

Mandatory Energy Conservation Target: A Case Study of 1% Electricity Saving in Taiwan's Industrial Sector

Tze-Chin PAN, Ph.D.

Industrial Technology Research Institute

2061 ECEEE Industrial Energy Efficiency Conference September 14, 2016



Contents

- Part 1. Energy <u>Situation</u> in Taiwan
- Part 2. Energy Efficiency Policy for Industrial Sector
- Part 3. Large Energy Users' <u>Attitudes</u> toward Mandatory Target



Part 1. Energy Situation in Taiwan



Energy Situation in Taiwan (1/4)

Taiwan Basic Information

- Area: 36 thousand km²
- Population: 23 million persons
- 2014 GDP (nominal): US\$ 529 billion
- 2014 GDP per capita (nominal): US\$ 22 thousand (ppp-IMF): US\$ 45 thousand







Energy Situation in Taiwan (2/4)

Industry sector has been the primary consumer of energy (about 37%) and electricity (about 53%).



Source: Taiwan Energy Monthly Statistics, 2016.



Energy Situation in Taiwan (3/4)

- From 2001 to 2015, the improvement of energy intensity in industrial sector (46%) is better than that in Taiwan (37%).
- The energy intensity of industrial sector is 0.08 koe/\$05p, which is closed to the average of EU.





The electricity consumption in electronic industry is obviously higher than other industries. The electronic industry also contributed the greatest amount of GDP.

Structure of Industrial Sector





Part 2. Energy Efficiency Policy for Industrial Sector

- 1. Energy Efficiency Regulation for Energy Intensive Industries
- 2. Energy Audit for Large Energy Users (LEUs)
- 3. Mandatory Target: Electricity Saving by 1%



Industry	Start date	Regulation for Energy Efficiency
Cement	2015.1.1	Maximum energy consumption per product for different manufacturing systems*
Iron & Steel	2015.1.1	Maximum temperature and oxygen concentration in the flue outlet
Pulp & Paper	2015.1.1	Maximum energy consumptions per product for different paper types*
Chemical	2015.1.1	Maximum temperature and oxygen concentration in flue outlet
Electronic	2015.11.1	Many Operation Requirements: such as freezer temperature, loss of dryer
Textile	2016.1.1	Limit of temperature difference between inlet and exit water in chiller; Maximum temperature and oxygen concentration in flue outlet of coal stoke

Shering cherda cose



2. Energy Audit Scheme in Taiwan

Industrial LEUs: 3200 factories (location-level)

→ Cover 89% electricity demand of industrial sector.

Туре	Energy Form	Basis for energy use	Mandatory Obligation	
I	Electricity	Contract capacity >800kW	 Set energy management officer. Any new installation or expansion on energy facilities should be 	
	Fuel oil	>6,000 KL/y	approved by the central	
	Natural gas	>10,000,000m ³ /y	 3. Report the energy audit and energy conservation plan annually. 	
	Coal	>6,000 Ton/y		
II	Steam	>100 Ton/h	Set up cogeneration (CHP) system.	
111	Centralized air conditioning system	Not for production use and refrigeration capacity over 100 hp	 Appoint energy managing personnel Provide space and wire connection boxes for necessary meters installed by electricity utilities. 	



2. Energy Audit Scheme in Taiwan

LEUs have to submit the Energy Audit Report every year.

 status of energy consumption, energy efficiency indicators for products and facilities, graphs of energy balance, and energy conservation report





3. Electricity Conservation by 1%

> Annual average electricity saving (S_i) from 2015 to 2019 must exceed 1% of the annual average total electricity consumption (C_i) .

$$R_n = \frac{\sum_{i=2015}^n S_i}{\sum_{i=2015}^n (C_i + S_i)}$$

- Electricity saving from one energy efficiency measure will be counted only in one year.
- The Bureau of Energy has commissioned the ITRI to review the appropriateness of the electricity conservation measures.
- If the LEUs' annual average saving rate less than 1% in 2019, the LEU will be penalized by the BOE.



Part 3. Large Energy Users' Attitudes toward Mandatory Target

工業技術研究院

Expected Achievement in 1% Electricity Saving

- Relationship between authorized capital and achievement of electricity saving targets is not significant.
- ➢ Higher number of employees → Higher likelihood of achieving the target.
- The achievement of electronic, textile, and paper industries are high.

0% 20% 40% 60% 80% 100%

	Industrial Sector	61%	39%
Amount of Authorized Capital (NT\$)	< 0.1 billion	59%	41%
	0.1~10 billion	63%	37%
	> 10 billion	62%	38%
Number of Employee	< 100	52%	48%
	100~500	63%	37%
	> 500	71%	29%
Sub-Sector	Electronic	68%	32%
	Chemical	60%	40%
	Iron & Steel	54%	46%
	Cement	63%	37%
	Textile	70%	30%
	Paper	75%	25%

□ Achievement □ Failure



Barriers of achieving 1% Electricity Saving

- The major barrier for most industries is that manufacturing facilities cannot be improved in short term.
- Electronic and paper industries expects that new production lines will increase consumption.



□ Factory is lack of funding for electricity saving.

□ New production lines increase electricity consumption.

□ Manufacturing facilities cannot be improved in short term.

□ Factory's Energy Efficiency is better than other competitor.

□ Factory has Introduced New and High Energy Efficiency Facilities.

□ Other



Assistance for Achieving 1% Electricity Saving

- Since the interest rate in market is low, the LEUs don't expect the soft loan.
- For achieving 1% electricity saving, 44% LEUs expect the government provides the subsidy for high energy efficiency facilities.

0	% 10% 20% 30	0% 40% 50%	70% 8	0% 90% 100%
Industrial Sector	16%	44%	19%	19%
Electronic	17%	58%		12% 12%
Chemical	30%	30%	15%	26%
Iron & Steel	18%	32%	21%	21%
Cement	7% 41%	0	30%	19%
Textile	14%	41%	14%	23%
Paper	13% 25%	25%		38%
	□ Tax Preference	□ Soft Loan	□ Subsidy	
	□ Consultation	■BAT Example	□ Other	



Closing Remark



Closing Remarks

- To avoid power shortages in coming years, the Taiwan government has set a mandatory target for electricity saving by 1% to LEUs between 2015 and 2019.
- This mandatory target is implemented based on the existing energy audit scheme.
- According to the survey, most LEUs will be able to meet the mandatory targets. Manufacturing processes generally account for the bulk of the electricity consumption.
- A drop in energy prices has reduced the motivation of LEUs to improve energy efficiency. Thus, the government should provide more subsidies or other incentives to promote electricity conservation over the short term.



Thank You For Your Attention