

Case Study Title :

Online and Offline Market Surveillance Inspection Systems for Energy Efficiency Management of Energy-Using Equipment/Appliances

Case Activities :

A series of promotion projects for energy efficiency management of energy-consuming equipment or appliances in Chinese Taipei.

Timeframe : Since 1981

Key Resources :

The government budget supported the establishment and completion of the mechanism for energy efficiency and conservation, as well as the implementation of policies for energy efficiency management.

Institutions Involved :

Administrated by Industrial Technology Research Institute. (ITRI).
Directed by Energy Administration, Ministry of Economic Affairs. (EA)

Regions & Country : East Asia and Pacific, Chinese Taipei

Sectors and Themes : Energy

Language : English, Chinese

Case Summary :

Science has confirmed the serious impact of climate change on the Earth. To mitigate the effects of climate change, energy conservation and carbon reduction have become the goals of global efforts. Improving energy efficiency and conservation has been recognized as the first effective measure to decarbonize, and thus has become one of the core policies in the pathway to net-zero by 2050 in Chinese Taipei.

Chinese Taipei has implemented several energy conservation measures to enhance energy-efficient management and reduce energy consumption. In terms of the energy efficiency policy focus on equipment and appliance sales in the market, enforcement of mandatory regulations such as the Minimum Energy Performance Standard (MEPS) and implementation of Energy Efficiency Rating Labeling (EEL), as well as voluntary Energy Conservation Labeling (ECL) have been done in Chinese Taipei. The regulations are key to accelerating the prevalence of highly energy-efficient products and contribute to achieving energy-saving and carbon-reduction.

To implement the energy efficiency management policy in the market and ensure policy credibility and consumer rights, Chinese Taipei has implemented EEL and ECL accuracy inspections at physical channels (offline market) and network platforms (online market). The online inspection results have even won the 2021

Energy Globe Award. The successful experience can be a good practice for other countries to reference and learn from.

To achieve energy conservation and carbon reduction, respond to climate change and meet sustainable development goals, Chinese Taipei looks forward to cooperating with ALP member economies and moving toward a net-zero sustainability future together.

Background : Energy Efficiency Policy in Chinese Taipei

Extreme climate is a common global challenge, with more than 130 countries having declared net-zero emission targets. Chinese Taipei unveiled its "Pathway to Net-Zero Emissions in 2050" on March 30, 2022. This pathway is built upon four major transformations: energy, industry, lifestyle, and society. It is supported by two key governance foundations: technology research and development, and climate legislation. Additionally, it is supplemented by "12 Key Strategies," with maximizing energy efficiency in the field of energy conservation being the most crucial keys.

Figure 1: 12 Key Strategies Toward Net-Zero Transition in Chinese Taipei



Source: ITRI

To improve energy efficiency, Chinese Taipei has implemented energy efficiency management policies based on Article 14 of the Energy Administration Act, regulating the use of energy-consuming equipment or appliances designated by the central competent authority to promote energy efficiency, and has implemented three major systems to manage it.

Three principal policies have been implemented for managing the energy efficiency of equipment and appliances in Chinese Taipei.

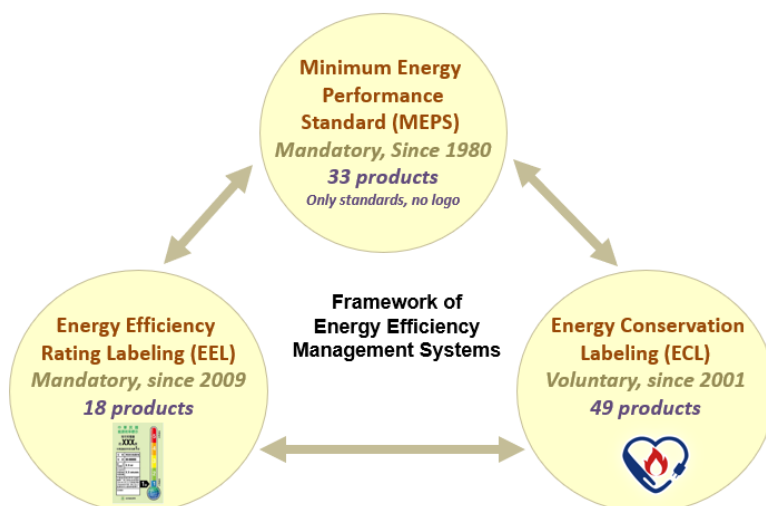
1. Minimum Energy Performance Standards (MEPS): Develop minimum energy efficiency benchmark specifications for major energy-consuming products. These standards prohibit the importation or sale of products in Chinese Taipei

that have low energy efficiency or high energy requirements. The new standards are revised based on the principle of eliminating products in the lower 15th to 30th percentiles in terms of energy efficiency.

2. **Energy Efficiency Labeling (EEL):** Products are assigned energy efficiency grades ranging from 1 to 5, with 1 indicating the highest energy efficiency within the same product group and 5 indicating the lowest. These ratings are determined based on the energy efficiency distribution of commercially available products, in coordination with the formulation or revision of MEPS. Energy efficiency-related information must be included in this labeling. This policy provides consumers with information such as power consumption and energy efficiency ratings to facilitate their selection of suitable products..
3. **Energy Conservation Labeling (ECL):** Products labeled with this symbol indicate energy efficiency levels 10-50% higher than product certification standard. These products are not only of guaranteed quality but also save energy and money. Manufacturers are encouraged to apply for certification voluntarily. The ECL policy guides the industry in developing and manufacturing products with high energy efficiency and encourages consumers to prefer these products through easily recognizable labeling patterns.

Currently, Chinese Taipei has announced mandatory MEPS requirements for 33 product categories. The mandatory EEL system includes 17 categories of energy-consuming products, such as ductless air conditioners (including window and box air conditioner models), refrigerators, automobiles, motorcycles, dehumidifiers, air cleaners, etc. Additionally, 50 product categories are authorized to participate in the voluntary ECL program.

Figure 2: Chinese Taipei's Energy Efficiency Management Systems



Source: ITRI

Challenges: Energy Efficiency Policy Implementation in the Market

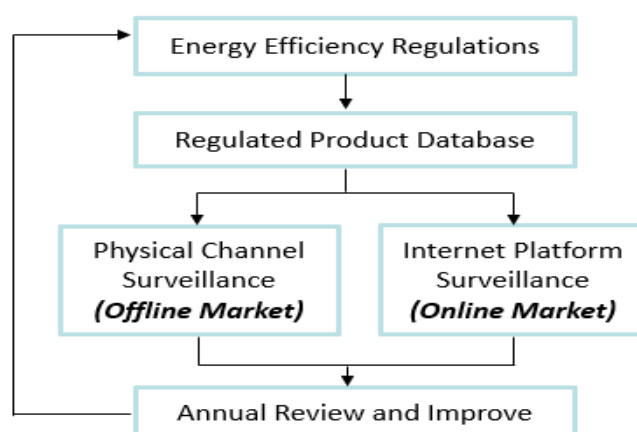
Energy efficiency management policies guide manufacturers to produce or import high-energy efficiency products. However, ensuring that many products made by

manufacturers or imported meet energy efficiency standards and regulations when exhibited or sold in the market is a significant challenge. Similarly, while energy efficiency policies encourage consumers to purchase high-energy efficiency products, ensuring consumers buy the correct and compliant products is also a difficult challenge when these policies are implemented and promoted in the public market.

Overcome: Market Surveillance Inspection Systems for Energy Efficiency Management

To address the issues mentioned above and ensure the steady operation of energy efficiency policies in the market, Chinese Taipei has implemented market supervision and management mechanisms. Since 2008, inspections have been conducted in physical stores and on the official websites of companies that have obtained ECL certification to ensure the correct use of labels and to prevent low-efficiency products from falsely using the energy-saving label. In 2011, the inspection of EEL was added to prevent false labeling of energy efficiency grades. With the rapid development of online shopping, online inspections began in 2017, utilizing AI and other online tools to conduct inspections.

Figure 3: Buildup of Market Surveillance in the Energy Efficiency Management System



Source: ITRI

Overcome : Offline Market Surveillance Inspection

1. In the initial phase of implementing the project, we conducted inspections to ensure the labeling accuracy of EEL and ECL in physical retail channels. This includes the appliance exhibit areas of chain stores or supermarkets, kitchenware stores, and home appliance retail stores.
2. Conduct irregular inspections each year in the 19 counties and cities on the main island of Chinese Taipei, comparing the EEL and ECL management system to inspect whether products are correctly using the labels of EEL and ECL.
3. Record and correct the products that do not comply with energy efficiency labeling regulations but are exhibited or sold in physical stores, and urge the store to correct the mistakes, and make improvements on-site.

4. Through physical store inspections, ensure the credibility of the energy efficiency policy management system, protect consumers' rights to purchase high-efficiency products, and promote energy-saving lifestyles.
5. After years of implementing the inspection system in physical retail channels, it has effectively maintained a high level of accuracy for EEL and ECL products. In 2023, a total of 4,204 stores were inspected in physical markets, with 322,311 products inspected for energy efficiency labeling and energy-saving labels. The overall labeling accuracy of EEL products reached 99.33%, and the overall labeling accuracy of ECL products reached 96.44%.

Figure 4: Audit ECL and EEL accuracy at the physical store



Source: ITRI

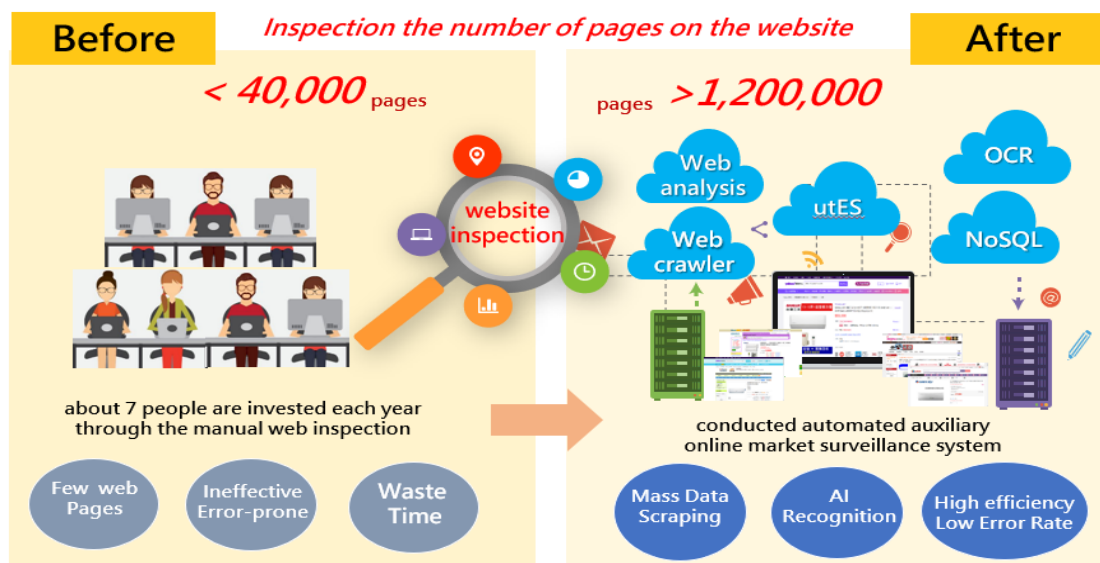
Overcome : Online Market Surveillance Inspection

1. Initial Situation: With the rapid development of the Internet, many non-compliant energy efficiency labeling regulations products are sold on online platforms, leading to consumer misinformation and infringing on the rights and interests of consumers and legal manufacturers. This situation also hinders the implementation of energy conservation policies and carbon reduction targets.
2. Conduct online market surveillance to inspect the accuracy of ECL and EEL labels on manufacturers'/importers' official websites and online shopping platforms established in Chinese Taipei. Incorrect or illegally used labels of ECL and EEL on web pages must be corrected immediately; otherwise, they will face legal consequences.
3. Innovation: (1) ITRI applies website structure analysis, web crawlers, NoSQL, OCR, AI recognition, and other network technologies, integrating them into a customized automated auxiliary online market surveillance system to overcome the complex protection measures of different e-commerce platforms. (2) The online audit system can extract a large amount of information from each website and use an automatic image and text comparison system, which

greatly increases the identification rate of non-compliant labels of EEL or ECL products, reduces manual identification errors, and substantially improves inspection efficiency.

4. The customized automatic auxiliary system can reduce labor costs and increase inspection capacity. Chinese Taipei's online inspection results not only maintain the credibility of government energy efficiency policies but also protect consumers' rights to correctly purchase energy-saving products online. This achievement has been recognized with the 2021 Energy Globe Award.

Figure 5: Audit ECL and EEL accuracy online via network technologies



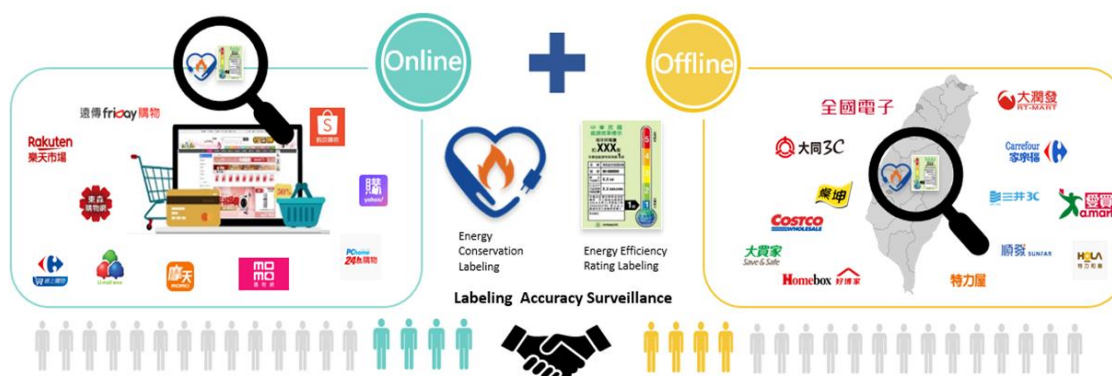
Source: ITRI

Impacts :

1. The representative labels promoted by the government, when correctly displayed in the market, can protect consumer rights, maintain the credibility of the policy, and promote the popularization of energy-saving products with high energy efficiency.
2. Through the market supervision mechanism, audit the labeling accuracy of mandatory EEL and voluntary ECL. Implement energy efficiency policy management for regulated products at physical channels and online platforms to prevent manufacturers or importers from selling non-compliant energy efficiency products with false labels.
3. Correct EEL or ECL can help promote public energy-saving policies and ensure the participation of manufacturers and the public in the benefits. For example, government departments procure products labeled with ECL, Grade 1 or 2 Energy Efficiency Classification Labeled Products Designated for Use in Government Public Works Tenders, and for use in Government's policy on the retirement and replacement of household appliances
4. Market supervision and inspections invisibly drive the implementation of energy efficiency policies, acting as invisible hands to successfully achieve

government energy conservation and carbon reduction objectives.

Figure 6: Market Surveillance of Energy-Saving Labels



Source: ITRI

Why is it good practice :

1. Chinese Taipei's energy efficiency policy promotion project includes comprehensive market surveillance inspection systems for both physical channels (offline) and network platforms (online) to efficiently manage energy-using equipment/appliances designated by laws and regulations.
2. This case provides the market supervision and management structure, main guidelines, and implementation methods of energy-saving policies to promote the implementation of energy efficiency policies.
3. This project consistently aligns with government energy conservation policies and contributes to reducing energy consumption and intensity, playing a significant role in achieving the goal of net-zero emissions by 2050.

Success factors :

1. Government's Top-Down Regulatory and Leadership Measures: Driven by a high-level policy commitment outlined in Article 14 of the Energy Administration Act, this approach utilizes regulatory pressure from the central government as the core delivery mechanism for the energy efficiency management system.
2. Focused and Well-Targeted Strategies: The three main components of implementing an energy efficiency management system are the government (critical for Energy), manufacturers/importers (critical for Economics), and the public/consumers (critical for Environment). These three roles are the most important factors in effectively implementing energy conservation policies, and a virtuous cycle between them benefits the achievement of 3E (Energy, Economics, Environment) development in the energy sector.
3. Designing a Comprehensive Market Surveillance Inspection System: Correctly or incorrectly addressing Energy Efficiency Labeling (EEL) and Energy Conservation Labeling (ECL) impacts the rights of energy-saving product suppliers and consumers, a key issue that cannot be ignored. The system built by Chinese Taipei includes setting audit targets, monitoring the market through

online platforms and offline channels where EEL and ECL products are displayed or sold, and verifying the authenticity of EEL and ECL labels. All of these measures can be effectively implemented to protect the rights of all interested parties.

4. **Setting Up the Management Method:** Compare market audit results with the government's EEL and ECL databases to identify genuine energy-saving labels and weed out fake ones, determining whether the energy-saving labels on energy-using equipment/appliances sold online or offline are truthful, to ensure the credibility of government energy efficiency policy. AI matching techniques are also employed to develop a smart network surveillance system for inspecting the energy-saving claims of online merchandise, thereby protecting consumers.

Lessons learned :

1. Implementing voluntary and mandatory energy efficiency policies through government laws and regulations to encourage industries to research, develop, and produce products with higher energy efficiency, facilitating consumer choice in the market.
2. Emphasizing market supervision to ensure the effectiveness of market inspection mechanisms, while also introducing market supervision and inspection mechanisms for physical retail channels and online platforms, enhancing public trust in energy efficiency management policies and confidence in the use of energy-saving products.
3. Comparing the government's energy efficiency product database with market inspection results can help identify correct or incorrect energy-saving labels, ensuring the credibility of government energy efficiency policies.
4. Faced with the many energy efficiency products regulated by the government, it is necessary to introduce internet and AI inspection technologies, which can help identify correct or incorrect energy efficiency labels or energy-saving labels, improve inspection efficiency, and ensure that products comply with energy efficiency standards.
5. Ensuring the authenticity of energy-saving labels is an important aspect of protecting consumer rights and maintaining overall market fairness in energy efficiency policies. Continuously optimizing inspection management methods and systems is key to ensuring the effectiveness of supervision and management in physical retail channels (offline markets) and online platforms (online markets).

How to replicate :

1. **Linking Government Regulations:** Legal sources are crucial for establishing energy efficiency management systems. Government regulations provide the necessary binding force to manage energy-consuming equipment or appliances, laying the foundation for the long-term promotion of energy efficiency

policies.

2. Establishing a Management System: Effective management of the vast and complex array of energy-using equipment and appliances relies on a robust database system to facilitate policy implementation and management.
3. Conducting Market Surveillance and Inspection: Conduct market inspections in both physical stores and online platforms. Identify and report products with false EEL or ECL. Ensure that regulated products comply with energy efficiency standards, effectively implementing policies in the market, and protecting the rights of law-abiding businesses and consumers. This fosters a beneficial cycle among the government, industry, and the public.
4. Project Counseling and Collaboration: Chinese Taipei's successful experience in improving energy efficiency management and market inspections can support and be replicated in other countries in need. Chinese Taipei can also collaborate with other countries on project base to contribute to improving energy efficiency and reducing carbon emissions, jointly creating a better and more sustainable environment.

Contributor:

Director Shu-Fang Kao, Energy Conservation Development and Management Division, Energy Administration, Ministry of Economic Affairs.

Authors:

Green Energy and Environment Research Laboratories, Industrial Technology Research Institute: Ching-Yu Li, Shin-Hang Lo, Wei-Chieh Wang, Liao Yi-Chi,

Contact for enquires : Ms. Ching-Yu Li, ITRI. chingyu.li@itri.org.tw

References and Websites :

- Energy Administration Act
<https://law.moea.gov.tw/EngLawContent.aspx?lan=E&id=10325>
- Pathway to Net-Zero Emissions in 2050:
https://www.ndc.gov.tw/en/Content_List.aspx?n=B154724D802DC488
- Energy Administration, Ministry of Economic Affairs, Energy Conservation Policies:
https://www.moeaea.gov.tw/ECW/english/content/ContentLink2.aspx?menu_id=965&sub_menu_id=8680
- The Research of Energy Efficiency Management Policy Implementation for Energy-Using Equipment/Appliances and Policy Support. (ITRI, project final report in 2023)
- The Energy Labeling Customized Automated Auxiliary Online Market Surveillance System. (APEC EGEE&C 58 Economy Updates, Chinese Taipei presentation file in 2022, https://www.apec.org/egeec/meeting_top/EGEEEC-58)
- EEL Management System: <https://ranking.energylabel.org.tw/>
- ECL Information Website: <https://www.energylabel.org.tw/englishlabel/index.aspx>