

The Development of Promotional Plans for Household Energy Usage Equipments in Thailand

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Abstract

According to the Act of Parliament to Promote the Energy Conservation (1992) section 3, the energy conservation from the use of machines, equipment, and materials for energy conservation has been mandated. In order to support this Act, the implementable and meaningful promotional plan must be systematically developed to encourage the market transformation. This report presents results from the study to establish the promotional plan emphasizing on household energy usage equipments in Thailand. Based on the surveying results, out of 47 energy usage equipments in the market, there are 36 types of household equipments those should be promoted. The amount of energy usage and the energy saving potential are evaluated in order to prioritize the promotional order for all 36 equipments. The results show that, in terms of the amount of energy usage, automobiles, motorcycles, small diesel engines, florescent lamps and computers are the top 5 products those use energy the most. However, in terms of the energy saving potential, automobiles, motorcycles, computers, printers and room air condition are the top 5 equipments those have the highest energy saving potential. Finally, the promotional plan for 5 years period is proposed.

Keywords: household, energy, saving, standard, regulation, promotion, plan, Thailand

1. Introduction

With the awareness of the energy crisis, Thailand has been actively developing and implementing energy policies and strategies during the past decade. According to the Act of Parliament to Promote the Energy Conservation (1992) section 3, the energy conservation from the use of machines, the equipment, and the materials has been mandated since. However, the realization about the use of energy efficient products among consumers has still been limited [1]. The well-known promotional scheme for energy efficient products run by the DSM (Demand-Side Management) program under EGAT (the Electric Generating Authority of

Thailand) has promoted only 7 products using “the Label No. 5” since 1995. These products include household refrigerators, room air-conditions, household electric fans, rice cookers, the magnetic ballast, fluorescent lamps, and residential light fixtures. Even though, the EGAT’s No. 5 program has been considered successful [2-5], the amount of the energy efficiency programs elsewhere around the world suggests that there are more products those could be considered. Therefore, implementable and meaningful promotional plan must be systematically developed. The result of the effective promotional plan would encourage the market transformation, meaning that there would be more production, sale, and utilization of the machines, the equipment, and the materials for energy conservation.

One of the main purposes for this study is to categorize and classify the types of products those are appropriate for the promotional plan, as well as to sort out the appropriate promotional order for the products of interest according to their nature of energy usage and energy saving potential. Unlike the principle of the EGAT’s No. 5 program of which the products to be labeled were selected from the amount of electricity usage during the peak hours [3], this study is interested in every household products in the market. The main criteria for the products selection are the amount of energy usage and the energy saving potential. In order to evaluate these issues, this study must also involve the determination of the performance and efficiency specifications for the product being considered. These hence lead to the evaluation of the testing methodology and laboratory facilities.

The organization for this paper is as follow. The products searching results is shown first. Then criteria for the products prioritization and its results are shown next. Some issues regarding to the energy efficiency standards, testing methodology, and facilities are then summarized. A brief description of the promotional plan is then given along with the conclusion and recommendation at the end.

2. Products Selections

The lists of products to be considered were gathered from different sources of data. The local data came from the Thai Industrial Standard Institute (TISI) who is responsible for developing the Minimum Energy Performance Standard (MEPS), from the Department of Alternative Energy Development, and Efficiency (DEDE) whose functions are on the development of High Energy Performance Standard (HEPS) and the promotional plan, and from EGAT who runs No.5 campaign as stated. Data contains information for energy efficient products and standards for the rest of the world came from the international organization so called “the Collaborative Labeling and Appliance Standards Program - CLASP” [6].

2.1 Products Searching

To summarize the types of products to be considered, the study was first done by summarizing the types of products those were already studied or had their standards developed in Thailand. Data from TISI, DEDE, and EGAT were used for this purpose. This data was then compared to the types of products those were already studied and/or implemented in other countries. The well reviewed data from CLASP filled this part of question. Finally, a market survey was then deployed to search for other products used in Thailand.

The result from these steps gave about 47 products. There are currently 7 products those have their energy (so called “the number 5 label”) labels issued in Thailand. There are 19 products those have their Royal Decree for the Energy Efficiency drafted. There are 43 products which their standards already exist elsewhere but Thailand. And there are 4 products resulting from the survey which their standards do not exist.

2.2 Selection Criteria

The selection criteria involved the readiness in terms of the energy efficiency standard, the testing methodology, as well as some other aspects such as the nature of utilization, the ease of promotion, etc. In order to consider all factors altogether and to make the consideration result comparable from one product to another, a simple scoring system was developed for each criterion as the following.

2.2.1. Testing Standard

To consider the readiness in terms of the testing standard, the score was given to each product as 10 points if the product had the testing methodology developed specially for Thailand, 5 points if the product had the testing methodology but was not developed specially for Thailand, and 0 point if the product did not have the testing methodology to evaluate its energy efficiency.

2.2.2. MEPS and/or HEPS

To consider the readiness in terms of the MEPS and/or HEPS specification, the score was given to each product as 10 points if the product had the

MEPS and/or HEPS specification in Thailand, 5 points if the product had the MEPS and/or HEPS specification in other countries, and 0 point if the product had no MEPS and/or HEPS specification.

Table 1 The list of all products under reviewed

No.	Name	Reg.	No.5	Std.
1	Automobiles			(8)
2	Clothes Dryers	√		(19)
3	Clothes Washers	√		(29)
4	Compact Fluorescent			(25)
5	Computers (Personal)			(18)
6	Dishwashers			(16)
7	Doors			(2)
8	DVD/CD Player/Recorder			(5)
9	Electric Ovens	√		(19)
10	Electric Pan			
11	Electric Ranges	√		(19)
12	Electronic Ballast	√		(17)
13	External Power Adapter			(3)
14	Fan (Household)	√	√	(5)
15	Fax Machine			(13)
16	Fluorescent	√	√	(39)
17	Gas Range (Low Pressure)	√		(19)
18	Glass (Household)	√		(5)
19	Hair Dryer			
20	Home Audio			(6)
21	Induction Ballast	√	√	(20)
22	Instantaneous Water Heaters	√		(1)
23	Irons	√		(4)
24	Kettles	√		(1)
25	Lighting Fixtures (Residential)	√	√	(1)
26	Microwave Ovens	√		(5)
27	Monitors			(20)
28	Motorcycle			(1)
29	Multifunction Devices			(10)
30	Printers			(16)
31	Range Hoods			(3)
32	Reflective Roof Products			(1)
33	Refrigerator (Household)	√	√	(42)
34	Rice Cookers (Electric)	√	√	(5)
35	Room AC	√	√	(31)
36	Room Air Cleaners			(1)
37	Scanners			(8)
38	Skylights			(1)
39	Small Diesel Engine			
40	Small Gasoline Engine			
41	Television			(21)
42	Thermal Pot	√		(1)
43	Toaster			(1)
44	Vacuum Cleaner			(7)
45	Water Pumps			(4)
46	Window Film			(1)
47	Windows			(4)

2.2.4. High Energy Efficiency Label

To consider the readiness in terms of the high energy efficiency label, the score was given to each product as 10 points if the product had the energy label issued in Thailand, 5 points if the product had the energy label issued in other countries, and 0 point if the product had no energy label.

2.2.5. Testing Laboratory

To consider the readiness in terms of the testing laboratory, the score was given to each product as 10 points if the product had the specific testing laboratory or testing facility in Thailand, 5 points if the product had no specific testing laboratory or testing facility in Thailand, but could be easily developed, and 0 point if the product had no specific

testing laboratory or testing facility in Thailand, and could not be easily developed.

2.2.6. Nature of Utilization

To consider the nature of utilization, the score was given to each product as 10 points if the product was generally used in general applications, 5 points if the product was generally used in particular applications, and 0 point if the product was rarely used in either general or particular applications.

2.2.7. Ease of Promotion

To consider the readiness in terms of the ease of promotion, the score was given to each product as 10 points if the product had no tendency to face problems when promoted, 5 points if the product showed tendency to face problems when promoted, and 0 point if the product was expected to face problems when promoted.

It should be noted that, the use of this simple scoring system here is just informative. The score from each criterion was added up without any weighting factor meaning that each criterion was considered equally important. Therefore, the full score for any product would be 70 points. The products to be included in the promotional plan were all those earned more than 35 points. The results showed that there were 36 from 47 products those should be promoted. The products those failed by the scoring system include dishwashers, doors, range hoods, a room air cleaner, toasters, windows, external power adapters, skylights, window film, hair dryer, light reflectors, and reflective roof products. The reasons for their exclusion mainly come from the lacking of testing facilities and the need for the adaptation of their testing standards such that the standards reflect the use of these products in Thai's environment.

3. The Promotional Order

To prioritize all 36 products of interest in order to develop appropriate and effective promotional plan, the amount of energy usage and the energy saving potential were evaluated. The concept of finding the amount of energy usage for each product is quite simple. The number of already owned units and annual sales for each product were surveyed, as well as the average powered consumption, the number of hours per day and days per year for the particular products to be operated. These information were multiplied together to get the annual amount of energy usage for each product. The most difficult step for this part was to get the sales data. For some products, the sales data was obtained from the marketing company. And for some other products, the data was obtained from the field surveys [7]. Others information but the sales could be found from [8].

In terms of the energy saving potential, the evaluation is simple as well. Unlike the energy usage calculation, only the number of annual sales for each product was of interested for this part. Due to the time constraint for this project, the prediction of the future

annual sales was made by using a simple regression method. This number was used for the estimation of the future saving potential for each product. The more accurate sales prediction method using a more complex model such as mixed logit model or discrete choice model could be used but with more extensive data requirement [9-10]. The difficult issues for the evaluation of the energy saving potential were the determination of the average efficiency for each product, and the efficiency level that each product could be improved to. In order to find these, an exhaustive surveyed were conducted of which the target groups were the manufacturers, along with the extensive study of all energy efficiency standards from around the world for each products of interested. The difference between the efficiency level from the energy efficiency standard and the average energy efficiency level, along with the sales data and period of time for the particular product to be operated, the energy saving potential could then be calculated. Details information for these evaluations can be found in [7].

Table 2 Energy usage for all products

No.	Names	The Amount of Energy Usage (kTOE)		
		2005	2006	2007
1	Automobiles	848,623.99	1,065,274.63	1,272,780.92
2	Motorcycle	143,618.85	183,119.94	215,702.20
3	Small Diesel Engine	378.86	383.25	376.81
4	Fluorescent	132.6	137.74	144.94
5	Computers	103.5	107.61	114.67
6	Water Pumps	58.20	59.31	61.76
7	Gas Range	43.39	44.78	50.72
8	Room AC	44.46	46.05	47.00
9	Inst. Water Heaters	29.01	34.65	41.45
10	Small Gasoline Engine	31.26	31.62	31.09
11	Irons	16.55	17.07	17.77
12	Electric Ranges	15.41	15.75	16.54
13	Rice Cookers	13.57	14.15	14.95
14	DVD/CD	11.32	11.43	11.79
15	Clothes Washers	9.53	9.99	10.35
16	Thermal Pot	9.08	9.79	10.12
17	Light Fixtures	7.79	8.06	8.36
18	Refrigerator	6.47	7.13	7.78
19	Television	4.58	5.73	6.89
20	Kettles	4.16	4.29	4.45
21	Printers	3.57	4.00	4.08
22	Microwave Oven	3.45	3.42	3.69
23	Fan (Household)	2.90	3.11	3.18
24	Vacuum Cleaner	2.32	2.35	2.49
25	Induction Ballast	1.88	1.94	2.02
26	Home Audio	1.73	1.79	1.85
27	Multi. Devices	2.13	1.7	1.74
28	Electric Pan	1.37	1.42	1.48
29	Monitors	1.36	1.39	1.46
30	Scanners	0.92	0.98	1.06
31	Fax Machine	0.59	0.69	0.80
32	Electric Ovens	0.63	0.65	0.68
33	Compact Fluorescent	0.35	0.36	0.37
34	Clothes Dryers	0.14	0.15	0.15
35	Electronic Ballast	N/A	N/A	N/A
36	Glass (Household)	N/A	N/A	N/A

To make all products comparable, the amount of energy was calculated in kTOE unit. Table 2 shows the estimated amount of energy usage for each product in descending order for the year 2005 to 2007. Since both the electronic ballast and the household glass were

considered as materials which do not consume energy by themselves, their energy usage could not be evaluated. Table 3 shows the estimated amount of energy saving potential for each product in descending order as well for the year 2007 to 2011. For the ease of consideration and planning, all 37 products were divided into 7 groups based on the nature of usage. They are the household, the products for transportation, the products for power and agricultural work, the products for heating and cooling, the lighting products, the personal entertainment products, and the products for energy conservation. Based on the calculation shown, Table 4 shows the first two products those should be focused for each group and for each criteria of consideration.

Table 3 Energy saving potential for all products

No.	Names	Energy Saving Potential (kTOE)				
		2007	2008	2009	2010	2011
1	Automobiles	500.85	600.16	700.50	801.87	940.26
2	Motorcycle	29.54	34.51	39.97	45.94	52.41
3	Computers	19.11	20.43	21.91	23.54	25.32
4	Printers	18.84	19.03	19.14	18.55	19.86
5	Room AC	18.06	21.38	25.05	29.08	33.46
6	Water Pumps	7.72	8.00	8.30	8.62	8.96
7	Gas Range	5.07	5.39	5.75	6.14	6.58
8	Irons	3.98	4.15	4.33	4.53	4.75
9	Television	3.93	4.68	5.51	6.42	7.42
10	Small Diesel Engine	3.93	4.06	4.19	4.34	4.50
11	Refrigerator	3.30	3.61	3.96	4.36	4.79
12	Inst. Water Heater	2.94	3.00	3.08	3.15	3.23
13	Light Fixtures	2.78	2.89	3.00	3.13	3.26
14	Electric Ranges	2.17	2.28	2.41	2.55	2.69
15	Clothes Washer	1.65	1.71	1.78	1.85	1.93
16	Small Gasoline Engine	1.55	1.57	1.57	1.53	1.63
17	Multi. Devices	1.25	1.29	1.32	1.36	1.40
18	Fax Machine	1.22	1.25	1.27	1.29	1.32
19	Compact Fluorescent	0.78	0.81	0.84	0.87	0.91
20	Induction Ballast	0.75	0.78	0.81	0.85	0.88
21	Monitors	0.72	0.76	0.81	0.86	0.91
22	Glass (Household)	0.70	0.79	0.89	1.00	1.12
23	Fan (Household)	0.52	0.54	0.55	0.56	0.57
24	Rice Cookers	0.49	0.52	0.55	0.58	0.62
25	Scanners	0.48	0.55	0.64	0.73	0.84
26	DVD/CD	0.42	0.45	0.49	0.53	0.58
27	Thermal Pot	0.21	0.23	0.24	0.26	0.28
28	Kettles	0.20	0.21	0.22	0.23	0.24
29	Home Audio	0.20	0.21	0.22	0.23	0.24
30	Electric Pan	0.19	0.20	0.21	0.22	0.23
31	Microwave Ovens	0.13	0.14	0.16	0.17	0.19
32	Vacuum Cleaner	0.12	0.13	0.14	0.15	0.16
33	Electric Ovens	0.08	0.08	0.08	0.09	0.09
34	Clothes Dryers	0.03	0.03	0.03	0.04	0.04
35	Electronic Ballast	N/A	N/A	N/A	N/A	N/A
36	Fluorescent	N/A	N/A	N/A	N/A	N/A

It should be noted that Table 2 and 3 show some interesting figures. Particularly, since the energy consumption was calculated based on the number of products currently owned by consumers, the amount of annual energy usage turns out to be extremely high as compared to the energy saving potential which was calculated using only the annual sales data. The energy saving potential for computers and printers are higher than that of the room AC because the amount of sales for both computer and printer are much higher than that of the room AC. Some others figures from Table 2 and 3 can be explained in a similar way.

And when consider the results shown in Table 4, it can be seen that the products those should be promoted based on either the criteria of energy usage or energy saving potential are mostly similar. These results along with the initial evaluation score presented in section 2 can be used for developing the effective promotional plan for all 36 products. In particular, it is reasonable to start the promotional campaign with the products those consume large amount of energy and have a high value of energy saving potential. This means that all products shown in Table 4 are all good candidates. The scoring system used in section 2 can then give more supportive information in terms of the readiness for each product. For example, since the gas range, electric range, instantaneous water heater, room AC, refrigerator, fluorescent, compact fluorescent, iron, clothes washer, light fixtures and the induction ballast are all already have their energy efficiency standards and testing standards developed, the promotion campaign for these products could be started at the early stage of the promotional plan. Other products shown in Table 4 such as the automobiles, motorcycle, small diesel engine, water pump, computer, DVD/CD player/recorder, and printer those do not currently have the energy efficiency standard and/or the testing standard developed, study and research could be started at the initial stage as well, and the promotional champagne could be done at the later time of the plan. To put the rest of the products shown in Table 3 and Table 4 in the promotional plan, the evaluation can be done in a similar way

Table 4 Suggested order of promotion

No.	Order of Promotions	
	Based on Energy Usage	Based on Energy Saving
The products for cooking		
1	Gas range	Gas range
2	Electric range	Electric range
The products for transportation		
1	Automobiles	Automobiles
2	Motorcycle	Motorcycle
The products for power and water supply		
1	Small diesel engine	Water pumps
2	Water pumps	Small diesel engine
The products for heating and cooling		
1	Instantaneous Water Heater	Room AC
2	Room AC	Refrigerator
The lighting products		
1	Fluorescent	Compact fluorescent
2	Compact fluorescent	Fluorescent
The products for personal entertainment		
1	Computers (personal)	Computers (personal)
2	DVD/CD player/recorder	Printer
The products for everyday shores		
1	Irons	Irons
2	Clothes washer	Clothes washer
The products for energy conservation		
1	Light fixtures (residential)	Light fixtures (residential)
2	Induction ballast	Induction ballast

4. Energy Efficiency Standards and Testing Facilities

Since the developing promotional plan concentrating on the efficiency products, all standards specifying the efficiency for the products of interested were examined.

The main interest for the investigation was to see if the particular standard would be suitable or adaptable to Thailand's environment. The aspects under the reviewed were the categorization of each product indicated in each standard, the specification of the efficiency both MEPS and HEPS levels, and the testing methodology. From the study, it was found that the energy efficiency standards and the testing standards for more than half of the products of interest do not yet exist in Thailand. In these cases, the standards from other countries were investigated. Though, the already existed standards in Thailand were also examined to ensure the applicability of these standards which, in effect, guarantees the successfulness of developing promotional plan. While, the fully detailed results can be found in [7], this report summarizes the results from the revision of the draft of the Royal Decree defining the High Efficiency Machines, Equipment, and Materials for Energy Conservation developed by DEDE for 19 products (see Table 1).

The revision of the draft of the Royal Decree revealed that, in many cases, the categorization or classification of the product is doubtful by not reflecting the real situation in the market. The result of the poor categorization affects the integrity of the performance standard levels indicated in the regulation. Specifically, there are many cases that the product of interested was categorized into too less number of classes than necessary. As a result, the number of the product to be sampled and tested becomes too small to represent the characteristic of the product in the market in terms of efficiency and energy usage. This leads to the set up of ineffective or unreasonable energy efficiency levels. Another type of the problem found relates to testing methodology which is normally adopted directly from the standards from other countries. The main problem resides in the set up of initial and ambient conditions, which normally are different and varied from country to country depending on the climate zone of a particular country.

In terms of the product categorization, the study shows that there are 3 products, i.e. the microwave oven, the kettle, and the thermal pot, those of which their already developed draft of the regulations should be reconsidered. In terms of the testing methodology, there are 7 products which their testing standards should be revised. These products are the electric range, the iron, the microwave oven, the kettle, the thermal pot, the electric oven, and the room AC. Lastly, in terms of the energy efficiency standard levels, they should be revised for all 19 products such that the standard levels reflecting the current market situation.

From the examination of the existing testing laboratories in Thailand those are certified by TIS 17025, it was found that all details of the laboratories such as the general standards, the testing methods, as well as the certifying standards for both domestic and worldwide, are only relevant to safety, which is not the area of interest in this project. However, in some cases, parts of the safety requirements involve the determination of the energy usage and the energy efficiency. Therefore, such laboratories are also considered into the database here.

All found laboratories are divided into 2 major groups; the testing laboratories and the calibrating laboratories. These groups are then divided into two subgroups which are the group with TIS 17025 certified and the other group without TIS 17025 certified, for both government agencies including universities and private organizations which are capable of energy efficiency testing but not yet certified. In conclusion, there are 17 testing laboratories with TIS 17025 certification, 4 university testing laboratories without TIS 17025 certification, and 13 private testing laboratories.

5. Promotional Plan

From the study, it was found that there are 36 products which must be taken into consideration. Parts from this figure, 19 products were already studied and their Royal Decrees (or energy efficiency standards) were already developed. Therefore, the total of 18 other products will be studied within the next 5 years. Table 5 shows the proposed promotional plan of which the promotional order is arranged based on the consideration of the energy usage, the energy saving potential, and other relating factors defined in section 2.

Table 5 Suggested order of promotion for all products

Name	Study	Revised	Drafted Standard	Announced	Order of Promotion
Gas Range		1		1	2
Inst. Water Heaters		1		1	2
Irons		1		1	2
Electric Ranges		1		1	2
Clothes Washers		1		1	2
Room AC		1		1	2
Refrigerator		1		1	2
Fluorescent		1		1	2
Electronic Ballast		1		1	2
Lighting Fixtures		1		1	2
Induction Ballast		1		1	2
Water Pumps	1		2	2	3
Compact Fluorescent	1		2	2	3
Computers (Personal)	1		2	2	3
DVD/CD	1		2	2	3
Printers	1		2	2	3
Electric Pan	2		2	2	3
Fan (Household)		2		2	3
Rice Cookers		2		2	3
Thermal Pot		2		2	3
Kettles		2		2	3
Microwave Ovens		2		2	3
Vacuum Cleaner			2	2	3
Glass (Household)		2		2	3
Television	2		3	3	4
Home Audio	2		3	3	4
Mult. Devices	2		3	3	4
Monitors	2		3	3	4
Scanners	2		3	3	4
Fax Machine	2		3	3	4
Automobiles	1-2		3	3	4
Motorcycle	1-2		3	3	4
Clothes Dryers		3		3	4
Electric Ovens		3		3	4
Small Diesel Engine	2-3		4	4	5
Small Gasoline Engine	2-3		4	4	5

As shown in Table 5, the promotional plan developed here includes the plan for research or study for the products those do not have the energy efficiency standard in Thailand, the plan for standard revision for

products those already have their energy efficiency standards developed, the plan for the making of the drafted of the standard, as well as the announcement of the standard, and finally the suggested order of promotion for each product. All numbers shown in Table 5 mean the suggested year for each step to be accomplished starting from 2008-2012, i.e. 1=2008, 2=2009, 3=2010, 4=2011, and 5=2012.

The time required for doing the study normally takes up to 1 year. After the study, the steps of making the draft of the standard include setting up the testing facilities, doing the testing, and reporting results with a steering committee. This can take up to another 1 year. The announcement includes getting the standard approved by stakeholders and the Cabinet, and some other steps to make the standard official. This can easily take about a year. For the product that has its standard developed, the revision involves updating the testing results and reporting the updated standard to the steering committee. And since the standard is already official in this case, the announcement of the updated standard normally takes a shorter time. As can be seen, most of the products take 2-3 years until they are ready to be promoted. The products such as automobiles, motorcycles, and small engines may take a little longer time since the complications from the testing as well as from the negotiation with the manufacturers are expected.

6. Conclusion

This report presents results from the study to establish the promotional plan emphasizing on household energy usage equipments in Thailand. Based on the surveying results, out of 47 energy usage equipments in the market, there are 36 types of household equipments those should be promoted. Unlike the development of some other promotional campaign for energy efficient products, this study aim to develop the plan by prioritizing all products of interested based on factors such as the amount of energy usage, the energy saving potential, and other related factors to ensure that the resulting plan is implementable. The results show that, in terms of the amount of energy usage, automobiles, motorcycles, small diesel engines, florescent lamps and computers are the top 5 products those use energy the most. However, in terms of the energy saving potential, automobiles, motorcycles, computers, printers and room air condition are the top 5 equipments those have the highest energy saving potential. The promotional plan for 5 years period is proposed of which there are 11 products those should be promoted in year 2009, 13 products those should be promoted in year 2010, 10 products those should be promoted in year 2011, and 2 products those should be promoted in year 2012,

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