工業技術研究院
Industrial Technology
Research Institute

Equipment Energy Efficiency Management Programs in Chinese Taipei

Sep. 17, 2018

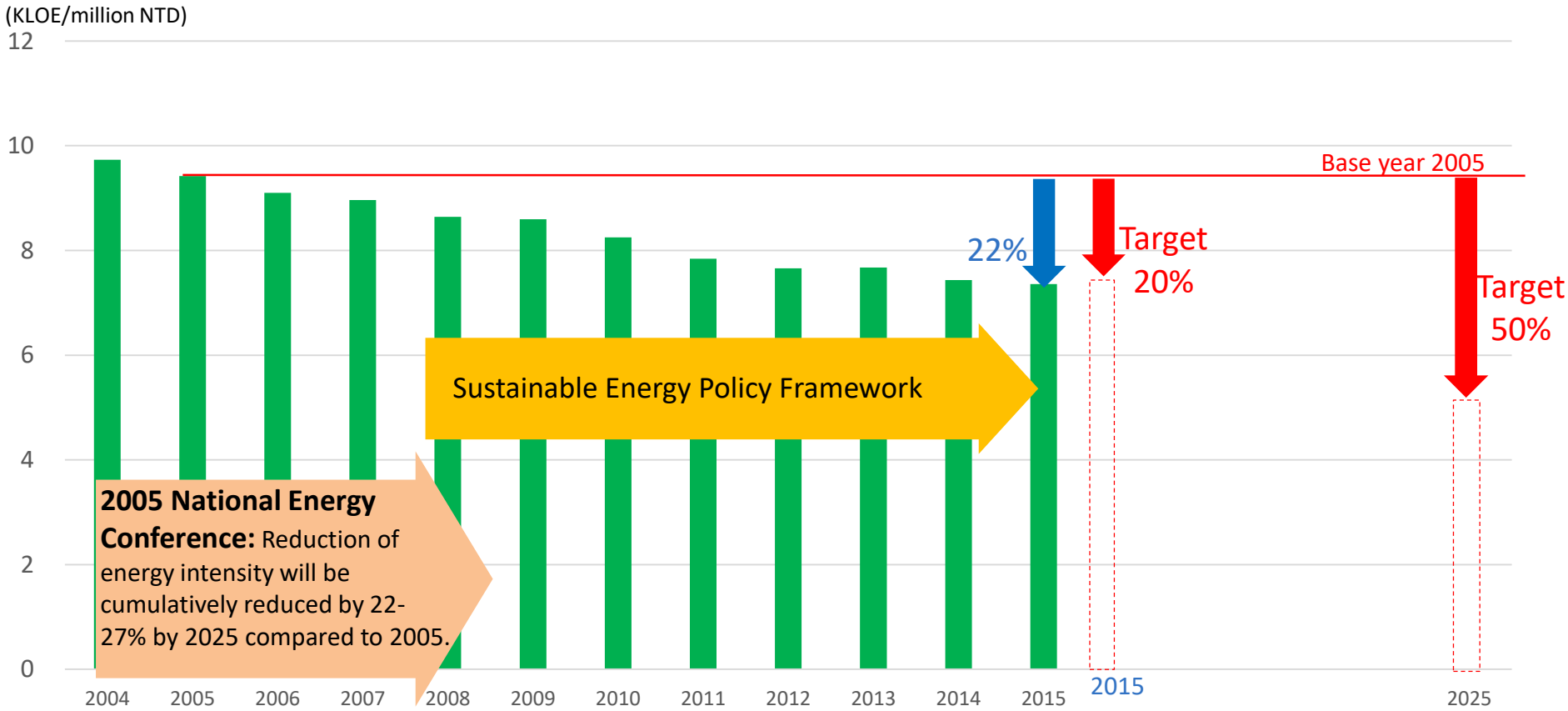
Outline

- Energy efficiency (EE) situation in Chinese Taipei
- Equipment energy management in Chinese Taipei
- Achievements

Energy Efficiency Situation in Chinese Taipei

Energy Efficiency Improvement Target

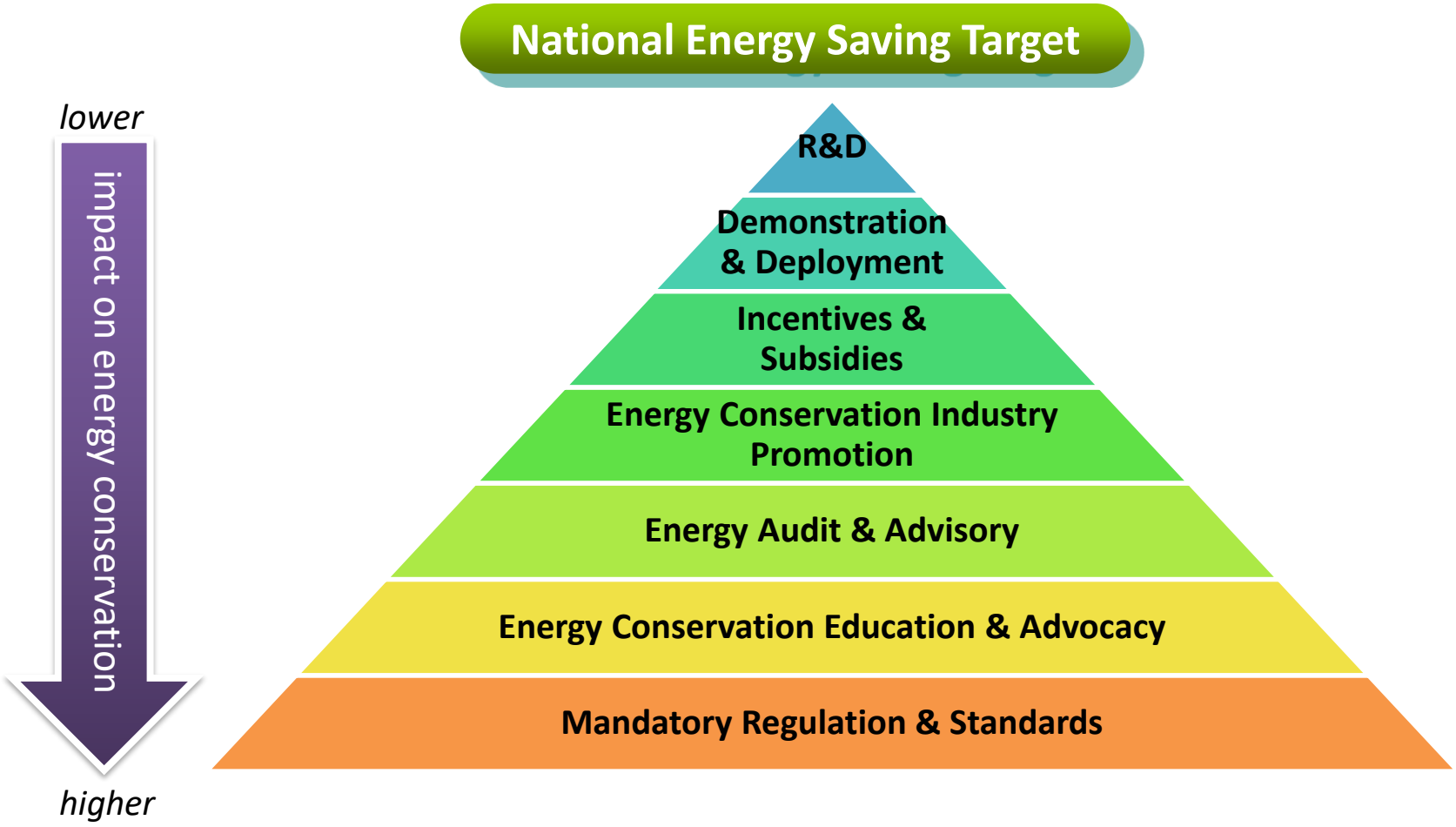
- **Sustainable Energy Policy Framework**:
  Energy efficiency improves at least 2% per year from 2008, to reduce the energy intensity no less than 20% in 2015 related to year 2005, and further reduction to at least 50% in 2025 with technology breakthroughs and effective supporting measures.



工業技術研究院
Industrial Technology Research Institute

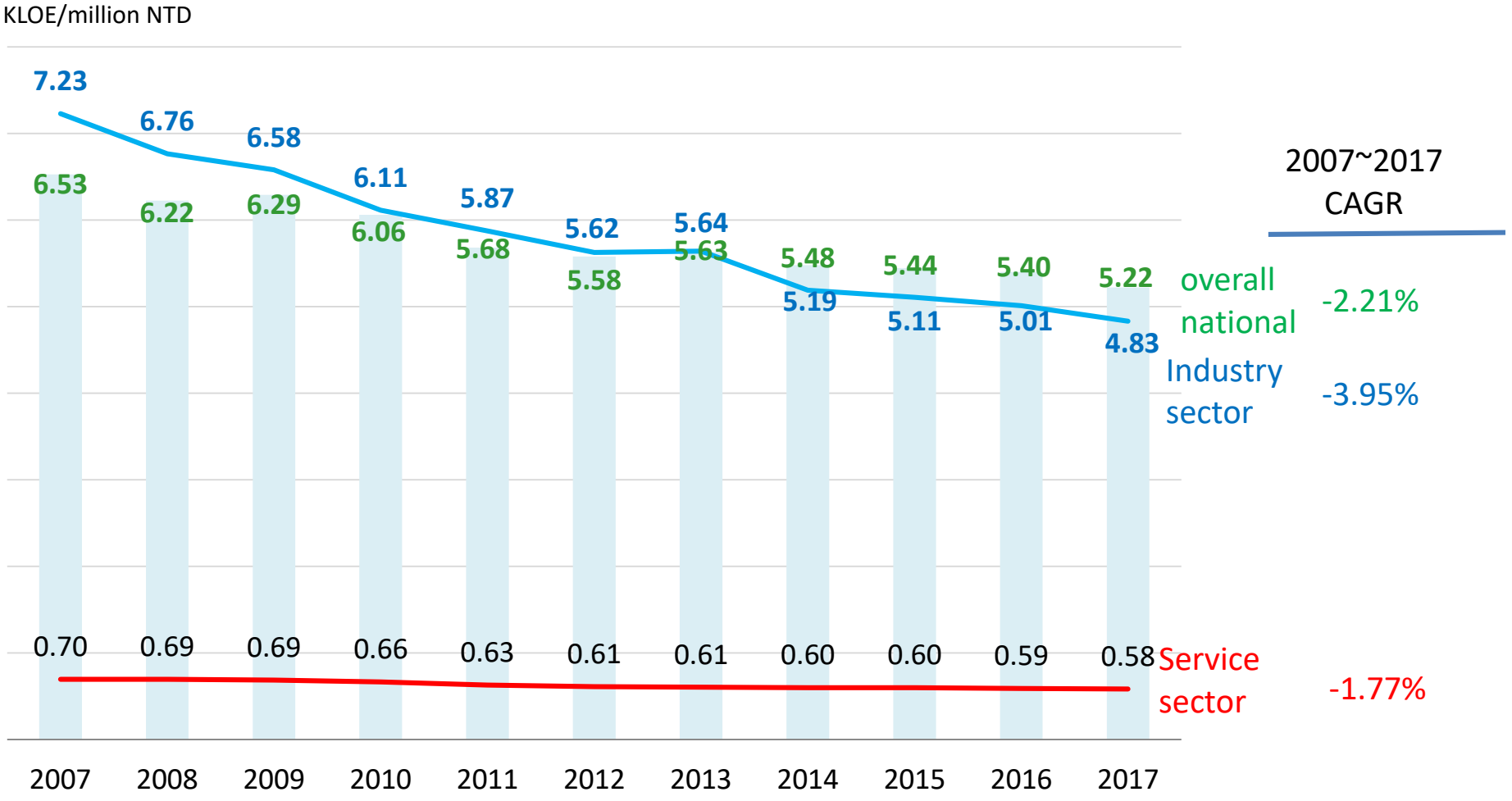
Energy Efficiency Management Strategy

- 7 key strategic themes toward National Energy Saving Target



Chinese Taipei Energy Efficiency Status (1/3)

- In 2017, Chinese Taipei Energy intensity was 5.22 (LOE /1000NTD), improved by 23.8% from 2005.

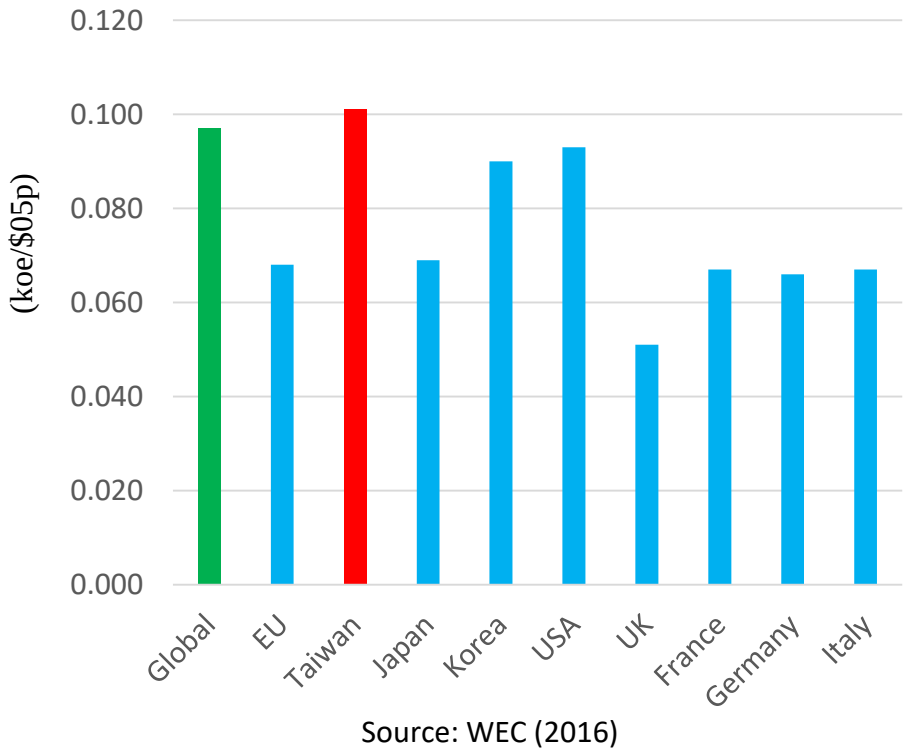


Source: BOE (2018), Monthly Energy Statistics.

Chinese Taipei Energy Efficiency Status (2/3)

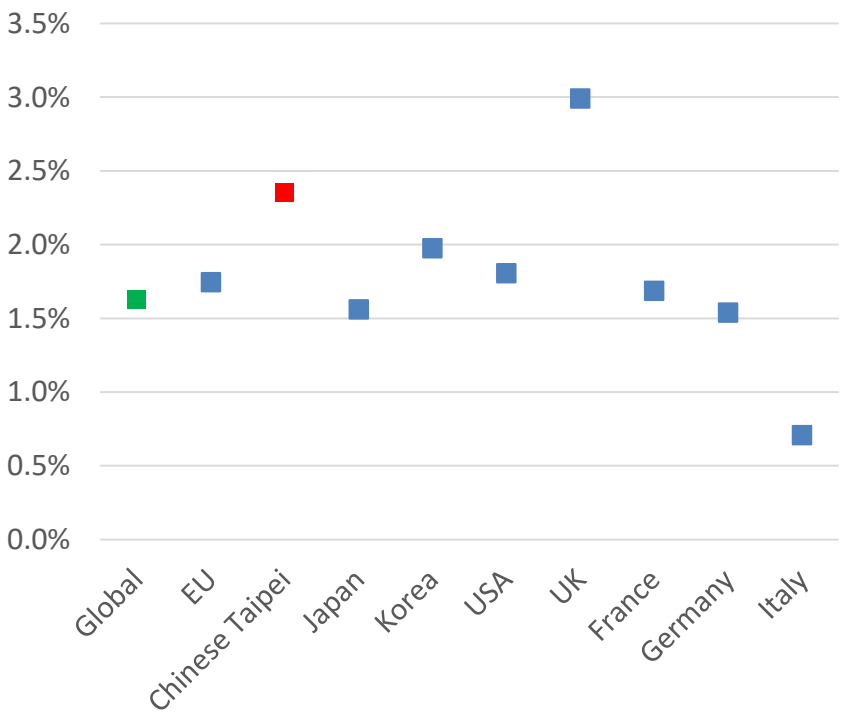
- The Energy intensity in Chinese Taipei is closed to global average; but there is still a gap between developed countries and Chinese Taipei. In recent years, our energy intensity has greatly improved and the magnitude of improvement is better than most countries.

final energy intensity in 2014 of major countries in the world



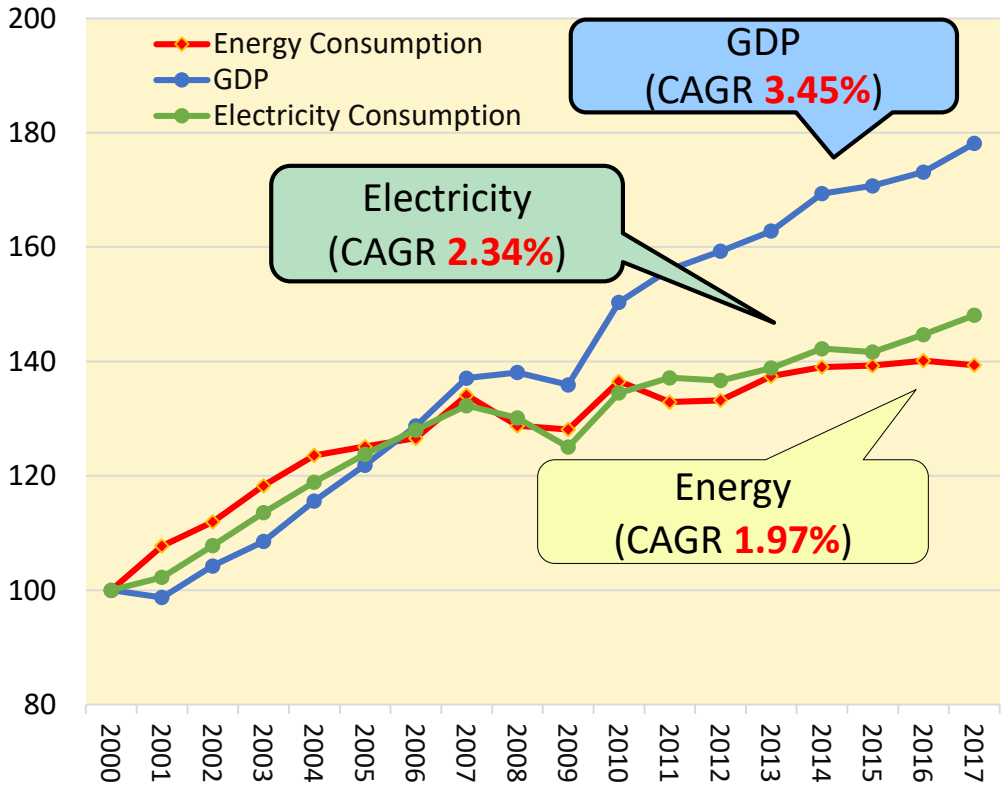
Source: WEC (2016)

annual average improvement in energy intensity from 2000 to 2014.



Chinese Taipei Energy Efficiency Status (3/3)

- **With improvement of energy efficiency, the energy consumption growth rate has been effectively contained.**
  - The energy and electricity consumption growth rates are lower than that of GDP in Chinese Taipei. The data reveals that Chinese Taipei's energy consumption and GDP are moving toward decoupling.



Source: BOE (2018), Monthly Energy Statistics.

Equipment Energy Management in Chinese Taipei

Energy Efficiency (EE) Management Programs

Mandatory Programs

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

Voluntary programs

- Energy conservation labeling
- Public awareness, education and promotion
- Incentive programs

Equipment EE Management

Chinese National Standards

Bureau of Standards, Metrology & Inspection (BSMI), MOEA

Chinese Taipei Accreditation Foundation

Testing Lab Accreditation

Comparative Labeling (Mandatory)

(14 products)

Minimum Energy Performance Standard (MEPS)

(25 products)

Energy Management by Bureau of Energy, MOEA

(Administrated by ITRI)

Energy Conservation Labeling (Voluntary)

(51 products)

Details of EE Management Programs in Chinese Taipei

EE programs	MEPS	EE Ranking Labeling	Energy Conservation labeling
Category	Mandatory (1980)	Mandatory (2009)	Voluntary (2001)
Regulations	Energy Management Law Article 14	Energy Management Law Article 14	Guidelines for the Operation of Energy Conservation Label Program, BOE, MOEA
Regulations Promulgated and Revised Date	Promulgated Aug. 8, 1980 Revised July 8, 2009	Promulgated July 8, 2009	Promulgated March 9, 2006 Revised Apr. 19, 2018
Authority in Charge	BOE[1]/BSMI[2]	BOE	BOE
Main Purpose and Function	To stop the import and sale of low energy efficiency products.	To provide consumers the information of products' energy consumption and efficiency	To encourage manufacturers to produce high EE products and to promote these products to consumers.
Execution in Progress	The criteria of MEPS set by BOE and enforced by BSMI follow the law of "The Commodity Inspection Act" by BSMI.	Products' Energy Efficiency Ranking regulations promulgated by BOE and the manufacturers are required to register regulated products with BOE.	Energy efficiency is 1.1 to 1.5 times higher than national standards or MEPS, or is in the top 20% to 30% marketed energy-efficient products.
Revision Guidelines	Phase out the bottom 15% to 30% energy efficiency products.	Re-adjust the ranking levels according to new MEPS.	Re-adjust the top 20% to 30% energy efficient product groups based on new MEPS and market conditions.

[1] Bureau of Energy
[2] Bureau of Standards, Metrology, and Inspection

工業技術研究院
Industrial Technology Research Institute

Mandatory EE Management Programs

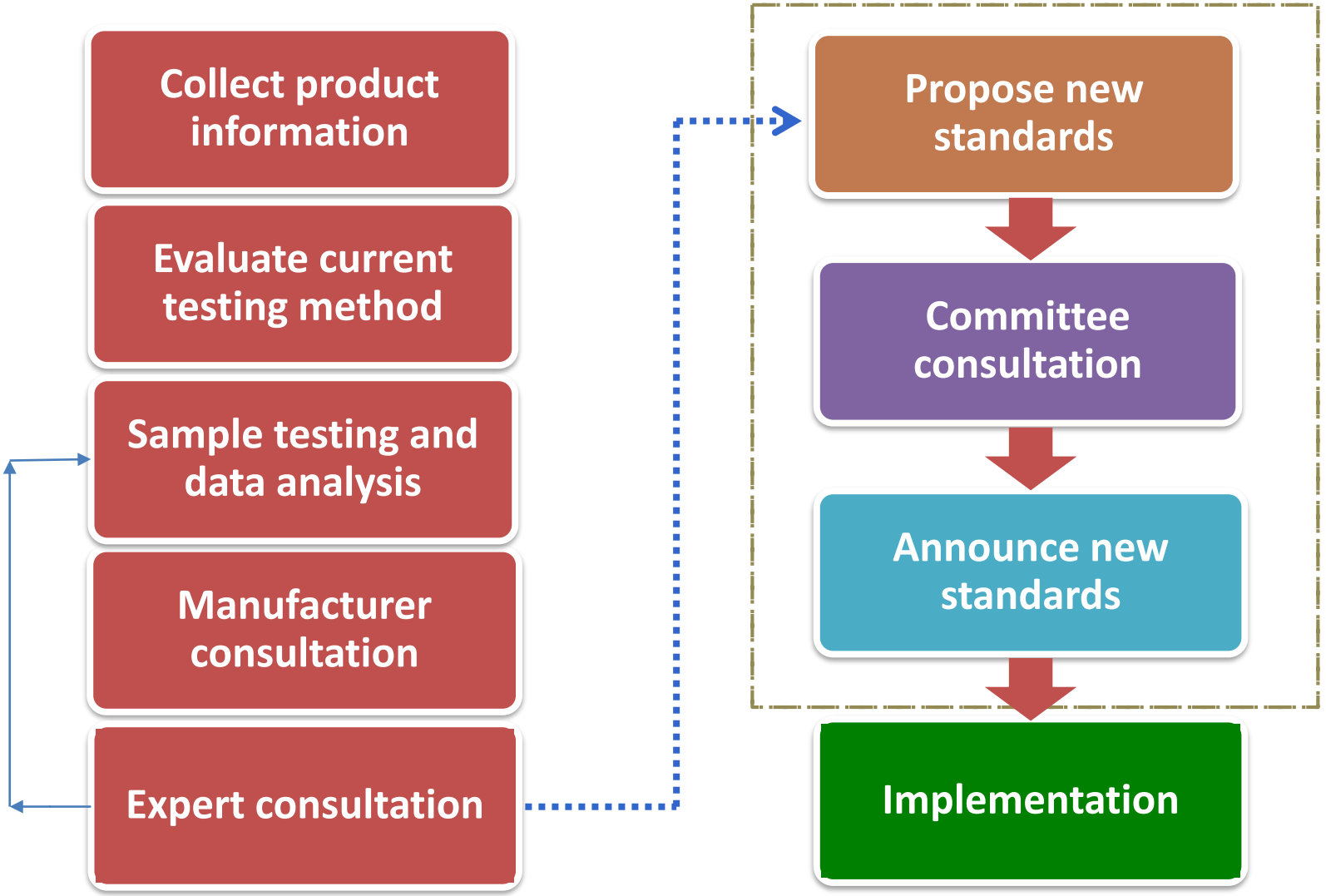
Policy	Minimum Efficiency Performance Standard (MEPS)	EE Ranking Labeling
Date of implementation	December, 1980	July, 2009
Purpose	Manufacturers and importers are obliged to apply in advance for compliance certification	Provide consumers with useful information when choosing among various models
Item	25 product categories	14 product categories
Product	1. Air Conditioners (change EER to CSPF) 2. Refrigerators 3. Dehumidifiers 4. Fluorescence Lamps 5. Ballast for Fluorescent Lamps 6. Compact florescent lamps 7. Fluorescent Lamps with embedded ballasts 8. Incandescent bulbs 9. Electric Hot Water Pots 10. Electric Storage Tank Water Heaters 11. Warm-Hot Drinking Water Dispensers 12. Chilled-Warm-Hot Drinking Water Dispensers 13. Vehicles 14. Motorcycles 15. Fishing vessel engines 16. Low-voltage single-phase induction motors 17. Low-voltage three-phase squirrel-cage induction motors 18. LED Lamps 19. Air-condition systems 20. Boilers 21. Warm-Hot Drinking Water Dispensers 22. Chilled-Warm-Hot Drinking Water Dispensers 23. Warm-Hot Drinking Water Fountain 24. Chilled-Warm-Hot Drinking Water Fountain 25. Water dispenser supplied by packaged drinking water	**1. Air Conditioners (2016.01.01RV)** **2. Refrigerator/Freezer (2018.01.01RV)** 3. Automobiles (2010.7.1) 4. Motorcycles (2010.7.1) **5. Dehumidifiers (2018.01.01RV)** 6. Self-ballasted fluorescent lamps (2011.7.1) 7. Instantaneous Gas Water Heaters (2012.12.6) 8. Gas Stoves(2012.12.06) 9. Electric hot water pots (2015.01.01) 10.Electric Storage Tank Water Heaters (2015.10.01) 11.Warm-Hot Drinking Water Dispensers (2016.12.01) 12.Chilled-Warm-Hot Drinking Water Dispensers (2016.12.01) **13.Warm-Hot Drinking Water Fountain (2018.01.01)** **14.Chilled-Warm-Hot Drinking Water Fountain (2018.01.01)** 

工業技術研究院
Industrial Technology Research Institute

Voluntary EE Management Program

Policy	Energy Conservation Labeling (ECL)	
Date of implementation	December, 2001	
Purpose	Encourage consumers to buy high-efficiency products and to enhance market penetration of efficient products	
Item	51 product categories	
Product	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 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 49. Down light Luminaire 50. Office and Business Area Luminaire 51. Indoor parking lot smart lighting fixtures

Revising Process of ECL

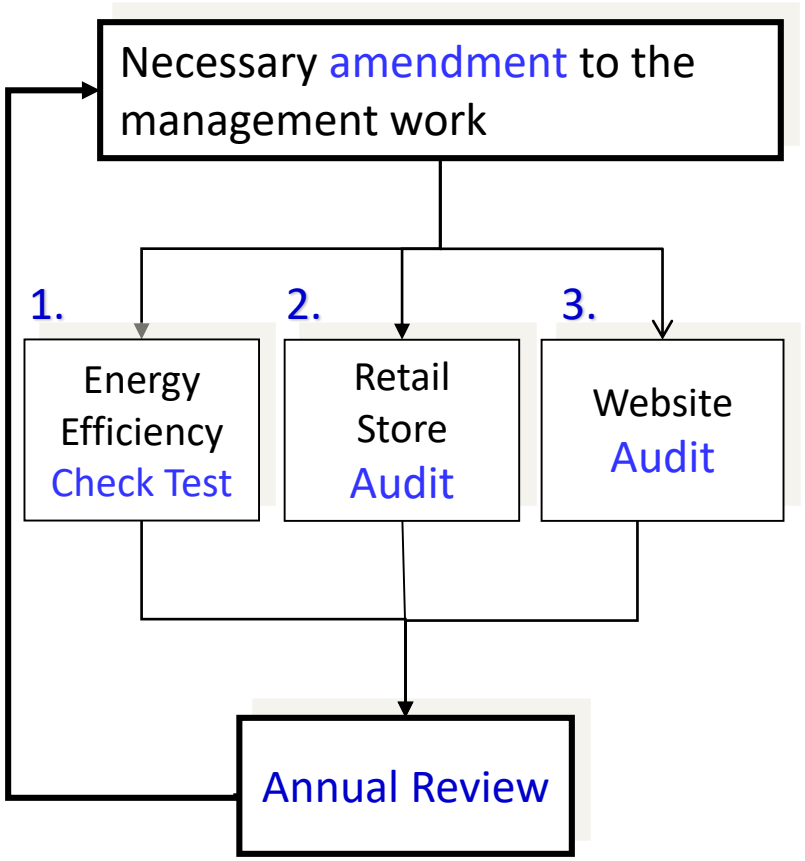


Market Surveillance in ECL program

Measures

1. *Check test* at least 900 product items every year. The manufacturers in each product item will be randomly selected for check test.
2. *Audit* at least 4200 retail stores for the correct usage of the labels.
3. *Audit* websites of the manufacturers and internet sales website for the correct usage of the labels.
4. *Review* outcomes of the management and make necessary amendment to the measures

Process Flow



工業技術研究院
Industrial Technology Research Institute

MEPS for Drinking Water Fountain

➢ History:

Warm-Hot & Chilled-Warm-Hot Drinking Water Fountain standard has taken effect in **Jan. 01 2018**.

➢ Test method:

CNS 3910 Drinking Water Fountain for piping water supply under 60L/h with electric heater for hot water and refrigeration/TE system for chilled water

➢ Energy Efficiency Standard: (MEPS)

	Warm-Hot Type Normalized Standing Loss per 24h $E_{st,24}$ (kWh)	Chilled-Warm-Hot Type Standing Loss per 24h E_{24} (kWh)
MEPS	$0.053 \times V_1 + 0.750$	$0.09 \times V_{eq} + 0.45$

Notes:

$V_{eq} = V_1 \times K_1 + (V_2 \times K_2)/3$

V_1 is the nameplate values of hot-water tank(unit：liter); K_1= (Th–Tamb) / (100 –Tamb)

V_2 is the nameplate values of iced-water tank(unit：liter); K_2= (Tamb –Tc) / (Tamb)

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 Fountain

(has taken effect in **Jan. 01 2018)**

◆ Energy efficiency grade labeling requirements for Warm-Hot Type

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

◆ Energy efficiency grade labeling requirements for Chilled-Warm-Hot Type

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

工業技術研究院
Industrial Technology Research Institute

Electric Refrigerators and Freezers

- Revised energy efficiency grade labeling regulation has taken effect in **Jan. 01 2018,** but MEPS keeps as the same as carried out in 2011.
- Test and calculate actual energy factor (E.F.) values of refrigerator according to CNS 2062. (*EF*=V_{eq} / *energy consumption for 30 days*)
- MEPS

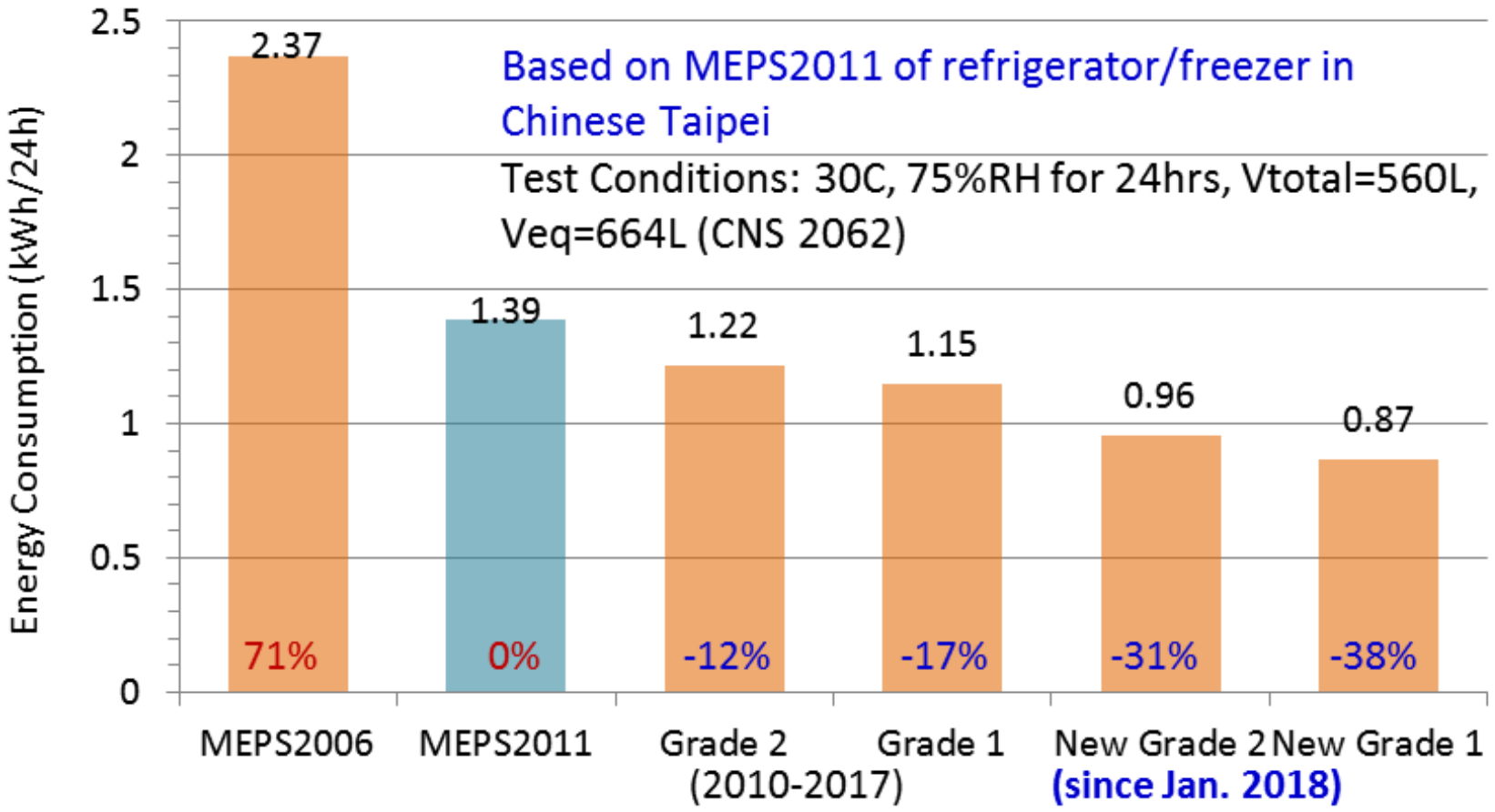
Product class	MEPS for EF(L/kWh/month)
Fan-circulation type refrigerator-freezers for V<400L (automatic defrost)	EF=V/(0.037V+24.3)
Fan-circulation type refrigerator-freezers for V≥400L (automatic defrost)	EF=V/(0.031V+21.0)
Direct cooled refrigerator-freezers for V<400L (manual defrost)	EF=V/(0.033V+19.7)
Direct cooled refrigerator-freezers for V≥400L (manual defrost)	EF=V/(0.029V+17.0)
Refrigerators	EF=V/(0.033V+15.8)

- Energy efficiency grade labeling regulation

Product class	Grade 5	Grade 4	Grade 3	Grade 2	Grade 1
Fan-Type & Direct - Cooled Type	MEPS ≤ EF< MEPS×115%	MEPS×115% ≤ EF< MEPS×130%	MEPS×130% ≤ EF< MEPS×145%	MEPS×145% ≤ EF< MEPS×160%	EF ≥ MEPS×160%
Refrigerator only	MEPS ≤ EF< MEPS×118%	MEPS×118% ≤ EF< MEPS×136%	MEPS×136% ≤ EF< MEPS×154%	MEPS×154% ≤ EF< MEPS×172%	EF ≥ MEPS×172%

Electric Refrigerators and Freezers

- Energy Consumption Comparison for MEPS & the energy efficiency grade labeling standard

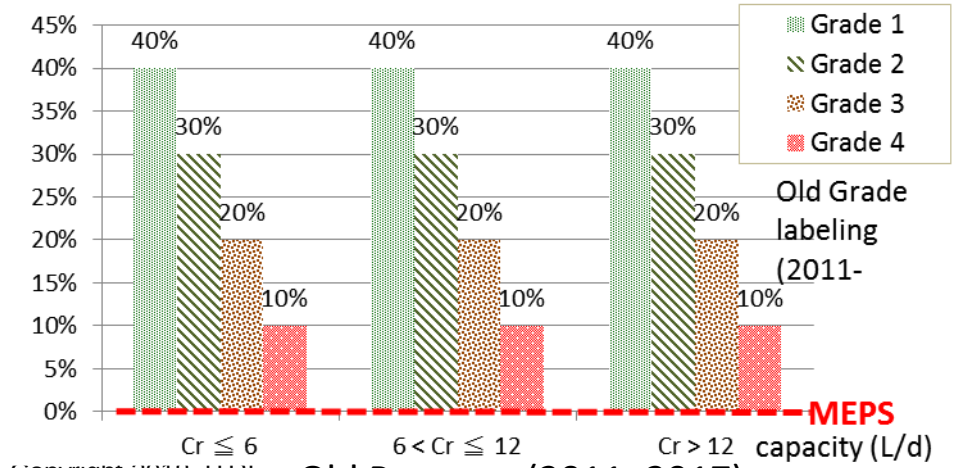


Dehumidifier

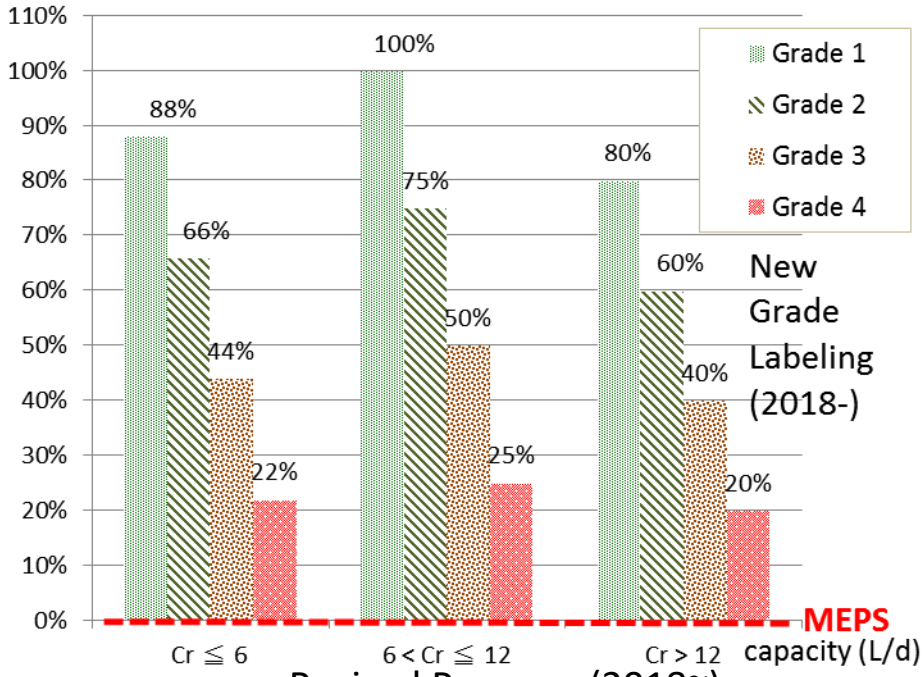
- Revised energy efficiency grade labeling regulation has taken effect in **Jan. 01 2018,** but MEPS keeps as the same as carried out in 2011.
- Test and calculate actual energy factor (E.F.) values of dehumidifier according to CNS 12492 (*EF= Capacity / energy consumption*)
- MEPS

Rated Capacity Cr (L/day)	MEPS for EF (L/kWh)
Cr ≦ 6	1.10
6 < Cr ≤ 12	1.20
Cr > 12	1.40

- Energy efficiency grade labeling regulation



Old Program (2011~2017)



Revised Program (2018~)

工業技術研究院
Industrial Technology
Research Institute

Self-ballasted LED bulbs

➢ History:

Revised MEPS for self-ballasted LED lamps standard will be taken effect in **2020**.

➢ 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 F4000 F5000 F6500	105	75	50	90	80

工業技術研究院
Industrial Technology Research Institute

Electric Rice Cooker

➢ History:

Minimum Energy Performance Standard and Energy Efficiency Rating Labelling and Inspection of Electric Rice Cookers will be taken effect in **2020**.

➢ Test method:

CNS 2518 "Electric Rice Cookers"

➢ Energy Efficiency Standard:

Table 1 MEPS for Electric Rice Cookers

MEPS for thermal efficiency value (%)
72.0

Note：

1. The Electric Rice Cookers denoted in this announcement are those meeting the definition in CNS 2518. The calculated thermal efficiency value shall be rounded off to one decimal place. Thermal efficiency(%) equals the cooker heating capacity(Qt)(sensible heat capacity (Q1 ， Wh) plus latent heat capacity (Q2 ， Wh)) divided by Total energy consumption(E, Wh).

sensible heat and latent heat are defined by the following equation:

sensible heat capacity $Q_1=1.16\times(W_1+W_2)\times(T_2-T_1)$

latent heat capacity $Q_2=\Delta w\times 0.6269$

W_1 ：mass of distilled water at a rate of 64% of cooker's inner container (kg)

W_2 ：mass of distilled water added to the outer container (kg)

T_1 ：initial distilled water temperature (℃)

T_2 ：highest distilled water temperature (℃)

Δw ：water evaporation(g)

3. The tested thermal efficiency value shall not be lower than the standard value shown in the table above. The tested value should be at least 97% or more of the product declared value. Both criteria must be met.

Electric Rice Cooker

Table 2 Energy efficiency rating standard requirements for Electric Rice Cookers

Energy efficiency rating	Thermal efficiency value (%)
Class 1	90. 0
Class 2	85. 0
Class 3	80. 0
Class 4	76. 0
Class 5	72. 0

WTO/TBT **G/TBT/N/TPKM/299**

Please note this notification was submitted to the WTO on 30 October 2017.

工業技術研究院
Industrial Technology
Research Institute

Water dispenser supplied by packaged drinking water

- **History:**
  Minimum Energy Performance Standard will be taken effect in **2020**.

- **Test method:**
  CNS 15929 "Water dispenser supplied by packaged drinking water"

- **Energy Efficiency Standard:**

Table 1 MEPS for Hot-Warm Type

$E_{st,24}$ (kWh)
0.152×V+0.99

Note：

1. V is the declared value of hot-water tank. V shall be rounded off to one decimal place.

Water dispenser supplied by packaged drinking water

Table 2 MEPS for Iced-Hot-Warm Type

E_{24} (kWh)
$0.131 \times V_{eq} + 1.181$

Note：

1. $V_{eq} = V_1 \times K_1 + (V_2 \times K_2)/3$
2. V_1 is the declared values of hot-water tank(unit：liter)
3. V_2 is the declared values of iced-water tank(unit：liter)
4. V_1 and V_2 shall be rounded off to one decimal place.
5. According to CNS 15929 Section 11.12, the ambient temperature (T_{amb}), 24-hour average temperature of hot-water system (T_h), and 24-hour average temperature of iced-water system (T_c) are measured. To calculate K_1 and K_2, as follows：
   (1) $K_1 = (T_h - T_{amb}) / (100 - T_{amb})$
   (2) $K_2 = (T_{amb} - T_c) / (T_{amb})$
   (3) K_1 and K_2 shall be rounded off to three decimal places.

Achievements of the most recent incentive program

Dec. 2015-March 2016
Rebate program

Energy Conservation Labeling Website

More than 86 million visits to the Energy Conservation Labeling Website have been registered as of September 2018. It is about 900 thousand visits per month.

What is Energy Label

✱Government-backed voluntary endorsement label

To promote deployment of energy efficiency technologies as well as to encourage manufacturers to invest in research and development of energy-efficient products, the Bureau of Energy (BOE), Ministry of Economic Affairs initiated the voluntary "Energy Label" program..... > See the details

http://www.energylabel.org.tw/

Information

51 product categories available for applying ..... > Applying Here

7362 products with 312 brand names are available for selection ..... > Purchasing here

Feature Reports

✱Introduction to Implementation Measures of Selected Energy Labeling Programs Worldwide

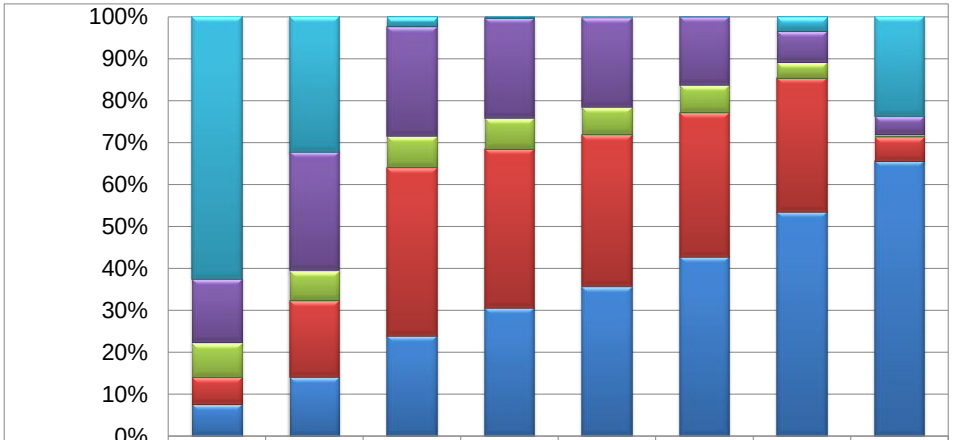
As a sequel to the first article describing the implementation legislation and promotional measures of important energy labeling programs worldwide, this article focused on the implementation aspects of selected energy labeling

Achievements of EE Ranking Labeling Program

(AC and refrigerator as examples)

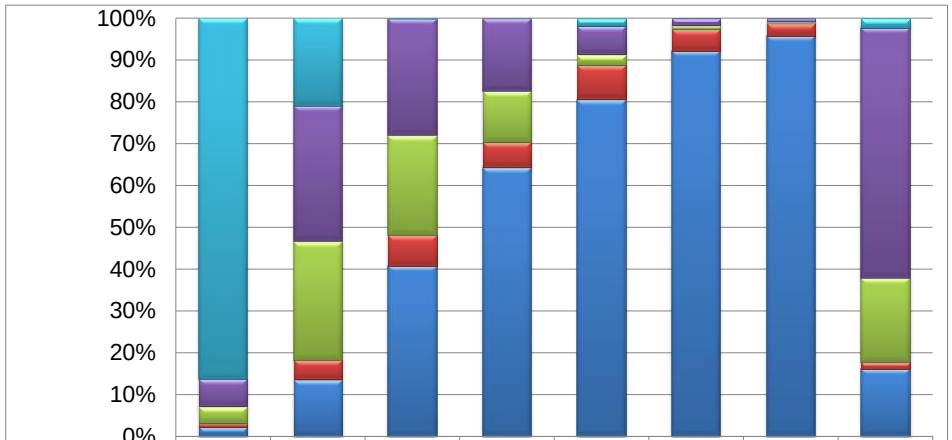
- The market share of ranking 1 and 2 ACs increased dramatically from **14.1%** in 2010 to **87.5%** in 2016. (New AC standard takes effect from 2016)
- The market share of ranking 1 and 2 refrigerators increased dramatically from **3.1%** in 2010 to **98.8%** in 2016. (New refrigerator standard takes effect from 2018)
- The **rebate program** boosted the market share of high efficiency products in 2011 and 2012.

market share of ACs



	2010	2011	2012	2013	2014	2015	2016	2017
E.E rating 5	62.5%	32.2%	2.3%	0.4%	0.1%	0.0%	3.4%	23.7%
E.E rating 4	15.2%	28.3%	26.2%	23.8%	21.3%	16.2%	7.4%	4.3%
E.E rating 3	8.2%	7.1%	7.4%	7.2%	6.6%	6.6%	3.7%	0.6%
E.E rating 2	6.5%	18.3%	40.3%	38.1%	36.2%	34.6%	32.0%	5.9%
E.E rating 1	7.6%	14.0%	23.8%	30.5%	35.7%	42.6%	53.5%	65.5%

market share of refrigerators



	2010	2011	2012	2013	2014	2015	2016	2017
E.E rating 5	86.3%	21.0%	0.2%	0.0%	1.9%	0.0%	0.0%	2.4%
E.E rating 4	6.6%	32.4%	27.9%	17.5%	6.9%	1.8%	0.8%	59.8%
E.E rating 3	4.0%	28.2%	23.8%	12.2%	2.6%	0.9%	0.4%	19.9%
E.E rating 2	0.8%	4.7%	7.4%	6.0%	8.1%	5.1%	3.0%	1.9%
E.E rating 1	2.3%	13.6%	40.7%	64.3%	80.6%	92.2%	95.8%	16.0%

Thank you for your attention