4.91 \leq \text{CSPF} < 5.42$	$5.42 \leq \text{CSPF} < 5.93$	$\text{CSPF} \geq 5.93$
		$4.0 < Q_c \leq 7.1$	$3.60 \leq \text{CSPF} < 4.03$	$4.03 \leq \text{CSPF} < 4.46$	$4.46 \leq \text{CSPF} < 4.90$	$4.90 \leq \text{CSPF} < 5.33$	$\text{CSPF} \geq 5.33$
		$7.1 < Q_c \leq 10$	$3.45 \leq \text{CSPF} < 3.86$	$3.86 \leq \text{CSPF} < 4.28$	$4.28 \leq \text{CSPF} < 4.69$	$4.69 \leq \text{CSPF} < 5.11$	$\text{CSPF} \geq 5.11$
		$10 < Q_c \leq 71$	$3.40 \leq \text{CSPF} < 3.81$	$3.81 \leq \text{CSPF} < 4.22$	$4.22 \leq \text{CSPF} < 4.62$	$4.62 \leq \text{CSPF} < 5.03$	$\text{CSPF} \geq 5.03$
Water cooled	All	$4.50 \leq \text{CSPF} < 4.77$	$4.77 \leq \text{CSPF} < 5.04$	$5.04 \leq \text{CSPF} < 5.31$	$5.31 \leq \text{CSPF} < 5.58$	$\text{CSPF} \geq 5.58$	



Water Dispensers

• MEPS

(will take effect in 2016.12.01)

MEPS for Warm-Hot Type

Normalized Standing Loss per 24h

$E_{st,24(kWh)}$

$$0.169 \times V1 + 1.1$$

MEPS for Iced-Warm-Hot Type

Standing Loss per 24h $E_{24(kWh)}$

$$0.146 \times V_{eq} + 1.312$$

$$V_{eq} = V1 \times K1 + (V2 \times K2) / 3$$

V1 is the nameplate values of hot-water tank(L).

V2 is the nameplate values of iced-water tank(L).

$$K1 = (T_h - T_{amb}) / (100 - T_{amb})$$

$$K2 = (T_{amb} - T_c) / (T_{amb})$$

- Testing and calculation of normalized standing loss per 24h ($E_{st,24}$) & standing loss (E_{24}) shall comply with CNS 13516 in Chinese Taipei.





Water Dispensers

(will take effect in 2016.12.01)

Energy efficiency rating standard requirements for Warm-Hot Type

Efficiency Rating	Normalized Standing Loss per 24h, $E_{st,24}$ (kWh)
Class 1	$E_{st,24} \leq 0.102 \times V + 0.66$
Class 2	$0.102 \times V + 0.66 < E_{st,24} \leq 0.119 \times V + 0.77$
Class 3	$0.119 \times V + 0.77 < E_{st,24} \leq 0.136 \times V + 0.88$
Class 4	$0.136 \times V + 0.88 < E_{st,24} \leq 0.152 \times V + 0.99$
Class 5	$0.152 \times V + 0.99 < E_{st,24} \leq 0.169 \times V + 1.10$

Energy efficiency rating standard requirements for Iced-Warm-Hot Type

Efficiency Rating	Standing Loss per 24h, E_{24} (kWh)
Class 1	$E_{24} \leq 0.088 \times V_{eq} + 0.787$
Class 2	$0.088 \times V_{eq} + 0.787 < E_{24} \leq 0.102 \times V_{eq} + 0.918$
Class 3	$0.102 \times V_{eq} + 0.918 < E_{24} \leq 0.117 \times V_{eq} + 1.050$
Class 4	$0.117 \times V_{eq} + 1.050 < E_{24} \leq 0.131 \times V_{eq} + 1.181$
Class 5	$0.131 \times V_{eq} + 1.181 < E_{24} \leq 0.146 \times V_{eq} + 1.312$



Drinking Water Dispensers



(will take effect in 2018.01.01)

MEPS for Warm-Hot Type

Normalized Standing Loss per 24h

$E_{st,24(kWh)}$

$$0.053 \times V1 + 0.750$$

MEPS for Iced-Warm-Hot Type

Standing Loss per 24h $E_{24(kWh)}$

$$0.09 \times V_{eq} + 0.45$$

$$V_{eq} = V1 \times K1 + (V2 \times K2) / 3$$

V1 is the nameplate values of hot-water tank(L).

V2 is the nameplate values of iced-water tank(L).

$$K1 = (T_h - T_{amb}) / (100 - T_{amb})$$

$$K2 = (T_{amb} - T_c) / (T_{amb})$$

- Testing and calculation of normalized standing loss per 24h ($E_{st,24}$) & standing loss (E_{24}) shall comply with CNS 3910 in Chinese Taipei.





Drinking Water Dispensers

Energy efficiency rating standard requirements for Warm-Hot Type

Energy Efficiency Rating	Normalized Standing Loss per 24h, Est,24 (kWh)
Class 1	$E_{st,24} \leq 0.032V+0.450$
Class 2	$0.032V+0.450 < E_{st,24} \leq 0.037V+0.525$
Class 3	$0.037V+0.525 < E_{st,24} \leq 0.042V+0.600$
Class 4	$0.042V+0.600 < E_{st,24} \leq 0.048V+0.675$
Class 5	$0.048V+0.675 < E_{st,24} \leq 0.053 \times V + 0.750$

Energy efficiency rating standard requirements for Chilled-Warm-Hot Type

Energy Efficiency Rating	24-hr Energy Consumption E_{24} (kWh)
Class 1	$E_{24} \leq 0.054 \times V_{eq} + 0.270$
Class 2	$0.054 \times V_{eq} + 0.270 < E_{24} \leq 0.063 \times V_{eq} + 0.315$
Class 3	$0.063 \times V_{eq} + 0.315 < E_{24} \leq 0.072 \times V_{eq} + 0.360$
Class 4	$0.072 \times V_{eq} + 0.360 < E_{24} \leq 0.081 \times V_{eq} + 0.405$
Class 5	$0.081 \times V_{eq} + 0.405 < E_{24} \leq 0.09 \times V_{eq} + 0.45$



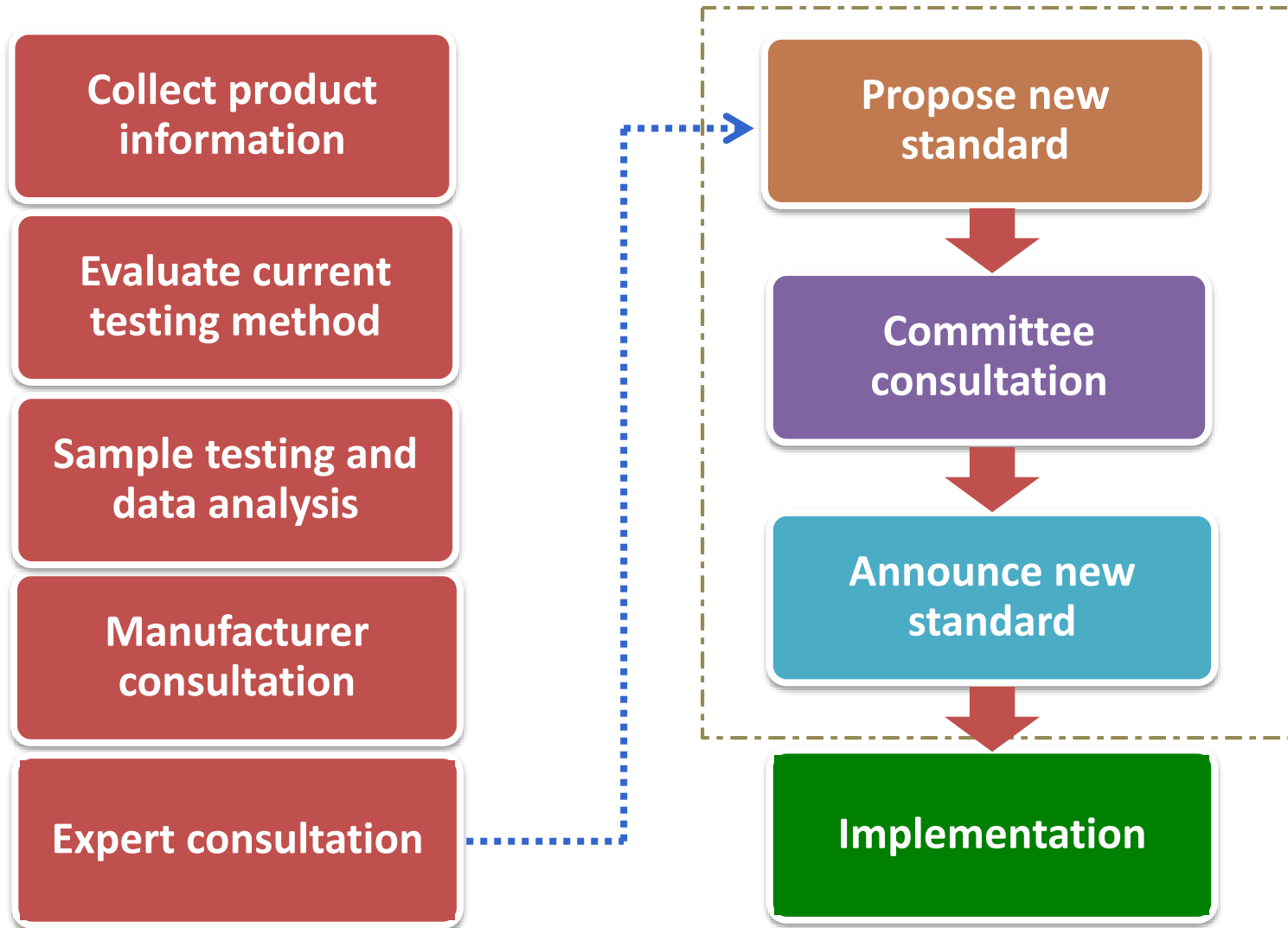
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Energy Conservation Labeling



Revising Process of Energy Conservation Label



International energy efficiency standards self-ballasted LED lamps

➤ US

- ENERGY STAR-Product Specification for Lamps(Light Bulbs),Eligibility Criteria V2.0
- Took effect Jan. 2, 2017

Lamp Type	Minimum Lamp Efficacy (initial lm/W)	
	CRI \geq 90	CRI < 90
Omnidirectional	70	80
Directional	61	70

➤ China (For Omnidirectional Lamps)

- Took effect Nov. 15, 2014

Labeling	Luminous Efficacy (lm/W)	
	Correlated Color Temperature value	
	2700K 、 3000K 、 3500K	4000K 、 5000K 、 6500K
Grade 1	105	115
Grade 2	85	95
Grade 3	65	70

International energy efficiency standards self-ballasted LED lamps

➤ Japan (Top Runner Program) 2017

Light Source Color	Standard Energy Consumption Efficiency(lm/W)
Daylight, neutral white, white	110.0
Warm light, lamp color	98.6

➤ India

- Star Rating Plan-**Voluntary Phase**
- (Validity:2015.07.06-2017.12.31)

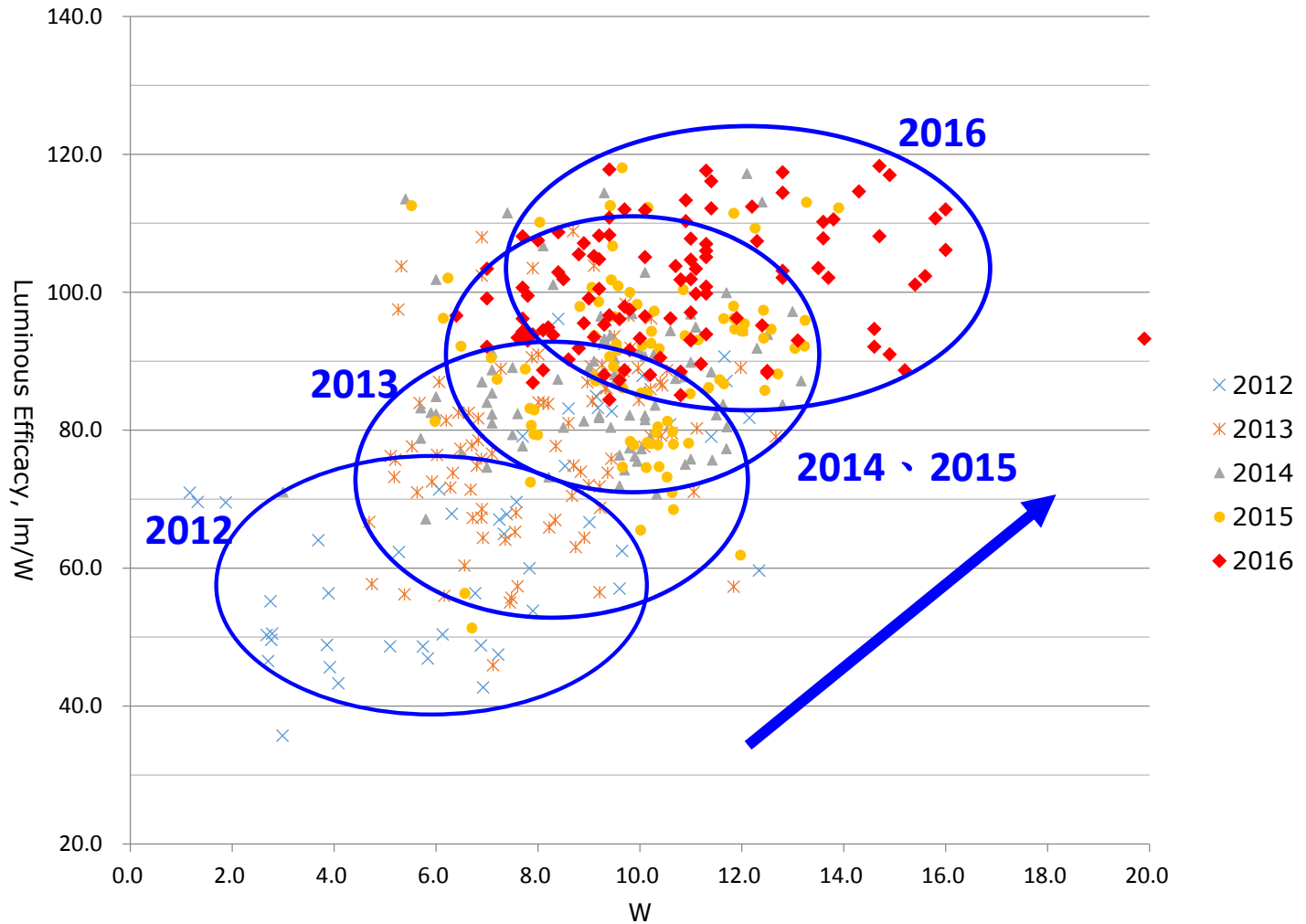
Star Rating	Rated Luminous Efficacy(lm/W)	Remarks
1	≥ 68 & < 79	Freezed
2	≥ 79 & < 90	
3	≥ 90 & < 105	
4	≥ 105 & < 120	
5	≥ 120	

- Star Rating Plan-**Mandatory Phase**
- (Validity:2018.01.01-2019.12.31)

Star Rating	Rated Luminous Efficacy(lm/W)	Remarks
1	≥ 68 & < 79	Freezed
2	≥ 79 & < 90	Freezed
3	≥ 90 & < 105	
4	≥ 105 & < 120	
5	≥ 120	



Efficacy Improvement of Self-ballasted LED Lamps in Chinese Taipei





Voluntary Energy Conservation Labeling Criteria

omnidirectional self-ballasted LED lamps in Chinese Taipei

New Standard

Validity: 2017.03.01~

Correlated Color Temperature(K)	Luminous Efficacy(lm/W)
2700K、3000K、3500K	110.0
4000K、5000K、6500K	115.0

Current Standard

Validity: 2014.07.01-2017.03.01

Correlated Color Temperature(K)	Luminous Efficacy(lm/W)
2700K、3000K、3500K	85.0
4000K、5000K、6500K	90.0

Self-ballasted LED bulbs



➤ Introduction:

Manufacturers have expanded the application of LEDs by "clustering" the small bulbs. The price of LED bulbs is going down each year as the manufacturing technology continues to improve.

➤ History:

Self-ballasted LED bulbs standard for Energy Conservation Label took effect in March 01, 2017.



➤ Requirement:

- Lumen maintenance :
 - (1) least 97% lumen maintenance at 1,000 hours
 - (2) least 95% lumen maintenance at 3,000 hours
- Color maintenance:
 - (1) at 1,000hrs: $\Delta U'V' \leq 0.005$
 - (2) at 3,000hrs: $\Delta U'V' \leq 0.007$
- CRI (color rendering index) ≥ 80
- Specific color rendering index(R9) > 0

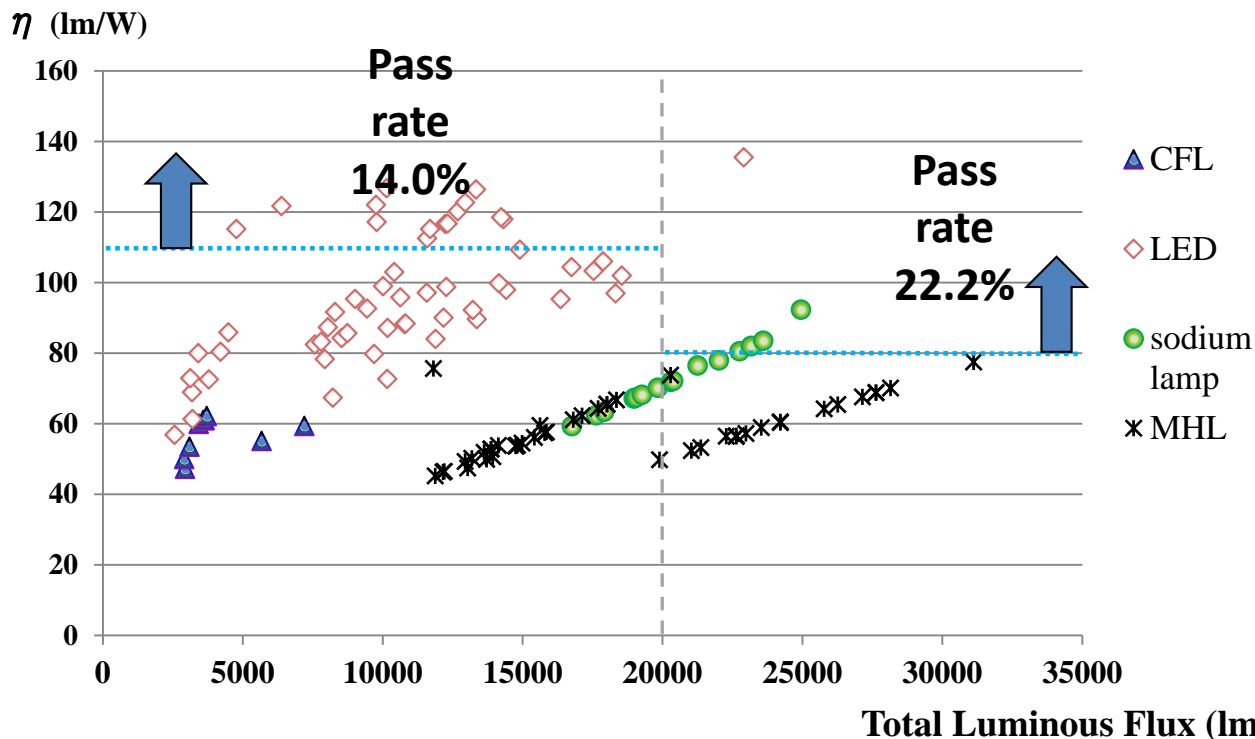
Energy Efficiency Standard:

Rated color temperature(K)	Minimum lamp efficacy(lm/W)
F2700 F3000 F3500	85.0
F4000 F5000 F6500	90.0

High Bay Luminaire



- ◆ Test sample: 27/127 (companies/models)
- ◆ In this study, 20,000 lumens of total luminous flux serves as a cut-off point.
- ◆ the luminaires with more than 20,000 lm focus on MHL(Metal Halide Lamps) and sodium lamp, and LED lighting products congregate in the area with below 20,000 lm.





High bay Luminaire Energy Efficiency Criteria:

- ◆ The tested energy efficiency value shall be over 95% of the indicated value and shall meet the following requirements:

Total Luminous Flux	Luminaire Efficacy (initial)
≥ 20,000 lm	80.0 lm/W
<20,000 lm	110 lm/W

- ✓ The tested total light flux (lm) shall be over 90% of the rated total light flux.
- ✓ The tested total input power shall be less than 110% of the rated total input power.

- ◆ The tested power factor shall be over 0.90

- ◆ The tested lumen maintenance rate shall comply with the following requirements:

Testing time	lumen maintenance
1,000 hr	97.0%
3,000 hr	95.0%



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Incentive Program

Dec.2015~Mar. 2016 Rebate program

The Achievement of Subsidy program

The Energy Conservation Labeling Rebate Program

■ Policy Origin

As part of the “Economy Prospering Program” of the government , this rebate program will achieve the purpose of **carbon emissions reduction**, **energy saving** and **prosperity stimulation** by rewarding consumers who purchase air conditioners, refrigerators, TVs, over 30 in monitor, gas stove and gas water heater..

■ Objective

The four-month sales of air conditioners, refrigerators and other products certified with Energy Conservation Labeling increase from 925 thousands units to 1 million and 430 thousands units, with a total sales amount of 1120 million USD. **The annual energy consumption is saved by 250 million KWh and 32.4 million m3 natural gas.**

■ Duration

from Dec. 1, 2015 to Mar. 31 2016. Consumers are allowed to apply until APR. 30, 2016.

■ Subsidy per unit

65 USD per unit for AC, RF, TV , over 30 in monitor and forced gas water heater

32.5 USD per unit for gas stove and natural gas water heater

■ Promotions

Detailed information is advertised via media and posters. An official website and a call center have been set up to provide counseling services to consumers..





The Achievement of the Rebate Program

(1) The amount of subsidy units for different products

Total subsidy units	A/C	RF	TV	Over 30 in Monitor	Gas Stove	Forced Gas Water Heater	Natural Gas Water Heater
1,434,121	315,606	231,112	118,290	511,349	103,343	88,157	66,267
100.00%	22%	16.1%	8.3%	35.7%	7.2%	6.2%	4.6%
subsidy/ unit USD	65	65	65	65	32.5	65	32.5

(2) Total amount of subsidy 87.05 million USD , this program led to the gross sale of high efficient products about 1120 million USD .

(3) Energy Saving amount

This program led to annual energy saving about 250 million KWh and 32.4 million m3 natural gas. The carbon emission reduction is about 199 thousand tons annually. °

(4) The improvement of high efficient products sale rates

The sale rates improvement of high efficient products is about 55%, with 140% of AC, 52% of RF, 59% of gas stove, -1% of gas water heater and 49% of TV and Monitor individually.



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Thank you for your attention