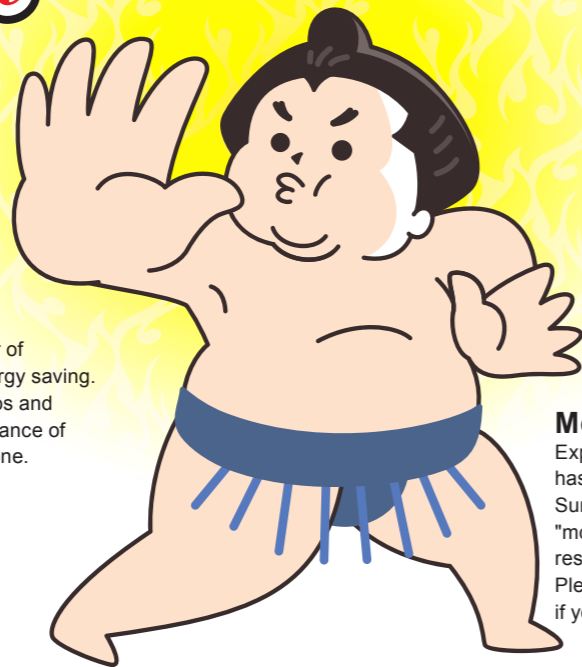


Review what you are wasting in your life.



Not only does it help save energy, but it also saves electricity bill! We will navigate you how.

Mottainai!!



Fariha
Active in SNS as an influencer of environmental issues and energy saving. Please take a look at the videos and leaflets that convey the importance of energy conservation to everyone.

Mottainai
Expressing the gratitude that has taken root in Japan. Sumo wrestlers with a spirit of "mottainai" that express gratitude, respect and avoid wastage. Please note that it will appear if you do mottainai.



National Energy Efficiency & Conservation Authority
Ministry of Energy (Power division)

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添付資料 8-3:
Pamphlets for awareness



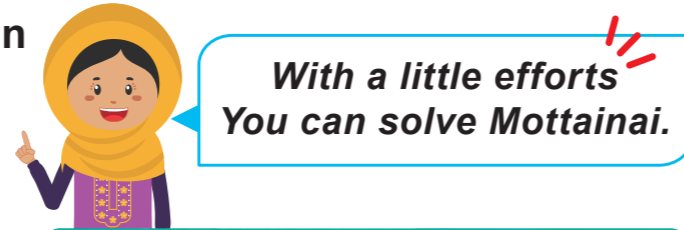
Importance of Energy Conservation



Mottainai!!

Don't you do these "Mottainai" ?

The spirit of Mottainai has been taken root in Japan to express gratitude, respect and avoid wastage. For example ...



Leftover food at the restaurant!



Put it in the container. Let's bring it to your home.



Waste of water!



For water-saving, Let's change shower head to water saving type.



Don't overload Refrigerator!



To keep space between goods stored in the Refrigerator, so that cold air can pass through space. Let's secure space.



Setting temperature is too low!



Let's set temperature about 26°C where you can feel comfortable.



We need to reduce CO2 emission to prevent global warming. Efficient use of electricity is required.



So, what we can do? Let's take electrical appliances as an example.

For example, old Air conditioner is inefficient. And the electricity consumption is growing and electricity bill is expensive too.

Old Air conditioner
Electricity consumption
2,630 Units/year



Electricity consumption
2,630 Units/year

Electricity consumption
2,605 Units/year

How do you like it.
You can run both the new Air conditioner and the new Refrigerator with the amount of electricity of one old Air conditioner.

If you replace an old inefficient Air conditioner with a new and efficient one, you can greatly reduce the amount of electricity used.

New Air conditioner
Electricity consumption
2,270 Units/year

Let's replace an old, inefficient Refrigerator with a new and efficient one.

New Refrigerator
Electricity consumption
335 Units/year




Let's try to save energy with spirit of Mottainai!

4 points to use the Air conditioner smartly.

In addition, to reduces the load of Air conditioner is important. That's why you should use the Air conditioner smartly. We have 4 points for smart use.

POINT 1 Maintenance


You can cut 15-20% of energy consumption.



To clean filter up is necessary periodically. At least 2times/month.

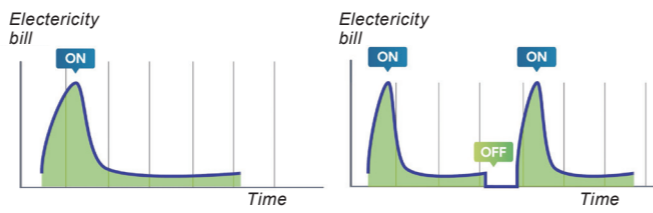
Do not leave the outdoor unit in direct sunlight!

Does outdoor unit receive strong direct daylight?
Check the location and direction of outdoor unit.
Shade on the outdoor unit may improve energy consumption.



POINT 2 Operation


The Air conditioner consumes a lot of energy at start-up.



When the Air conditioner was driven with frequent ON and OFF, inrush current at each ON consumes much electricity. If you leave the room for 10-20 minutes, continuous operation is better to save electricity. Frequent ON-OFF operation is not recommended.

POINT 3 Temperature Setting


The set temperature is about 26°C!



You shall set room temperature about 26°C. Raising 1°C high in temperature setting of Air conditioner saves approx 10% of energy consumption.

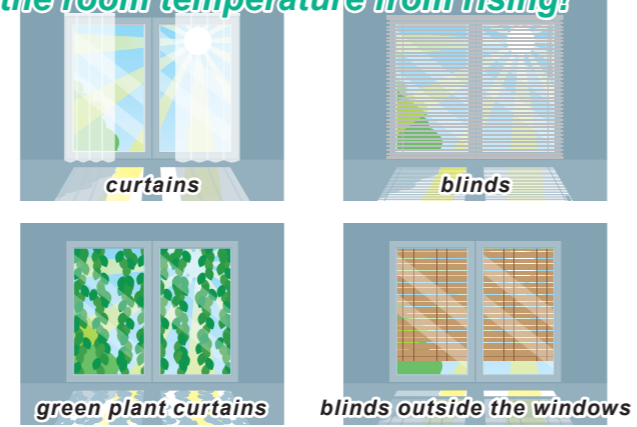
Use a ceiling fan!

When you use an Air conditioner together with a ceiling fan, it will allow you to raise the temperature setting about 2°C higher with feeling comfortable and saves approx 20% of energy consumption.



POINT 4 Keep Out Heat

Block the sunshine heat and prevent the room temperature from rising!



Placing curtains, blinds, heat-shielding films, or green plant curtains or blinds outside the windows is also effective.



Energy Saving on Air Conditioner



How to choose energy efficient Air Conditioner

How to use Air Conditioner smartly

Use energy efficient Air conditioner to save energy.

Have you ever seen this Label?
The Air conditioner has
"PAKISTAN ENERGY LABEL"
that indicates its energy efficiency.



Let's verify!

Air conditioner with higher number of stars is more expensive than lower number of stars. However, electricity bill of more stars Air conditioner is lower than less stars Air conditioner. Let's verify which is more economical in lifetime. To compare with two Air conditioners, one has 1-star label and the other has 3-stars label. The price of 1-star is 68,000Rs and 3-stars is 74,000Rs.

1 The annual power consumption is 1,550Units/year for 1-star. The electricity bill is 34,100Rs/year when calculated with 1Units = 22Rs. 3-stars is 1,350Units/year and becomes 29,700Rs.

2 Total expenditure of the equipment and annual electricity bill of 1-star is 102,100Rs and 3-stars is 103,700Rs. In the first year, 1-star is still cheaper than 3-stars.

3 If you use them 2 years, 1-star will be 136,200Rs and 3-stars will be 133,400Rs, 3-stars will become cheaper.

4 If you use them another 10 years, 1-star will be 409,000 Rs and 3-stars will be 371,000Rs. Cost of 3-stars Air Conditioner will be 38,000Rs cheaper.

How do you like it.
3-stars Air Conditioner doesn't only contribute to energy saving but also economy.

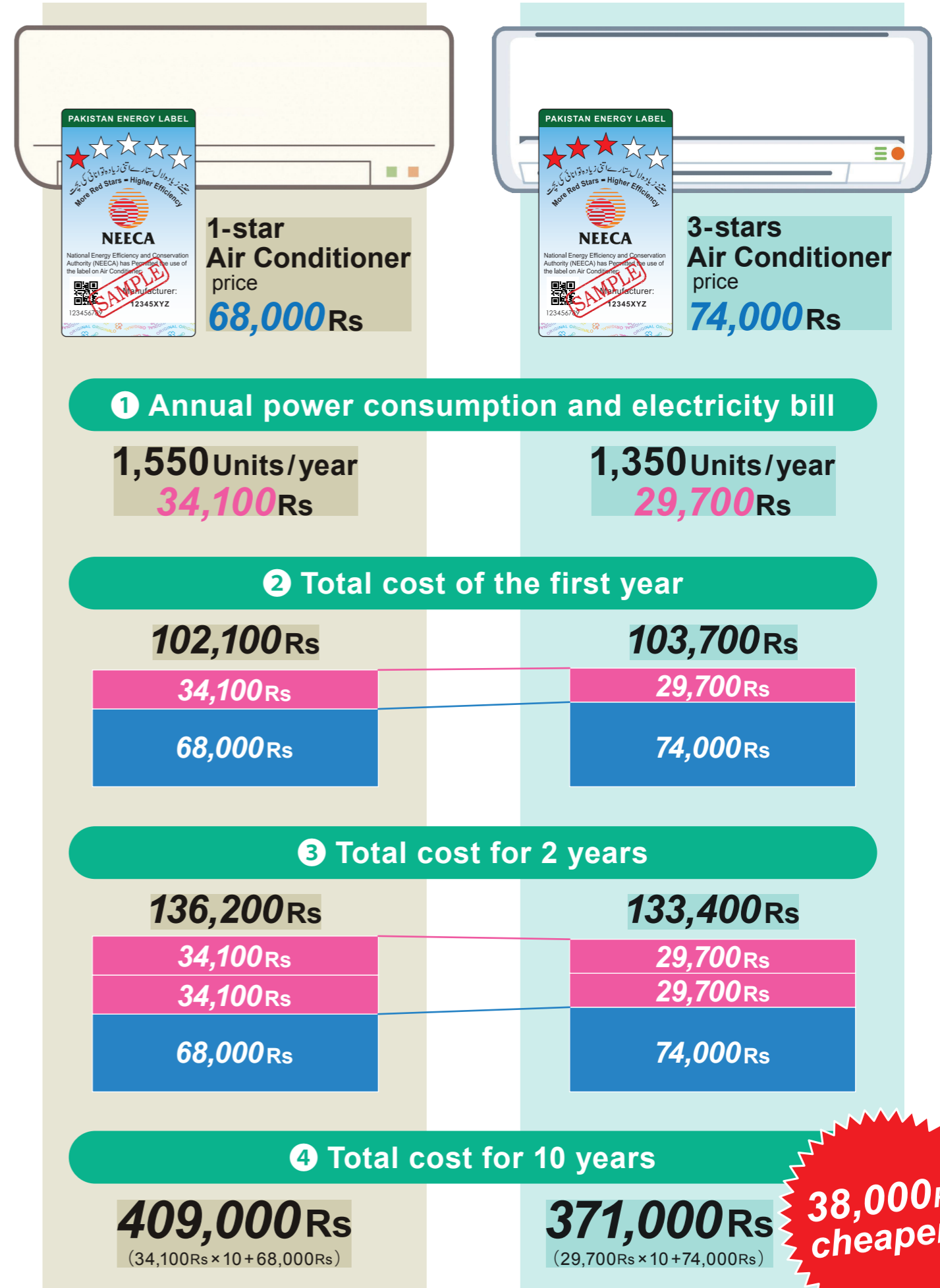
At the retailer, be sure to check this "PAKISTAN ENERGY LABEL" and buy an Air conditioner with more of stars.

Point is number of stars.

Many stars indicate higher energy efficiency. More stars means less power consumption. By choosing Air conditioner with less power consumption, you can save more electricity bill.

★★★★★★	under 1,129
★★★★★	1,130 ↔ 1,259
★★★★	1,260 ↔ 1,389
★★★	1,390 ↔ 1,549
★★	1,550 ↔ 1,700

Cooling capacity: 3.96kW = 1.12ton (Units/year)



38,000Rs cheaper!

5 points to use the Refrigerator smartly.

In addition, to reduce the load of Refrigerator is important. That's why you should use the Refrigerator smartly. We have 5 points for smart use.

POINT 1



Store it after cool down

Let hot foods which need store in Refrigerator cool down, before putting them in Refrigerator. Before putting hot foods in Refrigerator, it is better to cool it down at outside.

POINT 2



Don't overload

The flow of cold air in Refrigerator will be disturbed by overload foods and power consumption will be increased.

Freezer without gaps

On the contrary, the cooling efficiency will be better if the freezer is packed tightly without any gaps.

POINT 3



Less and Quick Door Opening!

If you keep the refrigerator door open, or open and close frequently, the outside warm air will invade and inside temperature of Refrigerator will rise quickly and power consumption will be increased.

POINT 4



Set Temperature Properly

If the inside temperature of Refrigerator is set moderate, power consumption will be reduced.

POINT 5



Proper installation method

Sufficient space is required around Refrigerator. To remove heat from Refrigerator, space between the Refrigerator and surroundings must be secured.

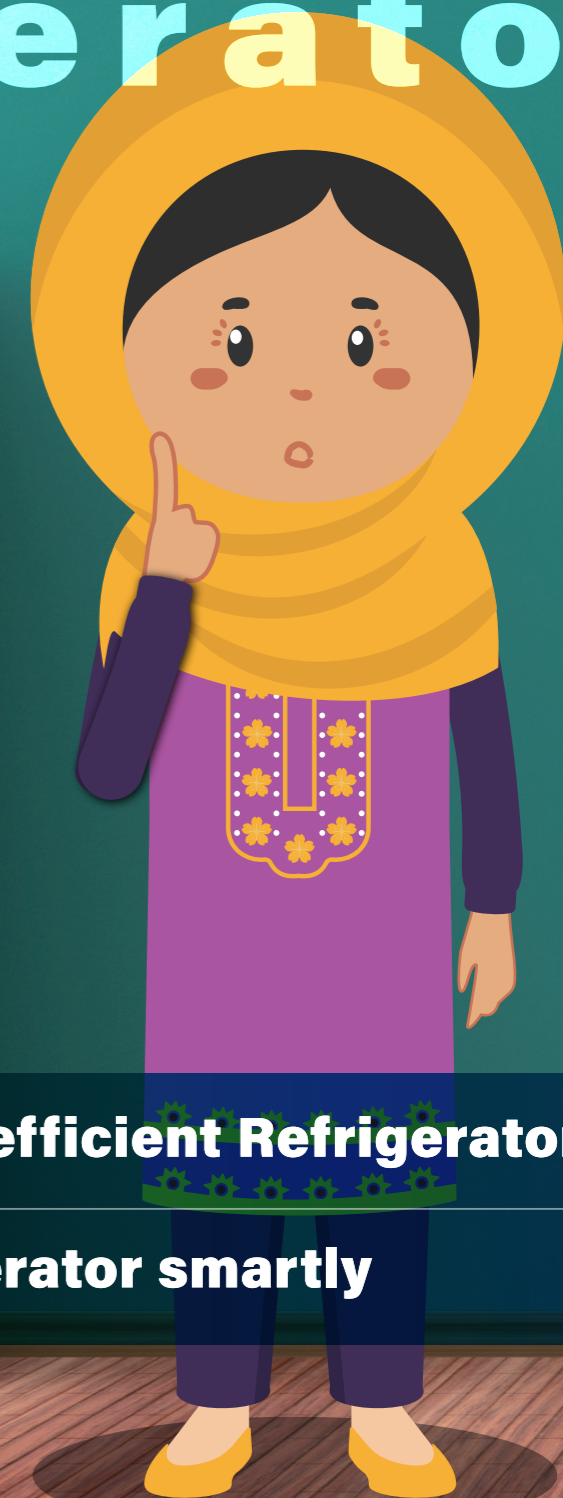


National Energy Efficiency & Conservation Authority
Ministry of Energy (Power division)

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Energy Saving on Refrigerator

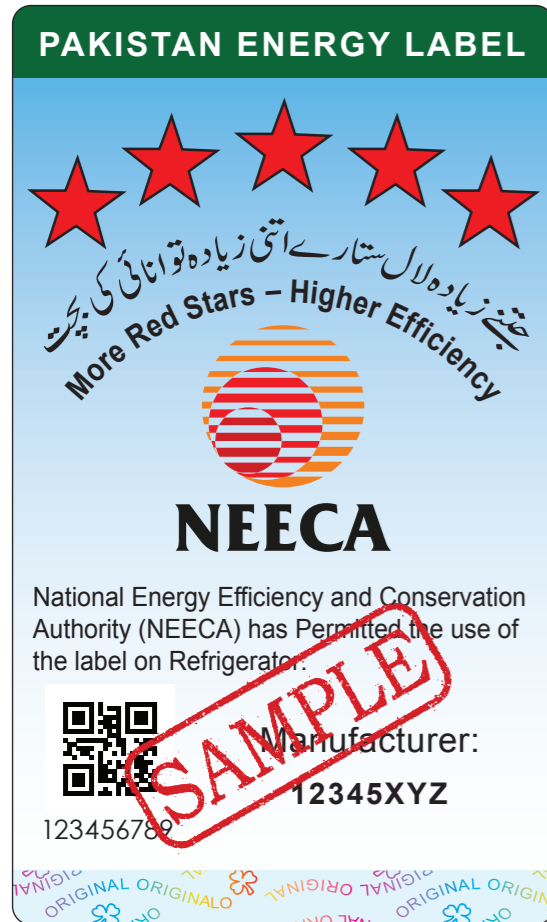


How to choose an energy efficient Refrigerator

How to use Refrigerator smartly

Use energy efficient Refrigerator to save energy.

Have you ever seen this Label?
The Refrigerator has
"PAKISTAN ENERGY LABEL"
that indicates its energy efficiency.



Let's verify!

Refrigerator with higher number of stars is more expensive than lower number of stars. However, electricity bill of more stars Refrigerator is lower than less stars Refrigerator. Let's verify which is more economical in lifetime. To compare two Refrigerators, one has 2-stars label and the other has 4-stars label. The price of 2-stars is 49,800Rs and 4-stars is 55,000Rs.

1 The annual power consumption is 550Units/year for 2-stars. The electricity bill is 12,100Rs/year when calculated with 1Units = 22Rs. 4-stars is 350Units/year and becomes 7,700Rs.

2 Total expenditure of the equipment and annual electricity bill of 2-stars is 61,900Rs and 4-stars is 62,700Rs. In the first year, 2-stars is still cheaper than 4-stars.

3 If you use them 2 years, 2-stars will be 74,000Rs, and 4-stars will be 70,400Rs, 4-stars will become cheaper.

4 If you use them another 10 years, 2-stars will be 170,800Rs and 4-stars will be 132,000Rs. Cost of 4-stars Refrigerator will be 38,800Rs cheaper.

How do you like it.
4-stars Refrigerator doesn't only contribute to energy saving but also economy.

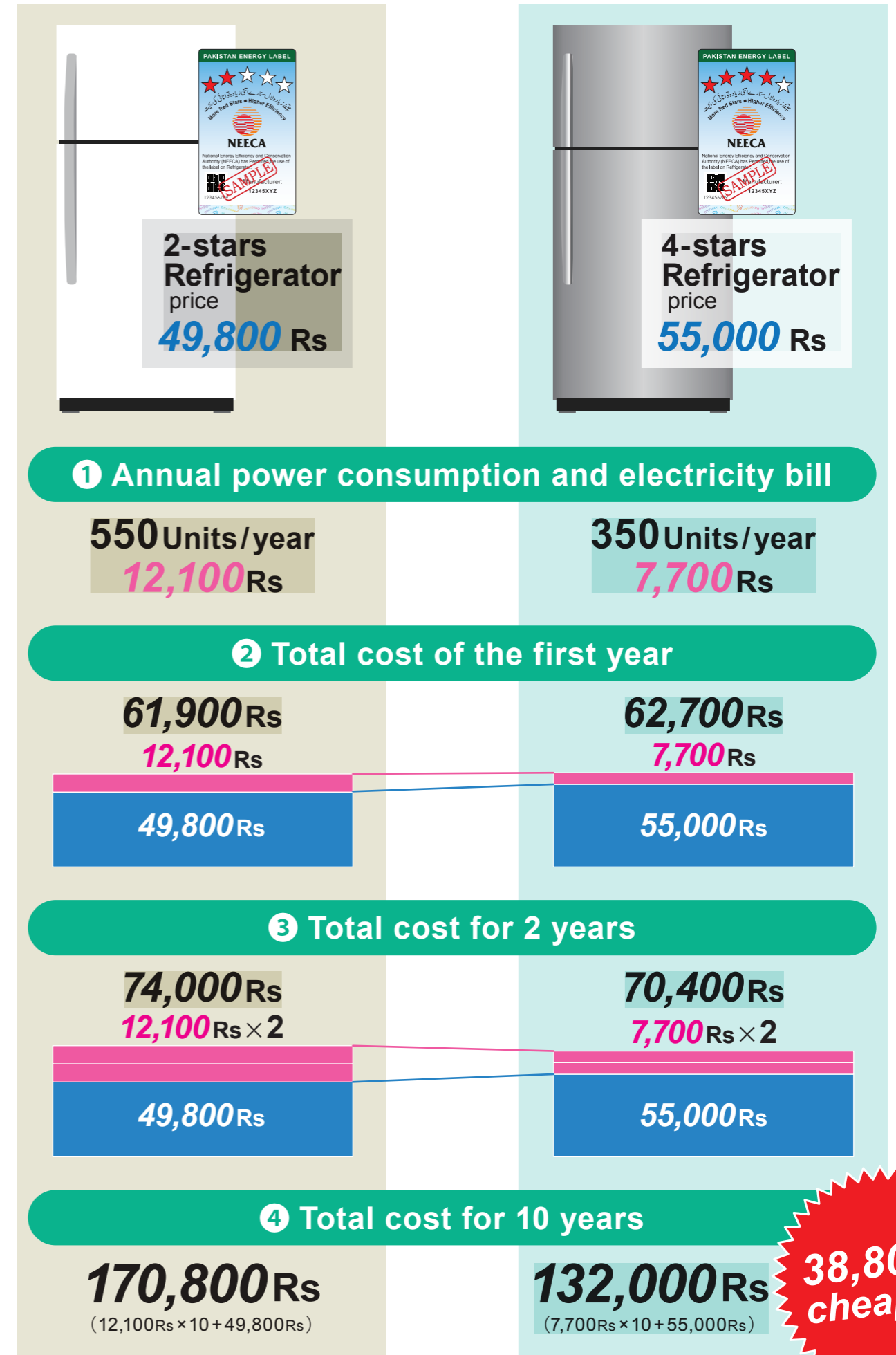
At the retailer, be sure to check this "PAKISTAN ENERGY LABEL" and buy a Refrigerator with more stars.

Point is number of stars.

Many stars indicate higher energy efficiency. More stars means less power consumption. By choosing Refrigerator with less power consumption, you can save more electricity bill.

★★★★★	under 335
★★★★	336 ↔ 435
★★★	436 ↔ 503
★★	504 ↔ 557
★	558 ↔ 672

2door Refrigerator/Freezer (Units/year)
Refrigerator:252L Freezer:100L



Project for Developing Effective Phasing out Strategy/ Program of Inefficient Appliances to Support Energy Standards and Labeling Regime in the Islamic Republic of Pakistan

Design of Public Awareness Campaign

The work of the Public Awareness campaign is divided into the design stage and the implementation stage. The design is described below.

1. Purpose of Public Awareness Campaign

The purpose of this campaign is shown as below.

- (1) Increase retailer motivation to sell high-efficiency appliances (AC and refrigerator) and encourage consumer motivation to buy high-efficiency appliances
- (2) Increased awareness of energy labels
- (3) Promotion of sales / purchasing behavior of campaign targets
- (4) Disseminate the importance of saving electricity power for the global environment and for preventing electric power shortages

2. Target

The purpose of this public awareness campaign are the following two targets. Regarding the supply side including manufacturers and importers, notification has been completed at seminars in the regulatory formulation process.

- (1) Consumers (potential consumers and owners of ACs and refrigerators)
Promote the understanding and use of energy conservation measures for consumers who are the actual users of energy efficient appliances.
- (2) Retailers of AC and refrigerator
At the distribution stage from producers to consumers, retailers understand energy conservation and national policies, and encourage consumers to use energy efficient appliances.

3. Public awareness message

Disseminate information so that the targets (consumers and retailers) have awareness about energy conservation.

- (1) Comprehensive economic efficiency

For high energy efficient appliances with a high initial purchase cost, it should be known that it will be economical in the long-term considering the life-time cost of running the appliances.

- (2) Serves to improve the quality of life and electric power shortages in Pakistan

Pakistan is still in short supply of electric power throughout the country. It should be known that the purchase of energy efficient appliances by consumers can contribute to the reduction of the national electric power shortage and ensure a more comfortable life and reduce electric power consumption.

- (3) Contribution to global environmental issues

By purchasing and using energy efficient home appliances, consumers can reduce electric power consumption at home, reduce carbon dioxide emissions from electric power generation, and reduce carbon dioxide emissions throughout the country, which finally contributes to the prevention of global warming. The final goal is to make consumers aware that they are contributing to this.

- (4) Communicate the following matters so that consumers and retailers have awareness of energy conservation.

- Necessity / effectiveness / economy of energy conservation
- Dissemination of labeling system
- What is an energy label?
- Effectiveness of high efficiency equipment
- Inquiry information about energy conservation

4. Public awareness implementation period

- (1) Consumers

From 1 month before the enforcement of ES&L (Energy Standards and Labeling) regulations for ACs and refrigerators units, and running for a 3 month period.

- (2) Retailers

From 2 month before the enforcement of ES&L regulations for ACs and refrigerators units, and running for a 3 month period.

5. Basic policy of public awareness

To improve cost effectiveness, publicizing under the following policy is recommended.

- (1) Focus on public awareness in line with the timing of ES&L enforcement.
- (2) Widely publicize by utilizing social media.
- (3) Comprehensive public awareness for consumers, from manufacturing to sales involving home appliance manufacturers and retailers.
- (4) Public awareness focusing on the spread of energy labels.

6. Selection of public awareness media

Commonly used public awareness media is shown in Table 1.

Table 1 Public Awareness Media

Kinds of public awareness media		Feature, merit, demerit
Public awareness magazine	Regular public awareness magazine	<ul style="list-style-type: none"> • Currently NEECA does not have a public awareness magazine. • New editorial staff and issuance budget required.
	Booklets, thematic booklets, posters, pamphlets, guidebooks, guide maps	<ul style="list-style-type: none"> • NEECA distribution at its event, placed at governmental organizations, or put into the package of appliance when a manufacturer delivers a high-efficiency appliance. • Budget required. Booklets to be distributed as educational materials at school. • Long-term cooperation with educational institutions is required.
	Convenience book (booklet for storage that describes how to use administrative services and contact information)	<ul style="list-style-type: none"> • Place it at an administrative service place that is easily noticed by consumers.
Official home page		<ul style="list-style-type: none"> • NEECA homepage already exists, but it is necessary to devise ways to attract consumers.
Publicity (news release to the media, information provision)		<ul style="list-style-type: none"> • An official announcement will be made when ES&L is enforced. NEECA needs to have good relationship with mass media outlets.
Delivery lecture by staff		<ul style="list-style-type: none"> • Instructor training is required. It is necessary to expand human resources.
Circulation board / local bulletin board for communities, NGOs, etc.		<ul style="list-style-type: none"> • Need to build good relationships with the community and NGOs
Commercial for TV and radio, etc.		<ul style="list-style-type: none"> • The effect of commercials is difficult to grasp for the high cost. It is necessary to devise ways to get publicities featured in advertorials and news.
Newspaper advertisement		<ul style="list-style-type: none"> • Not only the English version, but also the Urdu newspaper is essential.
Advertising stand		<ul style="list-style-type: none"> • It is necessary to select an effective bulletin board that fits the budget.
Mail delivery service e-mail magazine		<ul style="list-style-type: none"> • Continue as a public relations service of NEECA.
Social Media	YouTube	<ul style="list-style-type: none"> • Mainly movie transmission. Can be viewed by all users. • As an advertisement, insert a PR movie at the beginning, middle, and end of the posted movie. (If an advertisement is not interesting, it will be skipped after 5 seconds. If an advertisement is viewed for 30 seconds or more, the poster will be charged) • movie distribution from NEECA is also possible. It doesn't cost anything, but it's difficult to secure the audience rating. • As an effective method, it is better to have influencers with many registered channels who introduce energy labels, energy efficient appliances, and PR movie.
	Facebook	<ul style="list-style-type: none"> • Focus on photos, movies and messages. Followers and their friends can be reached. • It is possible to publicize photos and movies with paid advertisements, but if viewers are not interested, they will be passed through. • It's better to have influencers with many follower's posts.
	Twitter	<ul style="list-style-type: none"> • Mainly short messages up to 140 characters. Up to 4 images are possible. Posts reach people who don't know at all when they are retweeted. • It is possible to publicize photos and videos with paid advertisements, but if viewers are not interested, they will be passed through. • It's better to have influencers with many follower's posts.
Seminar/Workshop		<ul style="list-style-type: none"> • Effective for retailers, NGOs, etc.

- For public awareness to consumers, social media can send messages with low cost to all age groups, as the main public awareness media. There is also JICA's guidance when selecting social media.
- Social media such as You Tube, Facebook, and Twitter, that have many users in Pakistan, and other social media (Instagram, etc.) will be discussed with the contractor of public awareness.
- For non-social media users, newspaper can be used, and booklet can be used as a teaching material of education at school.

Table 2 summarizes the specific measures for public awareness.

Table 2 Target and medium used

Target	Public awareness medium	Explanation
Consumer	YouTube	<ul style="list-style-type: none"> • Social media spreads messages widely and is efficient • Cost effective
	Facebook	
	Twitter	
	Pamphlet	<ul style="list-style-type: none"> • The easiest way to publicize • To be widely known, put pamphlet into the package of appliances
	Booklet	<ul style="list-style-type: none"> • Utilize booklets for school education and NEECA's events
	Newspaper advertisement	<ul style="list-style-type: none"> • Public awareness for non-social media users
Retailer	Online seminar	<ul style="list-style-type: none"> • For talking with a large number of people in both directions • Public awareness for retailers all over Pakistan
	Pamphlet	

7. Ideas to enhance the public relations effect (impact) of social media

In public awareness using social media, it is essential to devise ways to attract people to the site or home page. Use the following measures to ensure that the public awareness message is widely disseminated.

- (1) Utilize the films already produced in Japan shown below. The film scripts are shown in Attachment 1.
 - 1) Importance of Energy Conservation: Mottainai
 - 2) Energy Saving on Air Conditioner 1: Energy Label
 - 3) Energy Saving on Refrigerator 1: Energy Label
 - 4) Energy Saving on Air Conditioner 2: Smart Use
 - 5) Energy Saving on Refrigerator 2: Smart Use
 - 6) CSPF Presentation

These films consist of ① a 2-3 minute feature film and ② a 1 minute shortened version. Use ① for YouTube and ② for Facebook and Twitter. In addition, an integrated version of

the movie that combines the films ① from 1) to 5) above was also produced in Japan. These should be used for screenings on long-distance buses.

(2) The film used is narrated in English for the movie produced in Japan, but an additional one in Urdu will be produced at the implementation stage.

(3) Utilization of influencers

Utilize popular influencers to carry out energy-saving public awareness campaigns on social media. When the contractor for public awareness is decided upon, the influencer will be decided after consultation with NEECA and the contractor.

(4) Utilization of hashtags

a) Clicking on a hashtag will search for social media posts related to the word. If hashtags with keywords are spread, interested people can easily find related posts.

b) Examples include #energy saving, #economical, #high efficiency, #power saving, #air conditioner, #refrigerator, #global warming, #comfort, #Mottainai.

When the contractor for public awareness is decided, these will be selected together with the contractor.

(5) Utilization of keywords that guide potential users to Facebook sites

a) In order to guide social media users who are likely to be interested, search for potential users with keywords related to energy conservation and send them a message.

b) Examples include Energy Saving, Mottainai, SDGs, Global Warming, Solar Power, Wind Power, AC, Fridge, Energy Label, ES & L.

When the contractor for public awareness is decided, these will be selected together with the contractor.

(6) Links to the NEECA homepage and Facebook using QR code

Shown in movies and in printed materials such as, booklets, and pamphlets. Details will be decided with the contractor before the public awareness campaign is implemented.

8. Each public awareness medium

During the preparation period of the implementation stage, produce the Urdu audio version of the films shown in 7. (1).

(1) Social Media

a) You Tube

- Distribution of the long version (2 to 3 minutes) of the film in 7. (1) will be on You Tube.
- Delivered from one month before the enforcement of ES & L regulations.

b) Facebook/ Twitter

- Delivery of a short version (about 1 minute) of the film in 7. (1) will be shown. Additionally, still images extracted from the films will be shown.
- Delivered from one month before the enforcement of ES&L regulations.
- From one month before the enforcement of ES&L regulations, the short version of the films and still images will be delivered. To avoid a stereotyped message, the posted contents will be changed frequently through a systematic strategy. One idea is shown in Table 3 regarding newspaper advertisements in (3). However, it is most desirable to decide on what to use and how in consultation with the influencers selected at the implementation stage.
- Utilize paid advertisements and deliver to social media users who are likely to be interested.
- Use effective influencers. The selection of influencers will be decided in consultation with the contractor. An example of candidates is shown in Attachment 2.

(2) Newspaper advertisement

a) Newspaper

In consultation with the contractor, decide the newspaper to advertise in as follows.

- English newspaper : The News, Jang, Dawn
- Urdu newspaper : Daily Jang, Daily Nawa e Waqt

b) Advertising schedule and contents

- Create advertising manuscripts using illustrations from the films, booklets, and pamphlets. (Reference: See the figure on the right)
- Advertise according to the concept shown in Table 3. At first, use a large ad with a high visual impact but at less frequently. Following this, use a medium sized ad, and in the third month use a smaller one but more frequently.



Figure 1 Dawn

Table 3: Newspaper ad schedule and contents

Period	1 month before enforcement	1 month after enforcement	2 months after enforcement
Morning or Evening	Morning		
Page	Front page	Back page	Inside page
Size	A4	A5	A6
Frequency	Once a week (Total 4)	Twice a week (Total 8)	3 times a week (Total 12)
Contents	<ul style="list-style-type: none"> • Importance of Energy Saving • Pre-announcement of ES&L regulation • Contents of Movie 1) 	<ul style="list-style-type: none"> • Notification of ES&L regulation • What is Energy Label • Contents of Movie 2) and 3) 	<ul style="list-style-type: none"> • Notification of ES&L regulation • What is Energy Label • Contents of Movie 1) to 5)

c) Other

- Actively carry out media interviews along with newspaper advertisements.
- Also consider advertorials (paid).

(3) Booklet, pamphlet

The following three types of booklets and pamphlets have already been produced in Japan.

- Importance of Energy Conservation: Based on film 1)
- Energy Saving of Air Conditioner: Based on film 2) and 4)
- Energy Saving of Refrigerator: Based on film 3), 5)

Pamphlets will be distributed at NEECA, MoE (Ministry of Energy), MoST (Ministry of Science and Technology) buildings, etc. during the three months of the public awareness period. Create and post posters based on the pamphlet. If there is an event such as a public awareness seminar, distribute booklets and pamphlets. In addition, the booklet will also be used for special lessons in school education. Lessons are held about 6 times over 3 months.

(4) Seminar / Workshop

Seminars on energy labels for retailers who sell ACs and refrigerators will be held, and retailers shall be asked them to promote the sales of high-efficiency appliances. Enlightenment and public awareness are very important because retailers are in contact with consumers.

a) Focal person list and retailer list

Since NEECA does not have a direct connection to retailers to recruit participants, the cooperation of manufacturers, the Chamber of Commerce, PEMA (Pakistan Electronic Equipment Manufacturers Association) and others is necessary. Attachment 3 shows the contact points of manufacturers, etc. and the main retailers that are currently known.

- b) When conducting the seminar, since participants are all over Pakistan, an online (Zoom and Google meets) seminar with films and Power Point will be used.
- c) Seminars will be held twice, once before the ES & L and once after the ES&L.
- d) Films and pamphlets will be used for seminar materials. Retailers are to understand the meaning of CSPF (Cooling Seasonal Performance Factor: AC energy efficiency throughout the cooling period). For this purpose, film 6) will be used.

(5) Implementation schedule

Table 4 summarizes the implementation schedule of the above public awareness activities.

Table 4 Public relations implementation schedule

Month			-4	-3	-2	-1	0	1	2	3
Preparation			[Blue bar from -4 to -1]							
Movie w/Urdu narration				[Blue bar from -3 to -1]						
Consumer	Social Media	YouTube	[Blue bar from -1 to 1]							May be extended
		Facebook Twitter	[Blue bar from -1 to 1]							May be extended
	Newspaper	A4 size publication 4 times/month				[Blue bar from 0 to 1]				
		A5 size publication 8 times/month					[Blue bar from 1 to 2]			
		A6 size publication 12 times/month						[Blue bar from 2 to 3]		
	Booklet Pamphlet	Delivery to the public, Placing at NEECA bldg, etc.			[Blue bar from -2 to 3]					Continued
Booklet	Special lecture to the school children, 2 times/month			[Blue bar from -2 to 3]					Continued	
Retailer	Seminar	Once each before and after enforcement			[Blue bar from -1 to 1]					
Evaluation & Reporting										[Blue bar from 3 to 4]

9. Evaluation of the effect of public awareness campaigns

The effects of the public awareness campaigns that have been implemented will be reviewed and evaluated using the following indicators and will be utilized for future reviews of public awareness strategies and countermeasures.

- You Tube will be evaluated by the number of views, the number of channel registrations and the number of clicks.
- Facebook will be evaluated by the number of followers, the number of likes it! and the number of shares.
- Twitter will be evaluated by the number of followers, the number of likes it! and the number of retweets.
- Newspapers will be evaluated by the number of accesses via QR code.

- Seminars will be evaluated based on the number of seminars and the number of participants.



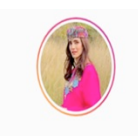
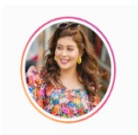
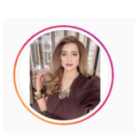
10. Implementation of public awareness campaign

Entrust public awareness work to a local advertising company to carry out the campaign. Attachment 4 shows the TOR proposal for contracting for implementation, and Attachment 5 shows the candidates for contractor sheet for reference.

Attachment 1: Film script of public awareness

Refer to Appendix 8-1.

Attachment 2 Example of Influencer

Name	Photo	Scope	Follower/ Number of registered channels	URL
Ali M oeen Naw azish		Com m entator for your concern happened in the world and new s	1,220 thousand	https://w ww .facebook.com /a.lim oeen.naw azish
Iqrar U I Hassan		Pakistan TV presenter and a journalist Formerly a newscaster Now hosting a program , called Sare Aam	500 thousand	https://w ww .youtube.com /w atch?v= rvM_6M_3vtA
Hem aya I		Fashion related D igit al creator, Pakistan Influencer of the Selected as a candidate for year 2020	480 thousand	https://instagram .com /hem aya?igsh id= 14m t50dn fkske
Sarah Fayyaz Chaudhary		Fashion related d igit al creator	540 thousand	https://instagram .com /sarahchaudhary?igsh id=rl6v41llt6g
Raheel a Khan		Fashion related d igit al creator	400 thousand	https://instagram .com /raheelakhanofficial?igsh id=1txk56lw o67hh

Attachment 3 List of stakeholders / collaborators regarding seminars for retailers

Makers and focal person list

Organization Company Name	Focal person	Designation
NEECA	Mr.Asad Mahmood	Manager Technical
Chamber of commerce	Mr.Muhammad Shakeel Munir	President
PEMA (PEL)	Mr.Tassawar Hanif Sahabyal	Secretariat, (Head of Supply Chain, PEL)
Dawlance	Mr. Adnan Nazir	Group Manager R&D
DWP Group, CE Division (GREE)	Mr. Jamal Aziz	Manager Quality Assurance
HNR Company (Pvt) Ltd. (Haier)	Mr.Muhammad Ayaz	Manager QA
Orient	Mr.Homaeer Waheed	Director Operations
PEMA (PEL)	Mr.Tassawar Hanif Sahabyal	Secretariat (Head of Supply Chain)

Retailer list

Retailer name	Location
Friends Corporation	Islamabad, Rawalpindi
Afzal Corporation	Islamabad, Lahore, Faisalabad
Umar Electronics	Islamabad, Rawalpindi
METRO Supermarket	Islamabad, Lahore, Faisalabad, Multan, Karachi
Carrefour	Rawalpindi, Lahore, Karachi
Jalal Electronics	Islamabad, Kohat, Gul Mingora, Karachi
Baig Electronics	Islamabad, Lahore, Faisalabad
Zeerak Electronics	Islamabad

Attachment 4 TOR plan for subcontracting public awareness

Draft of TOR for Implementation of Public Awareness Campaign for ES&L

This TOR is prepared based on the assumption which enforcement shall be made in July 2022.
And NEECA shall review and modify the draft of TOR based on the situation for RFP.

1. Background and Objectives

JICA implemented a technical assistance project, “The Project for Developing Effective Phasing Out Strategy/Program of Inefficient Appliances to Support Energy Standards & Labeling Regime in the Islamic Republic of Pakistan” (hereinafter referred to as “JICA ES&L Project”), to establish a mandatory ES&L (Energy Standard & Labeling) scheme for Air Conditioners (hereinafter referred to as “AC”) and refrigerators (including deep freezers) in Pakistan.

In the project, Public Awareness of the mandatory ES&L (Energy Standard & Labeling) scheme for AC and refrigerators in Pakistan was designed for the whole of Pakistan. Before implementation of the public awareness campaign, the JICA project was terminated in February 2022.

As such, implementation of the Public Awareness Campaign for ES&L shall be sub-contracted to a consultant (hereinafter the Consultant) by NEECA, based on the Terms of Reference (TOR) prepared by JICA.

In this particular assignment, the Consultant is expected to undertake the following objectives for NEECA.

2. Purpose of Public Awareness Campaign

- (1) Increase retailer motivation to sell high-efficiency appliances (AC and refrigerators) and increase consumer motivation to buy high-efficiency appliances
- (2) Increase awareness of energy labels
- (3) Promote of sales / purchasing behaviors of campaign targets
- (4) Disseminate the importance of saving electricity for the global environment and for preventing electric power shortages

3. Target of Public Awareness Campaign

- (1) Consumers
- (2) Retailers

4. Duration of the Assignment

From four months before the enforcement, 8-month period

5. Scope of the Consultancy Service

5.1. Period of Public Awareness Campaign

- (1) Consumers: From 1 month before the enforcement of ES&L regulations for ACs and refrigerators units, and running for a 3 month period.
- (2) Retailers: From 2 month before the enforcement of ES&L regulations for ACs and refrigerators units, and running for a 3 month period.

5.2. Public Awareness Activities to be implemented

5.2.1. Film

The following films were produced in Japan. Movie scripts are shown in Attachment 1.

- (1) Importance of Energy Conservation: Mottainai
- (2) Energy Saving on Air Conditioner 1: Energy Label
- (3) Energy Saving on Refrigerator 1: Energy Label
- (4) Energy Saving on Air Conditioner 2: Smart Use
- (5) Energy Saving on Refrigerator 2: Smart Use
- (6) CSPF Presentation

Each film has 2 versions, that is, a long version and a short one. The former is approximately 2 – 3 minutes long and is designed to be used for YouTube ads, and the latter is approximately 1 minute long and is designed to be used for Facebook and Twitter ads.

A consolidated version made from 1) – 5) was also prepared, which may be shown on long-distance coaches.

All films have only English narration. The Consultant shall produce Urdu version before starting the Public Awareness Campaign.

5.2.2. Social Media

(1) YouTube

- The long version of the films shall be uploaded to YouTube.
- The films shall also be broadcast from one month before the enforcement.

(2) Facebook/ Twitter

- The short version of the films shall be shown on Facebook and Twitter.
- Still images extracted from the movies shall also be shown.
- The above content shall be posted from one month before the enforcement. To avoid viewer fatigue, the posted content shall be changed frequently using a systematic strategy.
- The strategy shall be decided among the Consultant, an influencer and NEECA.
- Use effective influencer. The selection shall be made by the Contractor and NEECA. Some candidates are shown in Attachment 2.
- Generate and use effective hash tags. Keywords for hash tags shall be studied and proposed based on consultation with NEECA and the Contractor.
- Use QR codes to invite non-social media users to our site.
- By using paid ads, invite potential social media users to our site. Keywords to search potential followers shall be studied and proposed based on consultation with NEECA and the Contractor.

5.2.3. Newspaper Ads

(1) Newspaper

Effective newspapers ads are shown shall be selected based on consultation with NEECA and the Contractor.

Candidates are as follows:

- English papers: The News, Jang, Dawn
- Urdu papers: Daily Jang, Daily Nawa e Waqt

(2) Advertisement schedule and contents

- Advertisement manuscripts shall be created from films, booklets, and pamphlets.
- A tentative advertisement scheme is shown below:

Table 1: Newspaper ad schedule and contents

Period	1 month before enforcement	1 month after enforcement	2 months after enforcement
Morning or Evening	Morning		
Page	Front page	Back page	Inside page
Size	A4	A5	A6
Frequency	Once a week (Total 4)	Twice a week (Total 8)	3 times a week (Total 12)
Contents	<ul style="list-style-type: none">• Importance of Energy Saving• Pre-announcement of ES&L regulation• Contents of Movie 1)	<ul style="list-style-type: none">• Notification of ES&L regulation• What is Energy Label• Contents of Movie 2) and 3)	<ul style="list-style-type: none">• Notification of ES&L regulation• What is Energy Label• Contents of Movie 1) to 5)

(3) Others

The Consultant shall arrange newspaper interviews to NEECA, and editorial advertising.

5.2.4. Booklet, Pamphlet

The following 3 booklets and pamphlets were already created in Japan.

- Importance of energy Conservation: based on film 1)
- Energy Saving on Air Conditioner: based on film 2) and 4)
- Energy Saving on Refrigerator: based on film 3) and 5)

The booklet and pamphlet shall be distributed at NEECA, the MoE and the MoST building for 3 months of the campaign. Posters can be created easily with the booklet and pamphlet. These printed materials shall be used at events, meetings and/or seminar with other parties and NGOs.

Booklets shall be mainly used in school education. Lessons are to be held 6 times over 3 months.

5.2.5. Seminar/Workshop

The Consultant shall arrange and hold Seminars for retailers carrying ACs and refrigerators, to spread awareness about energy conservation and energy labels, and to promote to sell high efficiency appliances. Since retailers have a very close link to consumers, the campaign for them is very important.

- NEECA doesn't have an effective channel to retailers. So, the Consultant shall develop a participants list of seminars. Some related focal points at manufactures, PEMA and the Chamber of Commerce are compiled in Attachment 3.
- Seminars shall be arranged not only in person but also on-line (with Zoom, MS Teams and Google Meet).
- Seminars shall be held once before enforcement and once more after it.
- Presentation materials shall be developed with films and pamphlets. It is also important to let retailers understand CSPF, so film 6) can be used to effectively lecture about it.

5.2.6. Campaign Schedule

Overall campaign schedule is shown below:

5.2.7. Evaluation of Campaign

The Consultant shall investigate and propose how to evaluate the effectiveness of the campaign. The following indexes may be used to evaluate it.

- You Tube: The number of views, the number of registered channels, and the number of clicks
- Facebook: The number of followers, the number of Likes it!, and the number of shares
- Twitter: The number of followers, the number of Likes it!, and the number of retweets
- Newspaper: The number of QR code accesses
- Seminar: The number of seminars and the number of participants

Table 2: Public Awareness Implementation Schedule

Month			-4	-3	-2	-1	0	1	2	3
Preparation			[Blue bar from -4 to -1]							
Movie w/Urdu naration				[Blue bar from -3 to -1]						
Urudu Version shall be produced.							Enforcement			
Consumer	Sicial Media	YouTube	[Blue bar from -1 to 1]							May be extended
		Facebook Twitter	[Blue bar from -1 to 1]							May be extended
	Newspaper	A4 size publication 4 times/month					[Blue bar from 0 to 1]			
		A5 siza publication 8 times/month						[Blue bar from 1 to 2]		
		A6 size publication 12times/month							[Blue bar from 2 to 3]	
	Booklet	Pamphlet	[Blue bar from -2 to 3]							Continued
Booklet		[Blue bar from -2 to 3]							Continued	
Retailer	Seminar	Once each before and after enforcement			[Blue bar from -1 to 1]					
Evaluation & Reporting									[Blue bar from 3 to 4]	

6. Liability

The Consultant shall be liable on any claim/compensation for loss/damage caused by this Public Awareness Campaign.

7. Reporting

The Consultant shall submit a report of the work with quantitative indexes.

Attachment 1. Film scripts

Attachment 2. List of Influencers (example)

Attachment 3. List of Person in Charge at Related Parties and Major Retailers

Attachment 5 List of candidate contractors for public awareness

Company name	Contact person
OUTPOST Consultants	Mr. Ahsan Izhar,
ADMAX Limited	Mr.Muhammad Fahad Ashfaq
Blitz Advertising (pvt) Ltd.	Mr. Qaiser Abbas
Channel7 Advertising	Mr.Muhammad Anees
Berserk Media Production	Mr. Aamish
Bilal Associates	Mr.Muhammad Hassan



ホーム > ニュース > セミナー・シンポジウム報告 > 2021年度 > 家庭用冷蔵庫のエネルギー消費量試験方法に関するオンライン研修－パキスタン省エネルギー基準及びラベリング制度にかかる戦略策定・推進プロジェクト－

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ニュース

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○ 家庭用冷蔵庫のエネルギー消費量試験方法に関するオンライン研修－パキスタン省エネルギー基準及びラベリング制度にかかる戦略策定・推進プロジェクト－

2021年10月15日

パキスタン・イスラム共和国政府では2016年に制定した省エネルギー法を施行すべく、省エネルギー庁（NEECA：National Energy Efficiency and Conservation Agency）による省エネルギー基準及びラベリング制度（ES&L：Energy Standard & Labeling）の普及促進を図っています。JICAはパキスタンでのエアコンと冷蔵庫のES&L創設に技術協力しています。

この技術協力は、ES&Lを導入することにより、対象製品であるルームエアコンと家庭用冷蔵庫のエネルギー消費量の減少を図り、また、ラベリング制度の適切な実施を通して、非効率な製品が効果的かつ段階的に排除されることにより需要側のエネルギー効率改善と省エネ推進を図るものです。

ES&Lでは正しい情報がラベルに表示されることが重要です。このため、NEECAは市場で販売された家庭用冷蔵庫について、その性能を定期的に確認するために買上げ試験を行うことにしています。その試験の能力強化のために、一般財団法人日本品質保証機構（JQA：Japan Quality Assurance Organization）と連携して、家庭用冷蔵庫のエネルギー消費量試験方法（IEC62552-3）のオンライン研修を実施しました。

セミナー受講者からは、パキスタンでの家電製品の省エネルギーにエアコンや冷蔵庫ばかりでなく他の家電製品の省エネルギー推進にも大変役立つとの評価でありました。

実施日

2021年10月7日、14日及び15日 各2時間（3日間）

実施場所

オンライン

講師

JQA、土屋和樹様

出席者（約50人）

- パキスタン科学産業研究評議会（PCSIR：Pakistan Council of Science & Industrial Research）（パキスタン国の認証試験機関）
- パキスタン電子機器製造協会（PEMA：Pakistan Electronics Manufacturers Association）のメンバー会社等、家庭用冷蔵庫の製造・輸入会社の技術者
- NEECA
- パキスタン標準品室管理庁（PSQCA：Pakistan Standards & Quality Control Authority）職員等。

講義内容

家庭用冷蔵庫のエネルギー消費量試験方法について日本及びパキスタン規格双方に採用されているIEC62552-3をもとに冷蔵庫設置方法等の具体的な試験方法、エネルギー消費量の算定式とエクセルを使った算定事例の紹介等実践的な研修を実施しました。

研修には、パキスタン国の認証試験機関であるPCSIRをはじめ主要な家庭用冷蔵庫の製造、輸入業者の試験担当者が参加し、試験のための試験設備のセット方法や試験結果の評価方法などについて実践的な内容の質疑応答が行われました。



JQA 講師と通訳によるオンライン講義状況。講師：JQA、土屋和樹、通訳：宮崎亜子

Outline of IEC 62522 Household Refrigerating Appliances

JAPAN QUALITY ASSURANCE ORGANIZATION Safety Testing Sector

JQA 一般社団法人
日本品質保証機構

講義資料の表紙

INDEX

JQA

1. Installation
2. Location of sensors
3. Steady state power and temperature
4. Defrost and recovery energy and temperature change
5. Defrost interval
6. Interpolation of results
7. Load processing efficiency

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3

講義資料目次

Block	Average Power (W)	Average Time (min)	Energy (Wh)	Temperature (°C)
1	1.000	60.000	0.600	1.000
2	1.000	60.000	0.600	1.000
3	1.000	60.000	0.600	1.000
4	1.000	60.000	0.600	1.000
5	1.000	60.000	0.600	1.000
6	1.000	60.000	0.600	1.000
7	1.000	60.000	0.600	1.000
8	1.000	60.000	0.600	1.000
9	1.000	60.000	0.600	1.000
10	1.000	60.000	0.600	1.000
11	1.000	60.000	0.600	1.000
12	1.000	60.000	0.600	1.000

省エネ性能計算書例

添付資料 9-1 : DISCO データ分析 (AC 電力消費量と日負荷曲線)

1. はじめに

一般家庭における AC の電力消費量は、その設置台数と稼働状況が不明であり、マクロレベルの電力消費量は推定するしかない。本プロジェクトでは、DISCO (配電会社) が保有するデータを用いて推定を行った。しかしながら、精度のよい推定は非常に困難であり、推定結果がどの程度の信頼性を有するかの評価も難しいことを最初にお断りしておく。

本調査への協力を得た DISCO は、IESCO, LESCO, FESCO, MEPCO, HESCO, SEPCO (6 DISCOs) 及び K-Electric (KE) ¹である。PEPCO 傘下の DISCO には、6 DISCOs 以外に GEPCO、PESCO、QESCO、TESCO があり、計 10 社 (以下、まとめて PEPCO と呼ぶ) ある。

GEPCO、PESCO、QESCO、TESCO の 4 社はデータが入手できず、7 DISCOs や PITC から提供されたデータにも多くの欠落・欠損があった。従って、無理な補間 (内挿・外挿) を行うことなく出せる以下の推定結果のみを示すこととした。

- (1) 一般家庭における AC 保有率及び AC 電力消費量 (kWh)
 - IESCO, LESCO, MEPCO, HESCO, SEPCO 及び KE
 - FESCO は参考情報として、その一部のみ
- (2) 一般家庭における AC の日負荷曲線 (Daily Load Curve: DLC, kW)
 - IESCO, LESCO, MEPCO 及び KE

この結果、当初目指していた国レベルの電力消費量の推定は断念せざるを得なくなった。以下、その分析方法と推定結果を示す。

2. 推定のための着眼点

DISCO 全体でも 1 世帯単位においても、AC 不使用方法 (AC Stopped Month: SM) と AC 最稼働月 (AC Full Running Month: FRM) の電力消費量の差分は、ほぼ冷房需要とみなせる。7 DISCOs から SM と FRM の販売電力量データと、主として一般家庭に供給している配電線 (Feeder) の DLC データを入手し、SM と FRM を比較することにより、電力消費量 kWh と日負荷曲線 kW の推定を行った。

しかしながら、FRM-SM の差分は冷房需要であり、これには AC だけでなく Fan の需要も含まれている。分析にあたっては、AC と Fan の分離を行う必要がある。

¹ KE は発送配が垂直統合された電力会社であり、正確には DISCO ではない。しかし、ここでは KE の配電部門を KE と呼び、それを DISCO に含めることにする。

3. 分析フロー

分析プロセスは以下に示すフローにより実施した。各ステップの詳細は、次章以降で述べる。

- 1) kWh データ入手 [4 章]
- 2) 1)の kWh データに基づく、AC 保有率の一次推定 [5 章]
- 3) 一次推定結果についての DISCOs との協議 [6 章]
- 4) 3)にもとづき、最終的な AC 保有者の条件を決定し、AC 保有率の二次推定 [7 章]
- 5) AC の消費電力量 (kWh) 推定 [8 章]
- 6) 日負荷曲線 (kW) データを入手する Feeder の選定 [9 章]
- 7) 6)で選定した Feeder の日負荷曲線 (kW) データ入手 [10 章]
- 8) 各社の AC 日負荷曲線 (kW) を推定 [11 章]

4. kWhデータ入手

4.1. SMおよびFRMの設定

SM および FRM の設定は、地域特性もあるため、7 DISCOs による設定とした。表 1 に設定結果の一覧を示す。

表 1 各 DISCOs による SM、FRM 選定結果

Source: Jizolab

	SM	FRM
LESCO	Mar 2019	Jun 2019
IESCO	Nov 2018	Jul 2019
MEPCO	Mar 2019	Jun 2019
FESCO	Apr 2019	Aug 2019
HESCO	Dec 2018	Jun 2019
SEPCO	Jan 2019	Jun 2019
KE	Jan 2019	May 2019

4.2. 入手したkWhデータ

- (1) 一般家庭の請求書ベースの kWh データ

7 DISCOs がもつ MIS (Management Information System) から、表 2 のフォーマットにより、一般家庭の請求書ベースの SM と FRM の 2 か月分の kWh データを入手した。Cicle (KE では Region と呼ぶ) は DISCO 内で地理的に分割された営業/配電エリアであり、これを分析の単位とする。なお、このデータについては、個々の需要家に供給している Feeder (低圧配電線) 名も求めた。

表 2 需要家データフォーマット

Source: Jizolab

DOMESTIC CUSTOMER CONSUMPTION in AC FULL RUNNING & STOPPED MONTH
 (Please list up all the domestic consumers in each Region, including TOD customer.)

CIRCLE/REGION NAME _____

DIVISION/IBC NAME _____

FEEDER CODE	FEEDER NAME	CUSTOMER ID (Serial) NO.	TARIFF CODE	LOAD (KW)	NET UNITS BILLED (KWH)	
					AC FULL RUNNING MONTH (FRM)	AC STOPPED MONTH (SM)

入手したデータ数を表 3 に示す。LESCO には 9 つの Circle があるが、その一つ Industrial Circle には一般家庭の需要家が存在しないため、8 Circle となっている。また、FESCO には 5 つの Circle があるはずであるが、2 Circle のデータしか提供されなかった。

データには空白や 0、負の値が存在する。このようなデータは分析対象から外し²、残りを有効データとした。入手データは約 1,750 万件、有効データ数約 1,478 万件で、有効率は 84.1%である。

表 3 一般家庭の入手データ (単位: 顧客数)

Source DISCOs, modified by Jizolab

DISCO	6 DISCOs						Total	KE	7 DISCOs
	LESCO	IESCO	MEPCO	FESCO	HESCO	SEPCO			
# of Circles	8 (9)	5	9	2 (5)	4	3	34	5	39
# of Original	4,058,701	2,509,299	5,890,514	1,601,324	716,565	481,046	15,257,449	2,322,986	17,580,435
# of Effective	3,423,701	2,227,663	4,950,137	1,508,107	487,288	307,421	12,904,317	1,877,047	14,781,364
Data Effective /Original	84.4%	88.8%	84.0%	94.2%	68.0%	63.9%	84.6%	80.8%	84.1%

(2) Feeder の kWh データ

一般家庭に供給している全ての Feeder について、表 4 のフォーマットにより、SM と FRM の 2 か月分の kWh データを入手した。一般的には Feeder は一般家庭だけでなく、産業や商業など他セクターの需要家も混在している。一般家庭の比率を知るために、Feeder の消費電力の総計と一般家庭分の kWh データを各 DISCO から入手した。Feeder 数の一覧を表 5 に示す。

² 無効データは、転出・転入、前月分過払い請求の補正、電気料金削減のための複数契約といったものと推定される。

表 4 Feeder データフォーマット

Source: Jizolab

FEEDER CONSUMPTION in AC FULL RUNNING & STOPPED MONTH (Please list up all the Feeders)

CIRCLE/REGION		DIVISION/IBC		FEEDER		No. of CONSUMERS		SUPPLIED ENERGY from FEEDER (kWh) (including loss)		BILLED ENERGY to CONSUMER (kWh)			
CODE	Cluster NAME	CODE	NAME	CODE	NAME	Total	Domestic	AC FULL RUNNING MONTH (FRM)	AC STOPPED MONTH (SM)	AC FULL RUNNING MONTH (FRM)		AC STOPPED MONTH (SM)	
								Total	Total	Total	Domestic	Total	Domestic

表 5 入手した Feeder のデータ数

Source Jizolab

DISCO	6 DISCOs						Total	KE	7 DISCOs
	LESCO	IESCO	MEPCO	FESCO	HESCO	SEPCO			
# of Circles	8	5	10	2	4	3	32	5	37
# of Feeders	1,865	1,122	1,500	183	608	562	5,840	1,701	7,541

(3) 月別電力消費量推移データ

ミクロな世帯別情報以外に、月別の DISCO 全体の電力消費量推移データを入手した。一例として KE のものを表 6 に示す。この情報は、FRM の月度差補正や年間消費量推定のために用いた。

表 6 KE 2019 年 年間電力推移 (MWh)

Source KE

Month	Jan.	Feb.	Mar.	Apr.	May	June
Total	793,826,208	730,727,090	832,007,754	1,093,303,937	1,297,251,963	1,342,220,349
Domestic	357,712,203	316,981,605	384,458,132	555,706,262	734,249,106	834,159,473
Dome./Total %	45.06%	43.38%	46.21%	50.83%	56.60%	62.15%

Month	July	Aug.	Sep.	Oct.	Nov.	Dec.	Total
Total	1,340,472,348	1,288,982,010	1,243,208,135	1,322,605,705	1,133,516,547	866,930,704	13,285,052,751
Domestic	795,425,975	773,306,319	736,484,224	755,962,277	591,980,566	389,776,691	7,226,202,833
Dome./Total %	59.34%	59.99%	59.24%	57.16%	52.23%	44.96%	54.39%

5. AC保有率の一次推定

AC 保有率推定の基本的な考え方は、

- 1 世帯における SM と FRM での電力消費量の差がほぼ冷房需要
- 1 世帯の冷房需要 (FRM-SM) が、判断基準よりも大きい場合に AC 保有というものである。

しかしながら、冷房需要は AC と Fan による消費量の和であること、そして、冷房需要のうち AC 稼働による電力消費量がどの程度なのかを推定するのが大きな課題となる。

1) AC 保有の判断基準：冷房需要（FRM-SM）

AC1 台の月間消費電力量を判断基準とする。AC の定格電力を Full-mode: 1.1kW, Economic-mode: 0.7kw、稼働時間を Full-mode: 4 時間/日、Economic-mode: 9 時間/日と仮定すると、AC 保有の判断基準は 300 kWh/月となる。

また、AC を 1 台保有している層は Fan（天井 Fan など）を 4 台保有し、その電力消費変化量は 50 kWh/月と仮定した³。

従って、AC 保有を判断する冷房需要の閾値は 350 kWh となるが、仮定に基づくものであるため、少し幅を広げて 250、300、350 kWh の 50kWh 刻みの閾値により AC 保有率を算出し、これをもとに 6 DISCOs と協議のうえ最終的な AC 保有判断基準を決めることとした。

2) AC 保有の判断基準：SM の消費量

また、AC を保有している層は低所得者層ではないと仮定して、もう一つの条件として、SM での電力消費量が 100 kWh 以上と想定した。

すなわち、AC 保有率一次推定の判断基準は、以下の 2 つである⁴。

- (a) 冷房需要が（250）、350、（300）kWh 以上
かつ
- (b) SM での電力消費 100 kWh 以上

一次推定は、データ入手済の FESCO、HESCO、IESCO、LESCO、SEPCO の 5 社（22 Circles）により行った。推定結果を図 1 に示す。図中の Change が FRM-SM である。

³ AC を初めて 1 台持つ世帯なら、独身者を除けば部屋数は 3、AC と併用の Fan も含め 4 と仮定した。

⁴ 最終的には、二次推定の段階で、(b) 項の条件は、AC の消費電力予想値への影響が大きいことから除外することとした。（7. 参照）

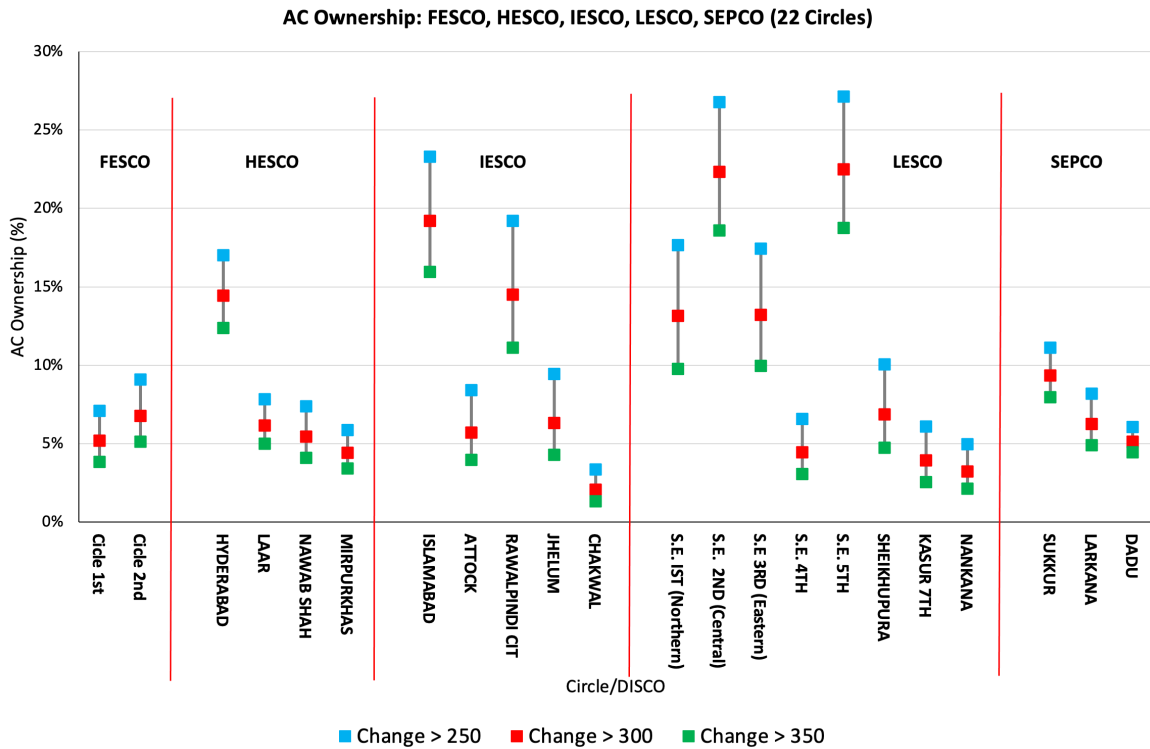


図 1 AC 保有率の一次推定

Source: Jizolab

6. 一次推定結果についてのDISCOsとの協議

2019年12月の第4次現地渡航において、6 DISCOs を訪問し、以下の報告を行った。

- 1) 図 1 により、冷房需要変化量 250、300、350 での AC 保有率説明
- 2) Circle 毎の特徴点の説明と、他の DISCO の結果も含めた総合評価

その結果、分析方法の妥当性について了承された。そして、条件 (a) の冷房需要の閾値について 6 DISCOs の意見を求めたところ、表 7 に示すような回答となった。

表 7 各 6 DISCOs の AC 保有判定基準

Source: Jizolab

	FESCO	HESCO	IESCO	LESCO	MEPCO	SEPCO	Weighted Average
Criterion (a) on AC ownership	300	300	350	350	350	350	342

表 7 の右端は、各 DISCO の提案する閾値と有効データ数により加重平均値を求めたものである。各社ごとではなく、統一的な判断基準で分析することも合意を得たため、以下、表 7 の右端 Total 欄の値に基づき、340 kWh を統一的な AC 保有判定基準 (a) とした。

7. AC保有者比率の二次推定

二次推定にあたっては、以下の課題への対応を検討し、判定基準を変更した。

- 1) 一般家庭の需要としては、極端に大きすぎるデータが存在する。
- 2) SM ではほとんど電力消費しないにもかかわらず、FRM では SM 時に比べて 340kWh 以上の電力消費する需要家の存在。

$$(a') 340 \text{ kWh} < \text{冷房需要 (FRM - SM)} < 10,000 \text{ kWh}$$

かつ

$$(b') 0 \text{ kWh} < \text{SM} < 5,000 \text{ kWh}$$

(a') については、冷房需要が 10MWh/月の一般家庭というものが、常識的には考えられないため、除外することとした。同様の理由により、(b') についても、SM で 5 MWh/月以上を除外する⁵。

(b') の下限閾値については、一時推定では AC 保有者は貧しくはなく、SM 期間中も一定程度の消費は行っているはずという前提で、判定基準 (b) として $\text{SM} > 100 \text{ kWh}$ という条件を設定した。しかし、実際には、 $0 \text{ kWh} < \text{SM} < 100 \text{ kWh}$ で $\text{FRM} - \text{SM} > 340 \text{ kWh}$ となる需要家が予想以上に多く存在している。SM での消費量が小さくとも、FRM には AC 1 台を保有しているとみなせるだけの消費量の増加があるわけだから、判定条件 (b') を $\text{SM} > 0 \text{ kWh}$ と変更した。

この2つの判断基準で AC 保有率を求めた結果を図 2 に示す。

⁵ 8.1節で示す SPECO の Sukkur Circle の場合、 $\text{SM} > 5,000 \text{ kWh}$ 、冷房需要 $> 10,000 \text{ kWh}$ の除外された部分では、需要家数 10 (表 8 参照)、増加電力量 176 MWh (表 9 参照) である。AC 寄与分 (表 赤枠内) の 1.1% に相当する。他の DISCO では 2~3% の場合もある。

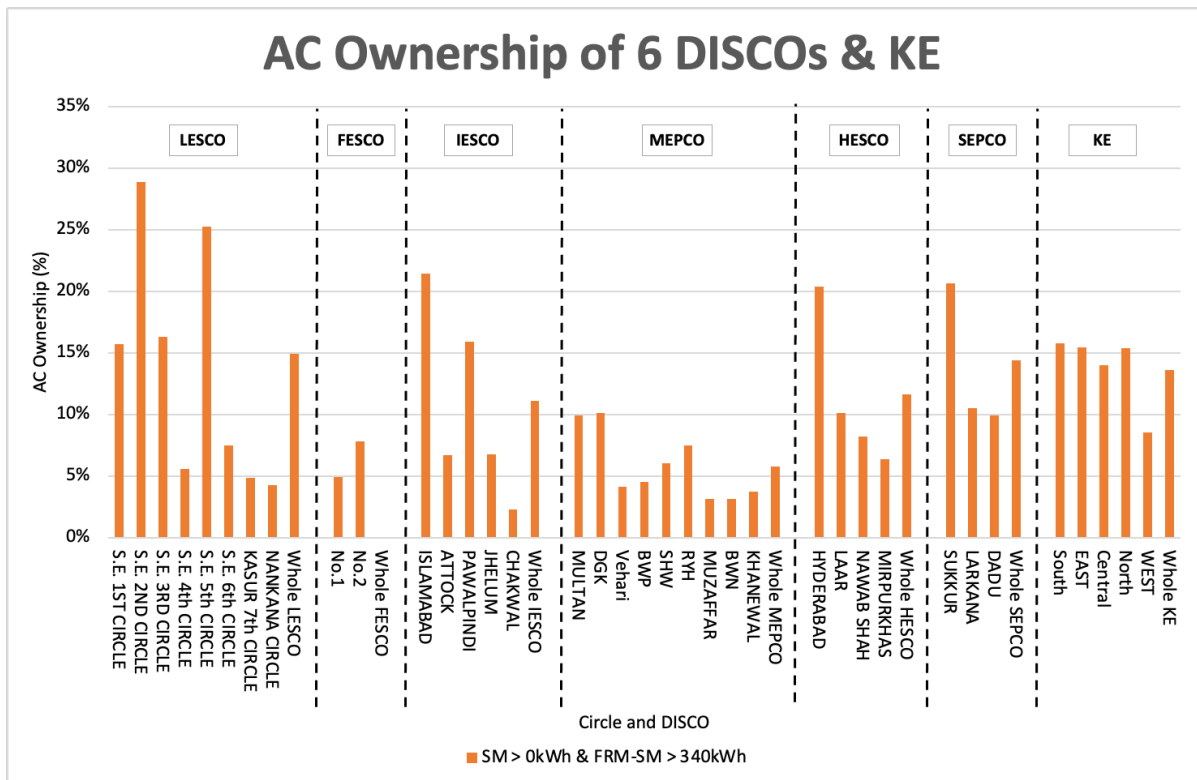


図 2 AC 保有率二次推定結果 (Circle 単位)

Source: Jizolab

LESCOのS. E. 2nd サークルの保有率が最も高く28.9%、都市部を含むと思われるサークルでは20%超がいくつかある。一方、地方部主体と思われるサークルでは、2~3%というところもある。なお、FESCOは一部のCircleデータしか入手できなかったため、参考値として当該Circleについてのみ推定結果を示している。

なお、FESCOについて、未入手のCircle分を、入手Circleの推定結果により外挿（補間）してFESCO全体とみなすという仮定を設ければ、6 DISCOsでは9.6%、KEを含む7 DISCOsでは10.1%のAC保有率となる。

8. ACの消費電力量 (kWh) 推定

8.1. 冷房需要の推定方法

AC 電力消費量の推計方法について、SEPCO の Sukkur Circle を例として説明する。表 8、表 9 は、それぞれ需要家数と冷房需要 (MWh) のクロス階層表である⁶。表の縦軸は SM の電力消費量、横軸は冷房需要である。

⁶ Sukkur Circle の総一般家庭需要家数は 210,507、うち有効なデータは 123,645 で、有効率 58.7%である。PEPCO の有効率 84.6%であり、最も低い Circle である。表 8 の総数 110,965 とのギャップは変化量が負のものが存在するため、有効データ中の 10.5%は夏季に消費量が減少している。これは、日照時間の増加により電灯消費量が減少し、その減少分と同程度の Fan 消費で、見かけの消費量が 25 kWh 以下だった世帯と推定している。

表 8 SEPCO Sukkur Circle クロス階層表 (需要家数)

Source: Jizolab

No. of HHs		Slab of Cooling Demand FRM - SM (kWh)					Total
		0	1-25	26-340	340-10000	> 10000	
Slab of SM Consumption (kWh)	0						0
	1-50	515	3,968	22,320	5,109		31,912
	51-100	655	4,722	29,738	6,176		41,291
	101-5000	325	1,910	21,325	14,192	3	37,755
	> 5000				2	5	7
Total		1,495	10,600	73,383	25,479	8	110,965

表 8 で、赤枠中の水色部分 (340 < FRM – SM < 10,000) が AC 保有者数で計 25,477 世帯である。AC 保有率は 22.95% という推定となる。

なお、Fan のみの需要家は黒枠中のベージュ色部分 (26 < FRM – SM < 340) と推定している。

表 9 表 SEPCO Sukkur Circle クロス階層表 (電力消費量の増加)

Source: Jizolab

Cooling Demand (MWh)		Slab of Cooling Demand FRM - SM (kWh)					Total
		0	1-25	26-340	340-10000	> 10000	
Slab of SM Consumption (kWh)	0						0
	1-50	0	50	2,475	2,718		5,243
	51-100	0	48	4,683	3,466		8,198
	101-5000	0	19	3,768	9,697	34	13,517
	> 5000				6	136	142
Total		0	117	10,926	15,887	170	27,100

表 8 と表 9 の当該部分をまとめたものを表 10 に示す。

表 10 SEPCO Sukkur Circle の冷房需要概要

Source: Jizolab

	Fanのみの保有者	AC+Fan併用者
冷房需要 (FRM-SM)	26~340kWh	340~10,000kWh
需要家数	73,383	25,477
総冷房需要 (増加分)	10,926 MWh	15,881 MWh
冷房需要の世帯平均電力消費量	149 kWh	623 kWh

8.2. Fan需要の推定

冷房需要はACとFanによるものであるため、AC保有者がどの程度Fanを使っているかを推定する必要がある。Fanのみの保有者の冷房需要は世帯あたり149kWhであるが、AC所有者も天井Fanを冷気循環のために併用しているようであり、149 kWhより高めの値となる、200kWh < FRM – SM < 340kWhのFanのみの需要家における加重平均値、243 kWhをAC保有者の平均的Fan電力消費量と仮定した⁷。

⁷ 149kWh, 243kWh という二つの数値は SEPCO の Sukkur Circle のもので、DISCO、Circle によって異なる。

よって、AC保有者 $25,477 \times 243 \text{ kWh} = 6,183 \text{ MWh}$ がAC保有者によるFanの電力消費であり、Sukkur Circleの総消費量は以下のような推定となる。

- AC電力消費量 : $15,881 - 6,183 = 9,698 \text{ MWh}$
- Fan電力消費量 : $10,926 + 6,183 = 17,109 \text{ MWh}$

なお、表 10からFan保有率も求められる。黒枠内と赤枠内の総和98,860が保有者数、Fan保有率は80.0%となる。

8.3. AC需要の推定

(1) NTDC PSS のデータとの乖離・補間

表 11 に、一般需要家顧客数についての NTDC. Power System Statistics 44th (2020 年 3 月) と入手データの比較結果を示す。7 DISCOs 全体では、一般家庭需要家数の 88.6%が分析対象である。しかしながら、LESCO、IESCO、MEPCO、KE の 4 社はほぼ合っているが、FESCO、HESCO、SEPCO の 3 社では NTDC 報告書の需要家数よりもかなり低く、電力消費量推定においては補正を行わざるを得ない。

表 11 入手データと PSS データの比較

Source NTDC, KE, Jizolab

DISCO	LESCO	IESCO	MEPCO	FESCO	HESCO	SEPCO	6 DISCOs Total	KE	7 DISCOs Total
# of Original Data (C)	4,058,701	2,509,299	5,890,514	1,601,324	716,565	481,046	15,257,449	2,322,986	17,580,435
# of Domestic Consumer in PSS* (D)	4,108,067	2,528,665	5,748,493	3,651,710	907,377	603,885	17,548,197	2,298,647	19,846,844
Ratio (C/D) in %	98.8%	99.2%	102.5%	43.9%	79.0%	79.7%	86.9%	101.1%	88.6%

データ補間は、需要家数や消費電力量について NTDC データと DISCO 全体の比を求め、入手した冷房需要推定値にその比をかけて行った。つまり外挿であり、データが欠落している部分はデータ入手済みのものと、平均的にみて大きく違わないという仮定をすることになる。

(2) AC の消費電力量 (kWh) 推定

外挿補間した冷房需要をもとに推定した AC 電力消費量 (kWh) と、それが全体及び一般家庭需要に占める比率をまとめたものを表 12 の上半分に示す。表の下半分には、データ未入手のため推定できなかった 4 DISCOs の全体及び一般家庭の電力消費量を参考のために示す。当該 DISCO の AC 消費量比率について、表の上半分の結果から外挿可能な知見があれば、国全体の推計が可能となる。

表 12 AC 電力消費量 (GWh) 推定値

Source: Jizolab, NTDC, KE

	Estimated Domestic AC Annual Consumption (GWh)	Annual Consumption (GWh) [NTDC, Power Market Survey 2019] [KE Data provided in 2020 in JICA Project]			
		Total	AC Ratio	Domestic	AC Ratio
LESCO	1,325	20,448	6.5%	9,029	14.7%
IESCO	517	10,606	4.9%	5,092	10.2%
MEPCO	589	15,853	3.7%	8,896	6.6%
FESCO	402	12,925	3.1%	6,512	6.2%
HESCO	246	4,027	6.1%	2,438	10.1%
SEPCO	230	2,963	7.8%	1,828	12.6%
6 DISCOs total	3,309	66,822	5.0%	33,795	9.8%
KE	842	13,285	6.3%	7,226	11.6%
7 DISCOs total	4,150	80,107	5.2%	41,021	10.1%
GEPCO		9,887		5,785	
PESCO		8,795		4,969	
TESCO		1,482		1,197	
QESCO		4,916		719	
4 DISCOs Total		25,080		12,670	
PEPCO Total		91,902		46,465	
PEPCO + KE		105,187		53,691	

9. 日負荷曲線 (kW) データを入手するFeederの選定

入手した kWh データには、Feeder 単位の Total、Domestic の顧客数、電力消費量なども含まれているので、Feeder 単位での AC 保有率、AC 消費電力量などが推定可能である。Feeder データの入手にあたっては、まず一般家庭への供給が多いものを選び、さらに AC 保有率により分類すれば AC、Fan の動作パターンが明確になるだろうという見込みのもと、以下の 4 or 3 Group を設けて選定を行った⁸。

- Group I : Circle の特徴と類似度の高い代表的と見做しうる Feeder (AC 保有率と FRM のスラブ分布という 2 つの指標により、Circle と各 Feeder の類似度を定量的に評価・比較して選定)
- Group II : AC 保有率が低い Feeder (ファンのみ保有者層)
- Group III : AC 保有率が高い Feeder (富裕層)
- Group IV : AC 保有率が Group II、III の間にあるもの (全体の傾向を補完するため: KE のみ)

KE については、各 Region で 3 Feeders/Group、4 Group/Region、5 Regions のため、KE 全体で 60 Feeders を選んだ。6 DISCOs は、5 Feeders/Group、3 Group/Circle、34 Circles であり、合計 510 Feeder となる。例として、KE の South Region で選んだ Feeder を表 13 に示す。

⁸ KE から入手した Feeder データの分析を踏まえ、クラス IV は不要と判断したため、6 DISCOs については Group 1~III の 3 つに変更した。

表 13 List of Selected Feeders in KE-South Circle

Source: Jizolab

	FEEDER		IBC		# of Customers			Consumption in FRM (kWh)	Consumption / Effective # (kWh)	AC Ownership (%)
	CODE	NAME	CODE	NAME	Effective	Effective %				
	South				438,295	375,986	85.8%			15.8
I	422	D-AREA RMU	146	KORANGI	2,102	1,895	90.2%	617,989	326	8.0
	22	PNT Colony	118	IBC - Defence	2,013	1,641	81.5%	566,792	345	15.1
	3571	ABU ZAR BAKERY RMU	146	KORANGI	1,652	1,529	92.6%	559,292	366	13.3
II	1332	C-STATION	146	KORANGI	1,557	985	63.3%	254,755	259	1.1
	1333	IBRAHIM HYDERI RMU	146	KORANGI	3,025	2,319	76.7%	466,622	201	1.1
	1248	ALI AKBER SHAH RMU	146	KORANGI	4,814	4,285	89.0%	833,887	195	1.2
III	2063	12th Lane Sehar	118	IBC - Defence	991	954	96.3%	1,114,585	1168	71.9
	75	Coastal Street	118	IBC - Defence	1,041	994	95.5%	1,278,821	1287	69.6
	3306	Asma Begum RMU	118	IBC - Defence	1,188	1,125	94.7%	1,444,851	1284	66.1
IV	428	7 - A RMU	146	KORANGI	1,031	901	87.4%	372,630	414	22.3
	11	Glass Tower	125	IBC - Clifton	1,007	840	83.4%	521,984	621	40.1
	1	Defence Pumping	118	IBC - Defence	1,670	1,604	96.0%	1,207,867	753	50.5

10. Feederの日負荷曲線 (kW) データ入手

前節で示したFeederデータを、表 14の様式により、KE及びPITCから入手した。基本的にはSM、FRMの各1ヶ月、計2か月間の日負荷曲線 (DLC: Daily Load Curve、15分ピッチ) と、NTDCの年ピーク発生日 (2019/06/02) のDLCである⁹。

表 14 Feeder データフォーマット

Source: Jizolab

NAME	DISCO		Sampling period				
CODE	Circle		15 minites				
			1				
			Feeder CODE				
			SM		FRM		NTDC Peak:
			Month	Month	Month		
NO	Date & Time	kW	Date & Time	kW	Date & Time	kW	
1	11/1/19 0:00		7/1/18 0:00		6/1/19 0:00		
2	11/1/19 0:15		7/1/18 0:15		6/1/19 0:15		
3	11/1/19 0:30		7/1/18 0:30		6/1/19 0:30		
4	11/1/19 0:45		7/1/18 0:45		6/1/19 0:45		
5	11/1/19 1:00		7/1/18 1:00		6/1/19 1:00		
6	11/1/19 1:15		7/1/18 1:15		6/1/19 1:15		
7	11/1/19 1:30		7/1/18 1:30		6/1/19 1:30		
:	:		:		:		
:	:		:		:		
:	:		:		:		
2969	12/1/19 22:00		12/1/19 22:00		12/1/19 22:00		
2970	12/1/19 22:15		12/1/19 22:15		12/1/19 22:15		
2971	12/1/19 22:30		12/1/19 22:30		12/1/19 22:30		
2972	12/1/19 22:45		12/1/19 22:45		12/1/19 22:45		
2973	12/1/19 23:00		12/1/19 23:00		12/1/19 23:00		
2974	12/1/19 23:15		12/1/19 23:15		12/1/19 23:15		
2975	12/1/19 23:30		12/1/19 23:30		12/1/19 23:30		
2976	12/1/19 23:45		12/1/19 23:45		12/1/19 23:45		

⁹ KE については、2019 年 6 月 (NTDC 最大ピークの月) の Feeder データも入手した。KE は FRM を 5 月としていたが、kWh データの分析結果では 6 月の方が大きかったため、分析では 6 月を FRM 相当とした。

しかしながら、データの品質という面では、事故及び計画停電（数時間）と思われるデータ欠損があり、都市部の一部を除けば通電率が30～40%という、正確なDLCを把握することが困難なFeederが多くあった。

データ欠損（供給停止）状況とその補正例（KE South Region, Feeder ID 3571）を図3と図4に示す。図3が修正前、図4が修正後である。青線がSM、オレンジ線がFRM、黒線が差分の冷房負荷である。このFeederはAC保有率が13.3%で比較的高いが、月間のデータ欠損率はSMで23.7%、FRMで19.5%である。データ欠損部分を補間すると、この段階から推定が入ることになるため、できるだけ欠損が少ないFeederデータを分析のために選ぶ必要がある。

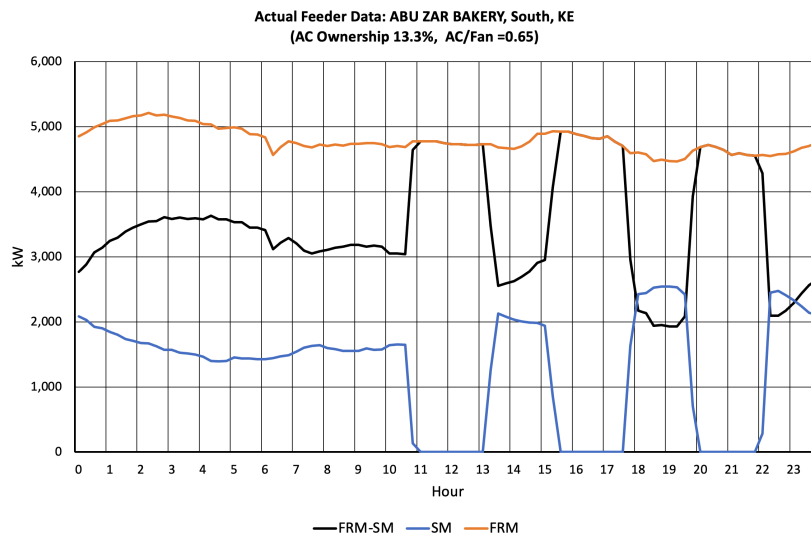


図3 データ欠損（例）

Source: Jizolab

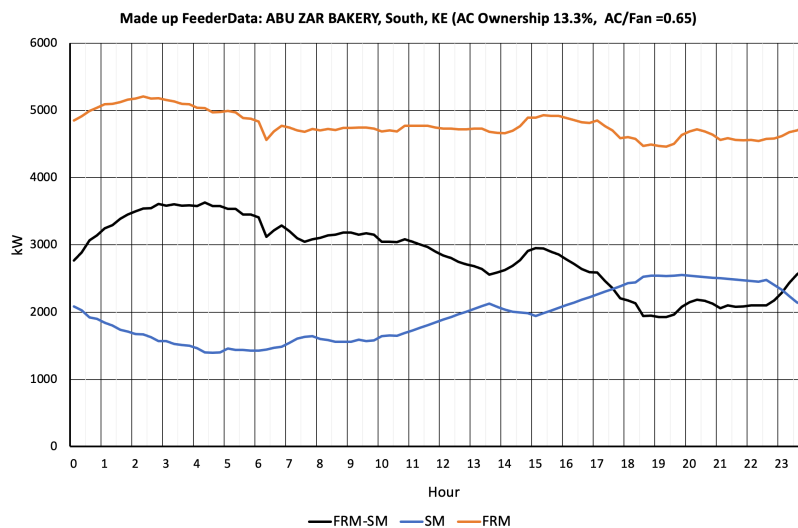


図4 データ欠損の修正例

Source: Jizolab

表 15にKE South Region Feederの供給支障率（1か月の測定点2880（4×24×30）に対する％）、表 16にLESCO、SEPCOの集約されたそれを示す。表 16では、供給支障率が30％、20％以上となるFeeder数を最下段に示している。

表 15 KE South Region Feeder の供給支障率

Source: Jizolab

FEEDER-CODD	FEEDER NAME	AC Owner	Fan Owner	AC Consump	Fan Consump	Total Cooling Demand	AC/Fan	Data unavailability (Power Outage)	
								SM	FRM
10: South									
422	D-AREA RMU	8.0%	61.1%	146,300	165,949	312,249	0.88	31.91%	22.74%
22	PNT Colony	15.1%	82.3%	76,604	226,707	303,311	0.34	0.56%	3.44%
3571	ABU ZAR BAKERY RMU	13.3%	74.1%	118,934	181,913	300,847	0.65	23.65%	19.48%
1332	C-STATION	1.1%	17.9%	5,567	18,646	24,213	0.30	33.85%	23.54%
1333	IBRAHIM HYDERI RMU	1.1%	31.1%	10,089	73,484	83,573	0.14	31.98%	26.35%
1248	ALI AKBER SHAH RMU	1.2%	48.6%	14,036	217,570	231,606	0.06	27.88%	24.65%
2063	12th Lane Sehar	71.9%	90.3%	516,571	206,312	722,883	2.50	2.40%	1.35%
75	Coastal Street	69.6%	89.5%	636,682	208,538	845,220	3.05	2.33%	0.21%
3306	Asma Begum RMU	66.1%	87.1%	685,831	227,375	913,206	3.02	-	0.49%
428	7 - A RMU	22.3%	81.1%	78,193	139,077	217,270	0.56	32.01%	22.43%
11	Glass Tower	40.1%	85.7%	135,994	155,472	291,466	0.87	0.31%	5.14%
1	Defence Pumping	50.5%	87.1%	447,007	310,582	757,589	1.44	1.04%	0.45%

表 16 LESCO、SEPCO の代表 Feeder の供給支障率（30 日間の平均値）

Source: Jizolab

		LESCO								
Circle		1st	2nd	3rd	4th	5th	6th	Kasur	Nankana	
# Of Selected Feeders		15	15	15	15	15	14	15	15	
Power Unavailability (%) (Power Outage)	Max	33.0%	85.3%	71.6%	30.2%	38.2%	52.2%	58.6%	26.2%	
	Average	9.1%	10.4%	21.5%	9.4%	9.6%	12.7%	19.2%	9.5%	
# of Feeders	Min	0.5%	0.2%	0.7%	1.3%	0.0%	1.6%	4.7%	1.0%	
	>= 30%	2	1	7	1	1	2	3	0	
	>= 20%	4	5	13	4	5	3	11	2	

		SEPCO		
Circle		Sukkur	Larkana	Dadu
# Of Selected Feeders		12	15	15
Power Unavailability (%) (Power Outage)	Max	70.6%	62.3%	78.6%
	Average	35.4%	34.7%	44.9%
# of Feeders	Min	12.0%	1.9%	4.4%
	>= 30%	12	18	22
	>= 20%	21	22	25

このように供給支障が多くあるため、結果として分析に使用できるDLCはGroup IIIのみとなった。特に6 DISCOsではデータ欠落が多いため、残念ながらFanのDLC推定は困難となった。

11.AC日負荷曲線 (kW) の推定

11.1. 推定方法 : KEを事例として

(1) AC の正規化 DLC

KE内でもAC保有率が高く、データ欠損も少ない10本のFeeder (表 17参照) を選んで分析する。AC保有率は、29.6~71.9%、平均46.0%である。KEの平均AC保有率が13.6%なので、高AC保有率である。

表 17 KE 高 AC 保有率 (71.9~29.6%、平均 46%) Feeders

Source: Jizolab

Feeder CODE	2063	591	1581	1	3684	1205	11	1215	316	3139
Region	10	30	30	10	30	40	10	40	40	20
	South	Central	Central	South	Central	North	South	North	North	East
IBC	Defence	Shah Faisal	Shah Faisal	Defence	Johar-i	F.B. Area	Clifton	Gulshan	Gulshan	Tipu Sultan
Feeder Name	12th Lane Sehar	MALIR DEFENCE (RMU)	HIGH RISE APARTMENTS	Defence Pumping	GREY HEIGHTS	SHAMIM APPARTMENT	Glass Tower	ERUM DEVELOPER	ORIENT BUILDERS	Salateen
AC ownership (%)	71.9	59.5	53.8	50.5	42.1	41.9	40.1	37.6	32.5	29.6

表 17に示すFeederのDLCについて、FRM - SMの変化分 (冷房負荷) のmax値を100%、min値を0%で正規化したものを図 5と図 6に示す。図 5は10本、図 6は10本の中でもAC保有率の高い4本 (表 17中のブルー地のもの) を描いたものである。

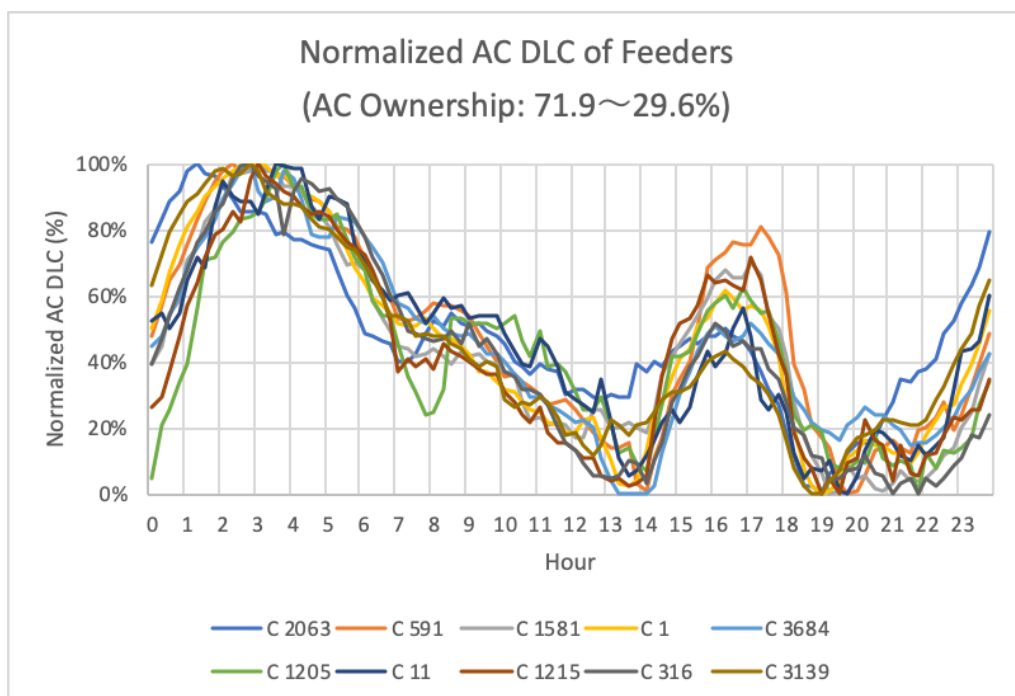


図 5 KE 高 AC 保有率 (71.9~29.6%) Feeders の正規化 DLC

Source: Jizolab

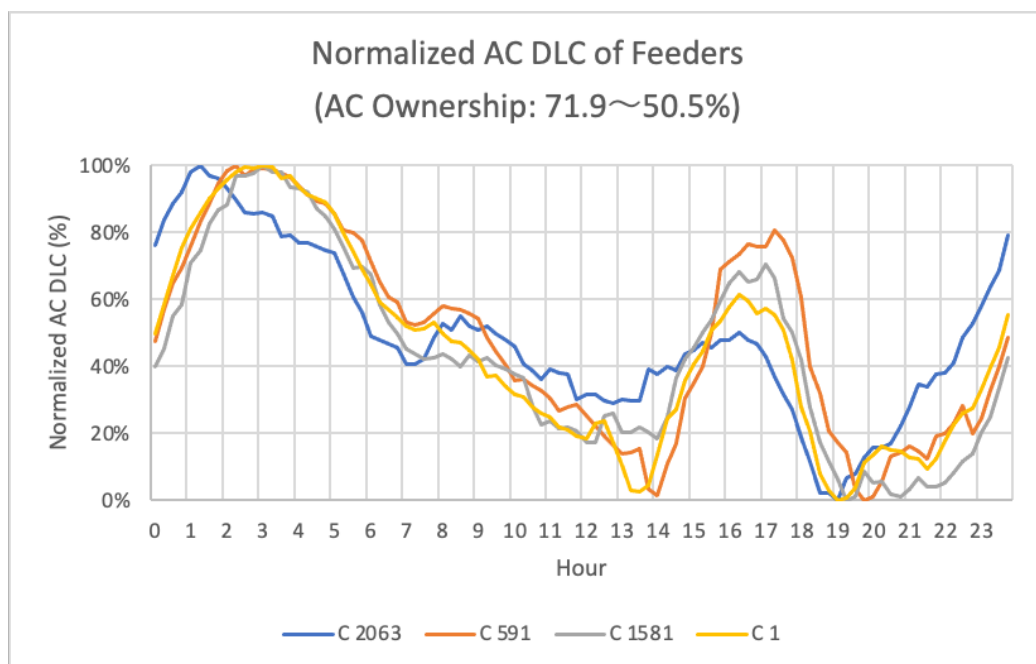


図 6 KE 高 AC 保有率 (71.9~50.5%) Feeders の正規化 DLC
Source: Jizolab

傾向としては、ほぼ似たような動きをしており、1日のピークは深夜、第2ピークは15~16時頃にある。正確にはこのDLCは冷房需要のものだが、形（プロフィール）としては、ACの保有率が高い（Group III）Feederなので、ACのDLCの特徴が鮮明に出ているとみなせる。つまりプロフィールとしては、ACのDLCと言ってよいだろう。

図 5のDLCを用いてACのDLCモデルを作る。まず、AC保有率とピークの出方について検討する。最初に、新たなパラメータを一つ定義する。波形の平均値に対する振幅の比を半分にしたものである。

$$\alpha = \frac{\text{DLC in MWの最大値} - \text{DLC in MWの最小値}}{\text{DLC in MWの平均値}} \times \frac{1}{2}$$

式右辺の第1項分子はDLCのRange、分母はAverageであり、 α はその比を半分にしたものである。

図 7は、10本のFeederについて、横軸にAC保有率、縦軸に α をとり、プロットしたものである。図中の赤線が示すように、ACの α は保有率が高くなると、ほぼ一定であることを示しており、 $\alpha_{AC} \doteq 0.35$ である。台数や保有者が増加すると、当然、DLCのMW変化幅（Range）は大きくなるが、 α_{AC} で見ればほぼ0.35近傍のままだろう。

図 8は16時頃の第2ピークに関するものであり、横軸にAC保有率、縦軸に第2ピークの高さ (%) をとって、10本のFeederをプロットしたものである。AC 保有率が上がれば、第2ピークは高くなる傾向がある。しかし、第2ピークが第1ピークを超えることはない。

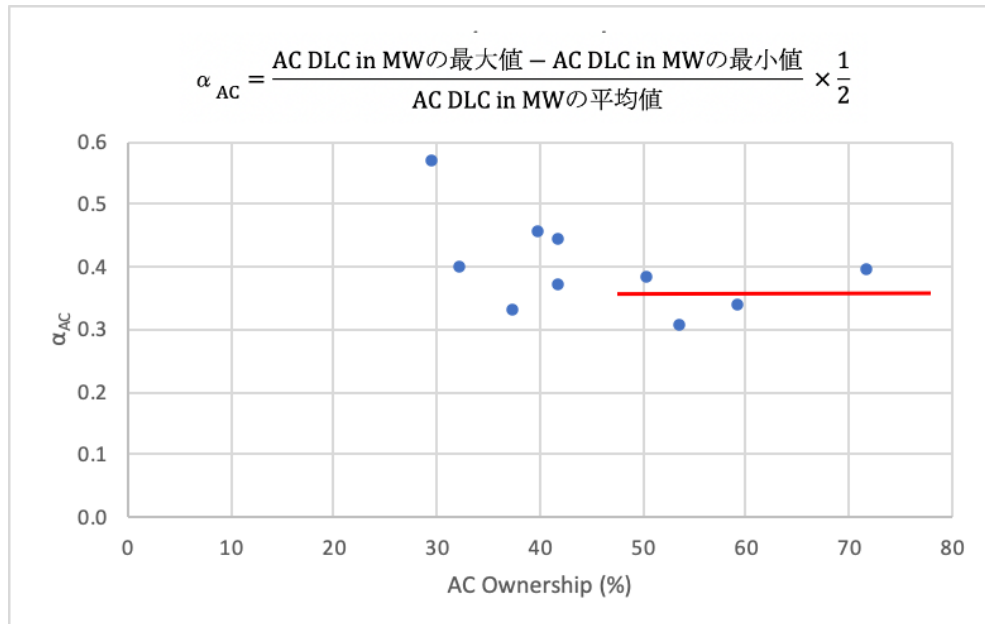


図 7 KE AC 所有率と α_{AC} (第 1 ピーク @深夜) の関係

Source: Jizolab

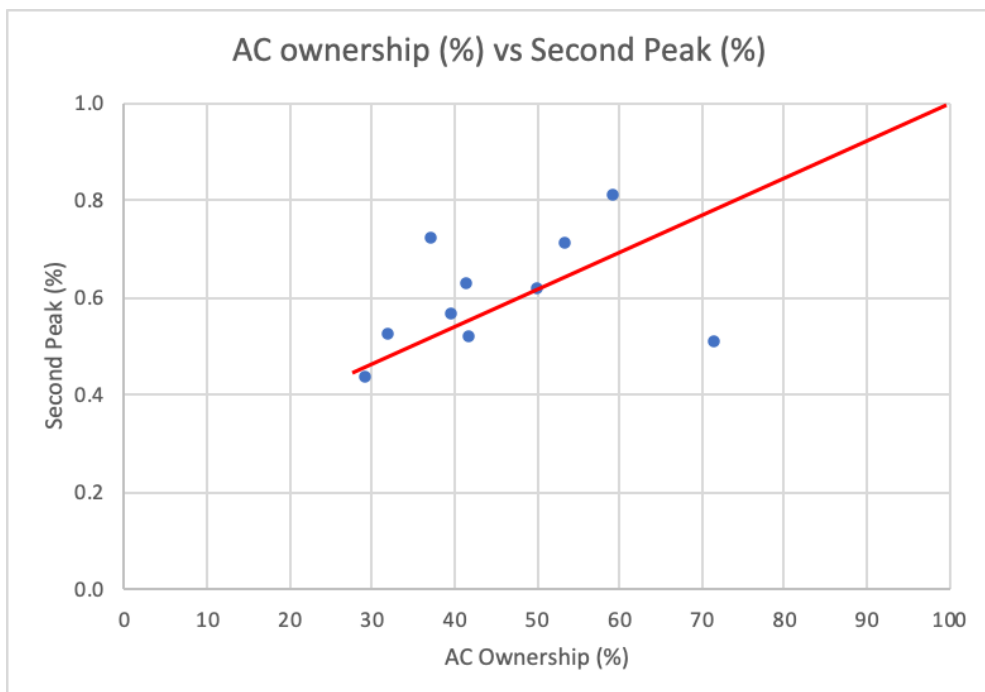


図 8 KE AC 所有率と第 2 ピーク (16-17 時) の高さの関係

Source: Jizolab

(2) AC DLC モデルの作成

図 5の正規化DLCを平均化したDLCを作り、これをACのDLCモデルとする¹⁰。そして、これの変化幅に着目して整理する。

ACDLCモデルの上部と下部の面積が等価（50%）になるような上下区分値 β_{AC} を求めると、 $\beta_{AC} = 0.46$ になる。DLCの β_{AC} の位置がX軸になるように、DLCを下に平行移動して描いたものが図 9である。ここでは、X軸の上と下の面積は等しくなっている。

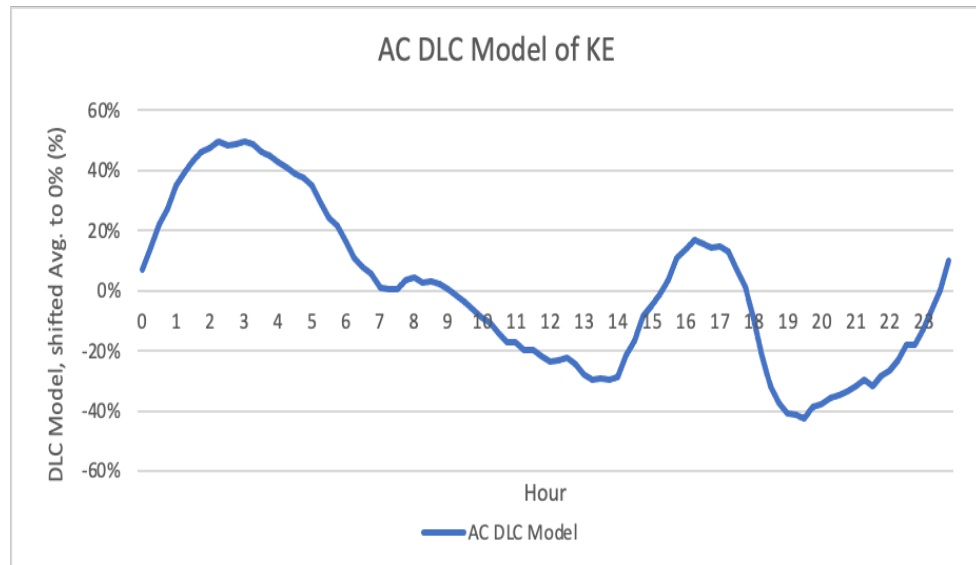


図 9 KE AC DLC モデル（平行移動後）

Source: Jizolab

(3) AC DLC の推定

この平行移動後のAC DLCモデルと、kWh分析で得た1日の消費電力量（MWh）情報と組み合わせることにより、MW のAC DLCを推定する。

ACの電力消費量を、1日24時間の長方形（高さ1）¹¹を赤線で描き、その上辺に図 9のDLCの上半分と下半分の面積が等しくなる%を0%に平行移動したものを合わせて描くと、このDLCの下の面積（ゼロは赤枠下辺、上はDLCという曲線を1日24時間にわたり積分）も赤枠長方形の面積と等しく、1日の消費電力量となる。波形のmax-min は元の長方形の高さを1とすると、ACの振幅は $=35\% * 2 = 70\%$ 、Fanは $32\% * 2 = 64\%$ 程度となる。このようにして描いた図 10がACのDLCとなる。

¹⁰ 複数本の Feeder を平均化するので、振幅は 0 -100%ではなくなる。

¹¹ AC の正規化 DLC の波形を 24 時間積分すると 1 日分の消費電力量になるが、どの高さに DLC を置くかを決めるために、kWh データから出した 1 日分の推定 AC 電力消費量（平均値）を正規化した上で突き合わせる。そのために、推定 AC 電力消費量（平均値）の高さを 1 にする。

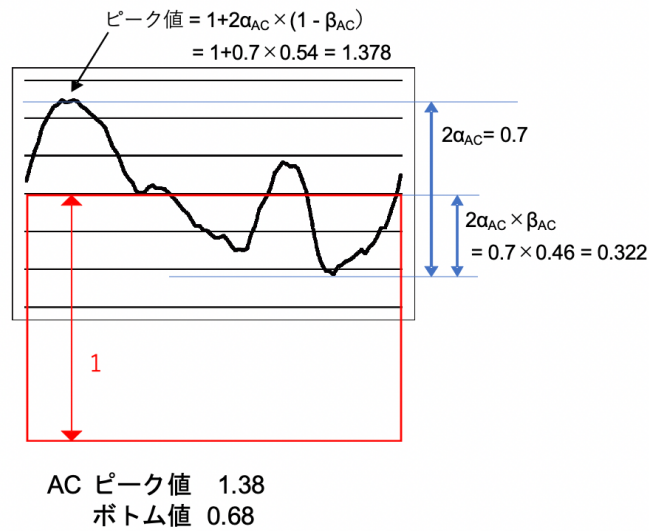


図 10 AC の 1 日平均消費電力量と AC DLC モデル
 Source: Jizolab

KE全体 (Company) のACのDLCを、縦軸をMW単位で求めるには、図 10の赤枠長方形の面積 (1x 24h) と実際の1日当りのAC電力消費量 (kWh)¹²の比を黒線DLCの値にかけることになる。推定されたACのDLCを図 11に示す。

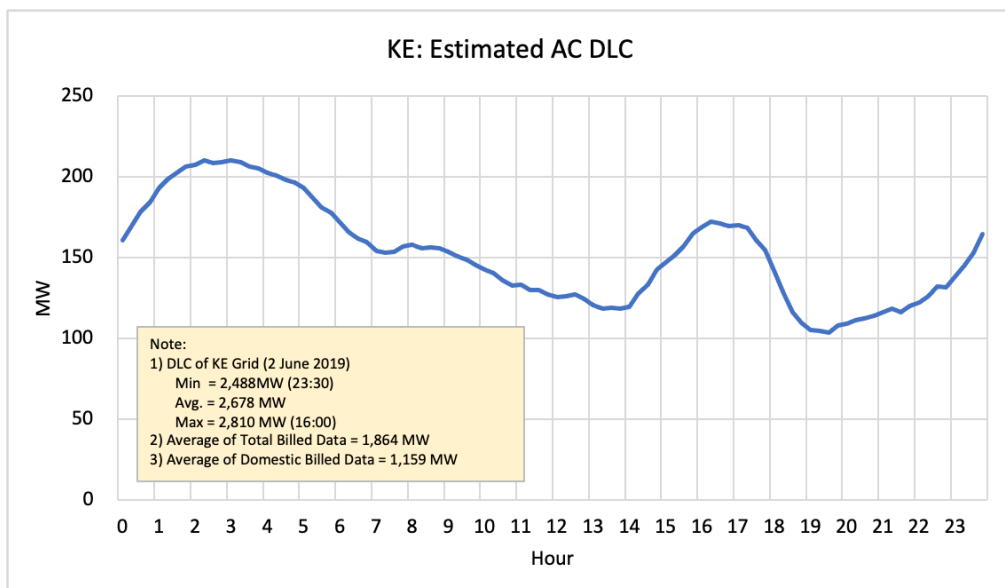


図 11 KE における AC の DLC (MW)
 Source: Jizolab, KE

ACのDLCは、KE全体DLC (2019年のピーク日、6月2日の平均値は2678MW) の4~8%であり、KE系統全体の中で電力負荷としてのACはまだ大きなものとはいえない。負荷ピーク

¹² KE 全体での AC 消費電力量は平均すると 110,129 MWh/日である。

出る時間帯を見た場合、KE系統では16時頃に対し、推定したAC DLCでは2～4時となっている。

なお、KEについてはGroup IIのFeederデータを用いて、FanのDLCも推定できたが、これについては割愛する。

(4) 推定結果についての留意事項

FeederのDLCデータを基に、KE全体のAC DLCを推定するためには、kWhの情報を活用せざるを得ず、この局面で、平均的データ（月の1/30）を使うことになる。従って、AC DLCのピーク絶対値やその時刻は、信頼のおけるものとはいえない。平均的なDLCの形を示唆しているだけである。

11.2. 6 DISCOs

(1) AC の正規化 DLC

AC保有率が高く、データ欠損も少ないFeeder（表 18参照）を選んで分析対象とした。AC保有率は、16.3～49.1%、平均33.1%である。なお、適切なFeederが少数の場合は、同一Feederの異なる日のデータを選定したものもある。

11 (1) 節に示したKEの場合と同様の分析を行なった。表 18に示すFeeder データからFRM-SMのDLCを描いたものを図 12～図 17に示す。

11.1 (1)節で述べたように、このDLCは冷房需要のものだが、形（プロフィール）としては、ACの保有率が高い（Group III）Feederなので、ACのDLCの特徴が鮮明に出ているとみなし、このDLCの形をAC DLCのプロフィールとする。

(2) AC DLC モデルの作成

図 12～図 17のDLCをDISCO毎に平均化してAC DLCモデルを作るのであるが、HESCO, SEPCOはFeeder数が少なく、平均化してDISCOのAC DLCを出していくのは無理がある。またFESCOについては、Feeder数は平均化できるだけのものがあるが、AC DLCモデルと組み合わせるkWhデータが2 Circle分しかないため、MWのDLCを描くことは難しい。従って、これ以降の分析ではHESCO, SEPCO, FESCOは省き、LESCO, IESCO, MEPCOについて行う。後者3 DISCOのAC DLCモデルをまとめたものを図 18に示す。DISCO間で若干の差異があるが、傾向としては概ね同様のプロフィールである。

表 18 6 DISCOs の高 AC 保有率 Feeders (16.3~49.1%、平均 33.1%)

Source: Jizolab

DISCO	LESCO								Average
No.	1	2	3	4	5	6	7	8	
Circle Name	S.E. 2ND CIRCLE				S.E. 5th				
DIV Name	ALAMA IQBAL		JOHAR TOWN	SHAHPUR	CANTT	DEFENCE	KOT LAKHPAT	GULBERG	
Feeder Name	RAVI	MEHRAN BLOCK	JOHAR TOWN	MUSTAFA	CAVALERY	N-BLOCK DHA	WAK GAS	FAISAL TOWN	
AC%	41.8	41.3	37.5	37.4	49.1	48.9	48.7	39.0	43.0

DISCO	IESCO					Average
No.	9	10	11	12	13	
Circle Name	ISLAMABAD			RAWALPINDI CITY		
DIV Name	SLAMABAD-II		ISLAMABAD-I	WESTRIDGE	PINDI CANTT.	
Feeder Name	G-11/1	G-11/3	G-6	NEW RACE	N.P.F-I	
AC%	38.5	34.6	33.9	44.8	36.3	37.6

DISCO	MEPCO						Average
No.	14	15	16	17	18	19	
Circle Name	MULTAN		D.G. KHAN		SAHIWAL	RAHIM YAR KHAN	
DIV Name	B.ZAKRIA		D.G. KHAN		SAHIWAL	RAHIM YAR KHAN	
Feeder Name	SABZA ZAR		KHAYBANA SARWER	EID GAH	TARIQ BIN ZAID	CITY NO.3	
AC%	27.1	27.1	20.0	16.3	30.6	24.1	24.2

DISCO	FESCO						Average
No.	20	21	22	23	24	25	
Circle Name	Cicle 1st			Cicle 2nd			
DIV Name	ABDULLAHPUR			PEOPLES COLONY		G.M ABAD	
Feeder Name	MADNI	NEW MADINA	MUSLIM TOWN	YASRIB	KHIZRA	GULSHAN COLONY	
AC%	32.5	25.1	24.9	23.5	22.5	22.1	25.1

DISCO	SEPCO			Average
No.	26	27		
Circle Name	SUKKUR			
DIV Name	SUKKUR			
Feeder Name	11KV QUEENS ROAD	11KV SHARAH-E-TASNEEM		
AC%	45.0	39.4		42.2

DISCO	HESCO			Average
No.	28	29		
Circle Name	Hyderabad			
DIV Name	QASIMABAD			
Feeder Name	11KV DOABBA			
AC%	31.8			31.8

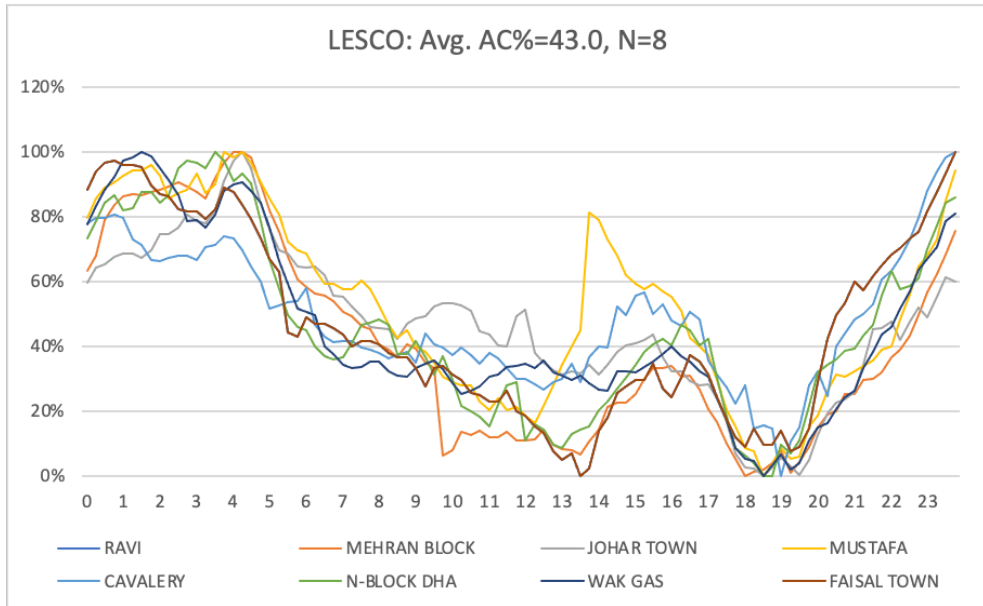


図 12 LESCO の高 AC 保有率 Feeders の正規化 DLC
Source: Jizolab

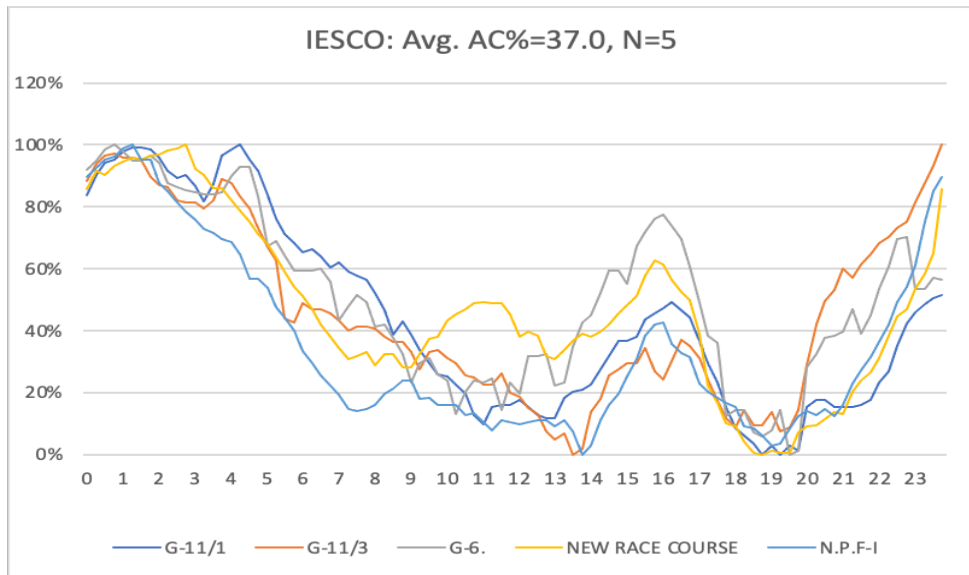


図 13 IESCO の高 AC 保有率 Feeders の正規化 DLC
Source: Jizolab

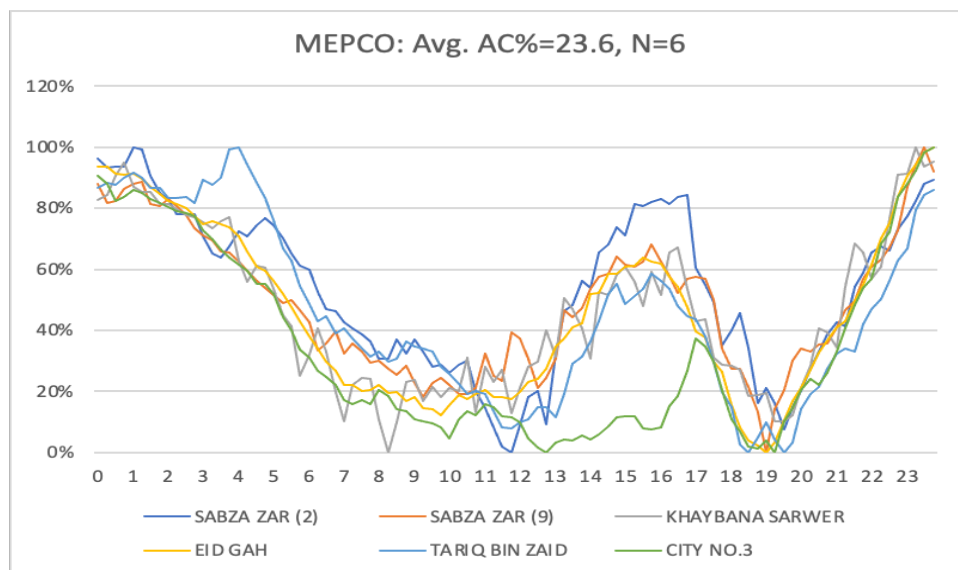


図 14 MEPCO の高 AC保有率 Feeders の正規化 DLC
Source: Jizolab

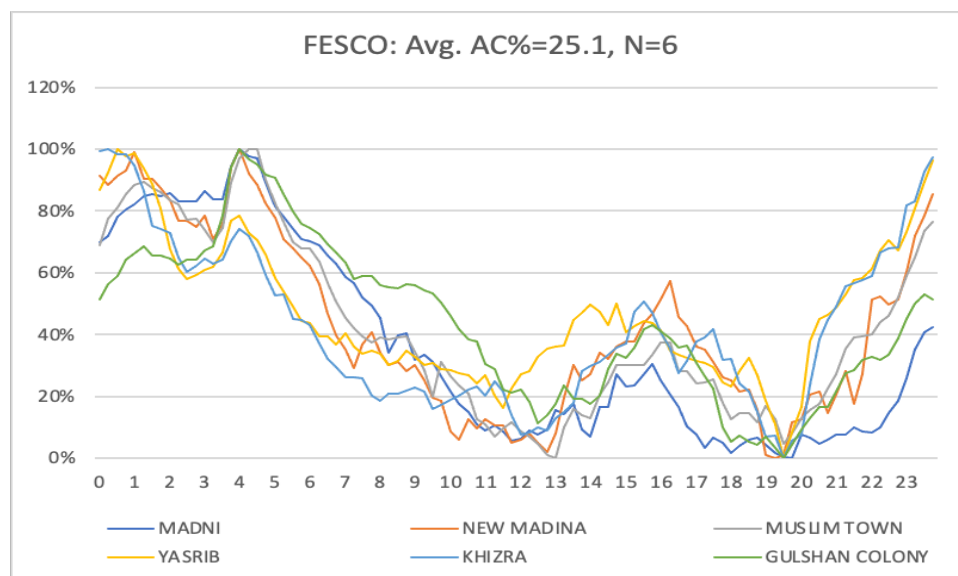


図 15 FESCO の高 AC保有率 Feeders の正規化 DLC
Source: Jizolab

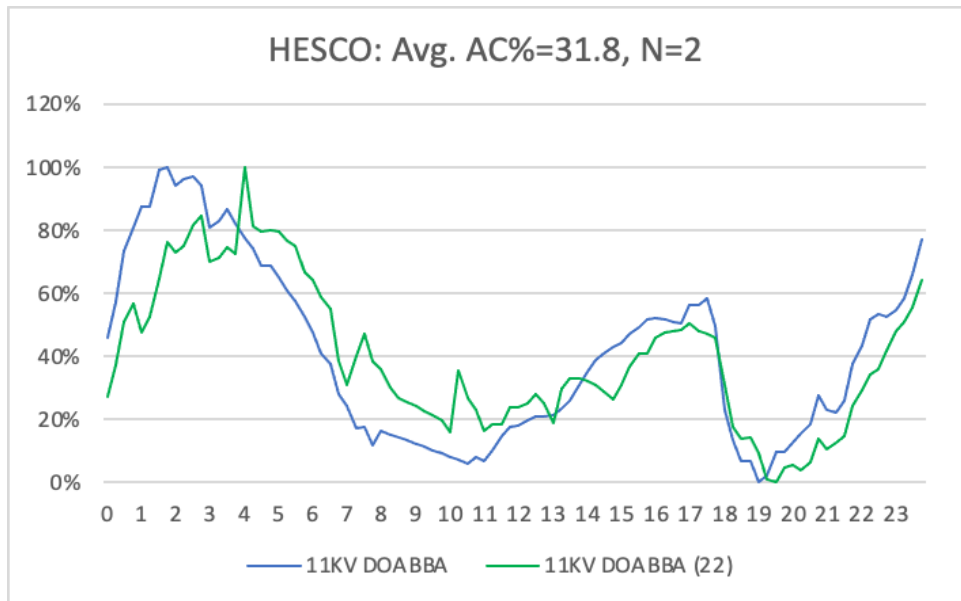


図 16 HESCO の高 AC保有率 Feeders の正規化 DLC
Source: Jizolab

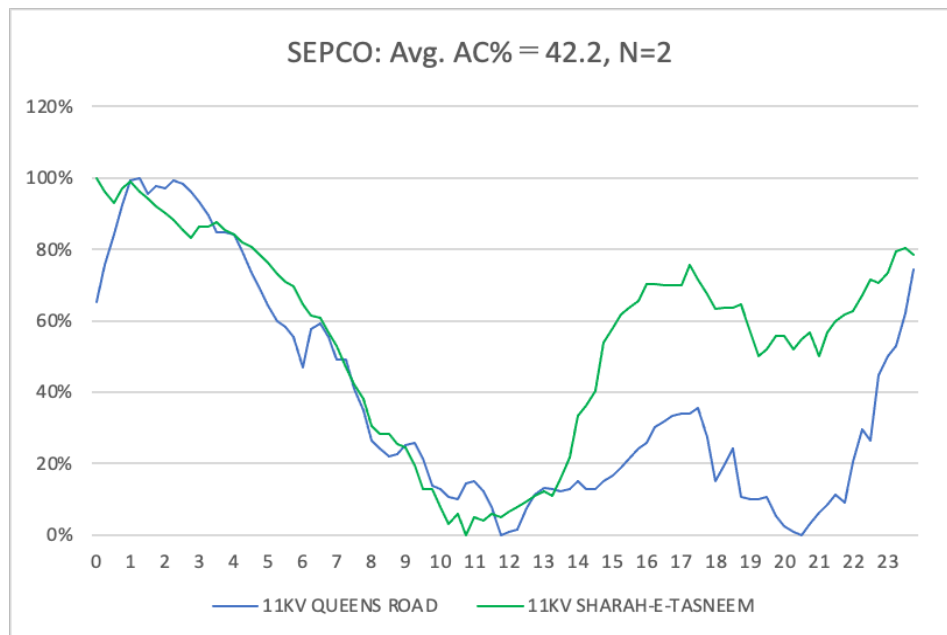


図 17 SEPCO の高 AC 保有率 Feeders の正規化 DLC
Source: Jizolab

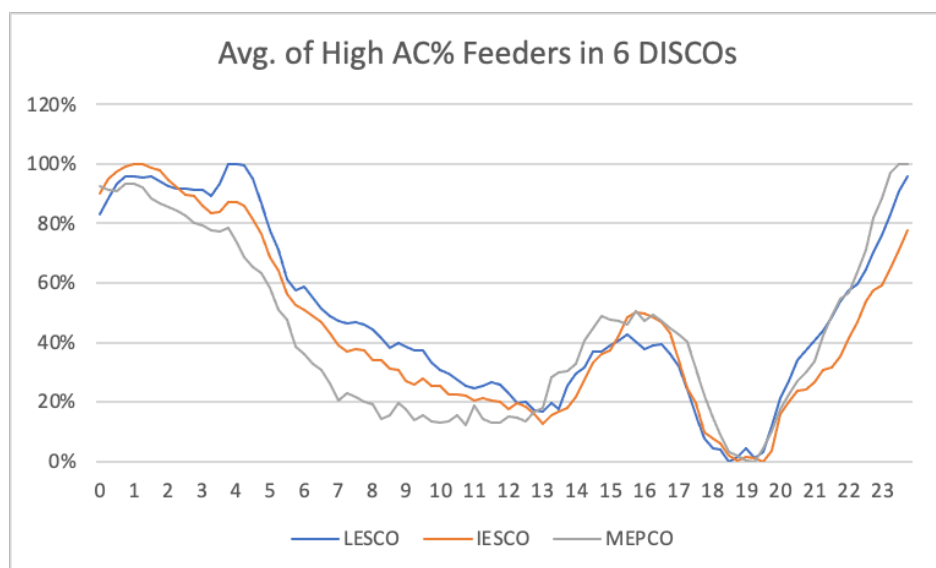


図 18 LESCO, IESCO, MEPCO の AC DLC モデル

Source: Jizolab

(3) AC DLC の推定

LESCO, IESCO, MEPCO 3 社の AC DLC (MW) 推定結果を、図 19～図 21 に示す。

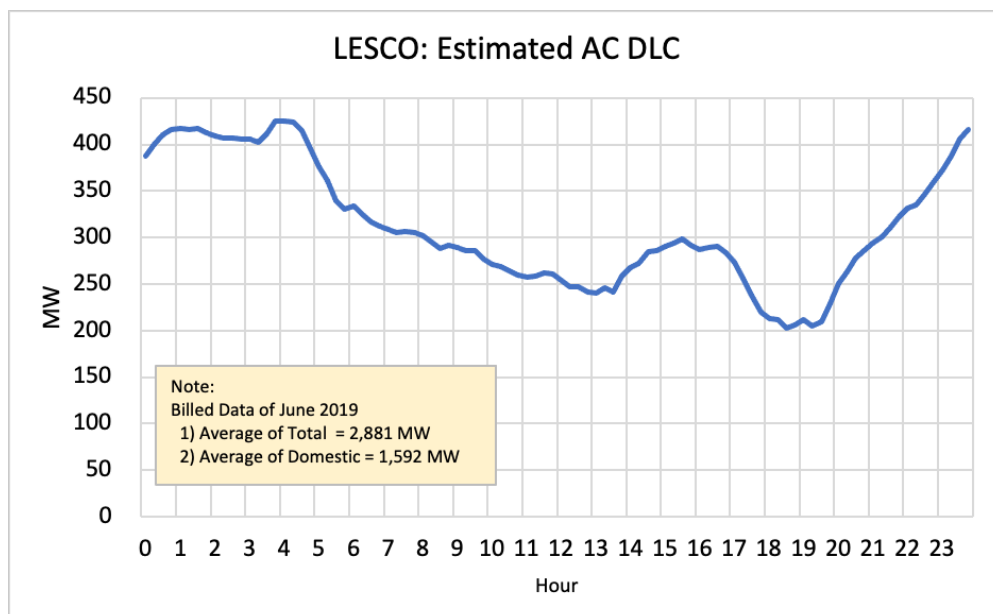


図 19 LESCO の AC DLC

Source: Jizolab

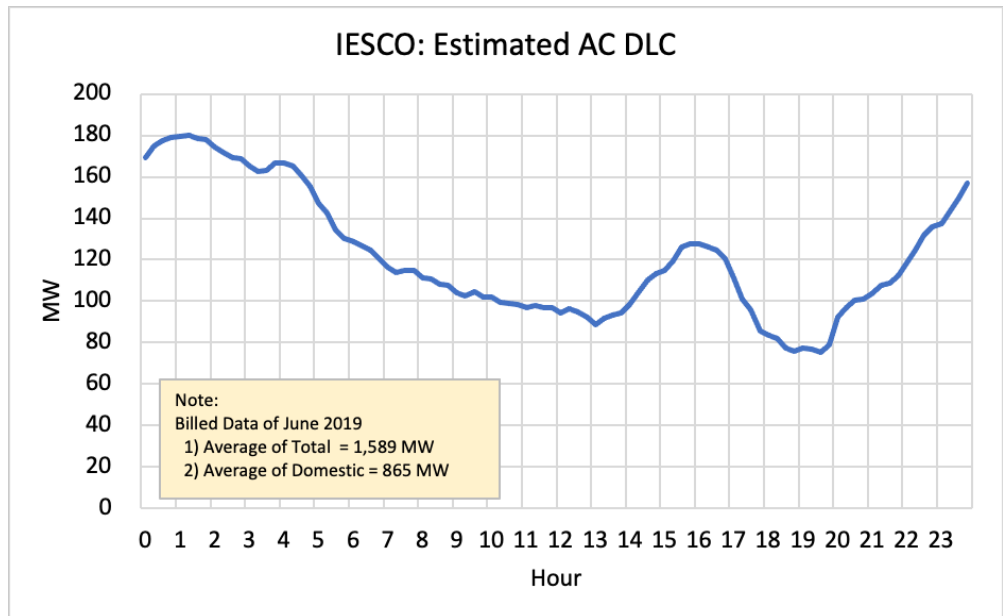


図 20 IESCO の AC DLC

Source: Jizolab

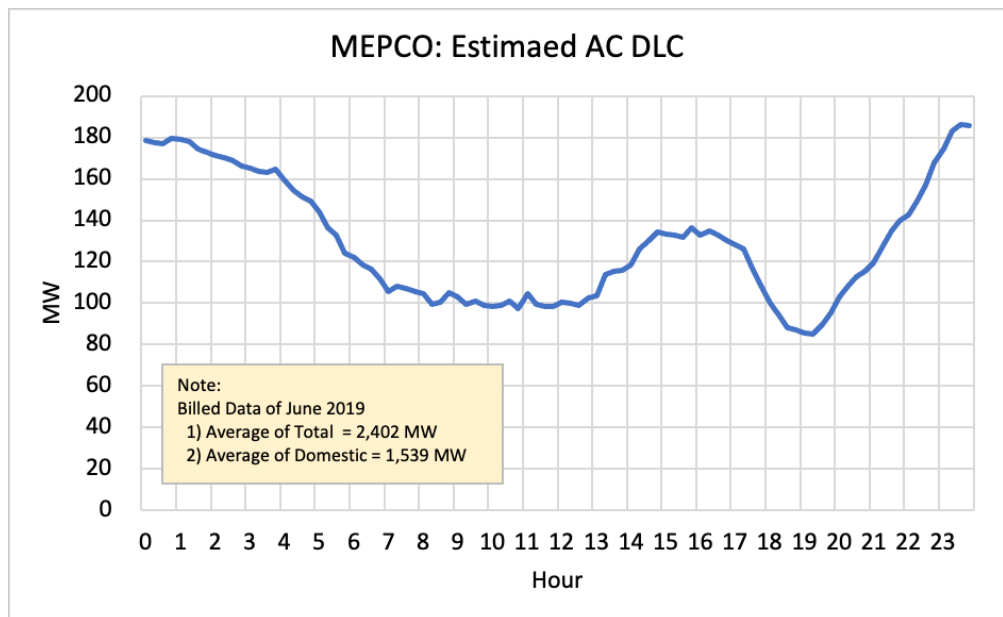


図 21 MEPCO の AC DLC

Source: Jizolab

PEPCO傘下のDISCO 10社のうちAC DLCを推定できたのは3社のみであったため、NTDCのピーク日との比較は残念ながらできていない。しかしながら、この3社の結果から推定すると、AC負荷は系統全体の10%以下であろう。

共通する大きな特徴は、深夜帯に大きな負荷が生じていることである。第2のピークは夕方16-17時頃に発生している。時間帯別料金制度では、夏季は19~23時の料金単価が高いため、第2ピーク後深夜まで負荷が小さくなっているのではないかと想像している。

NTDCのピークは15-18時頃に発生しており、ACの第1ピークとは時間が大きくずれている。今後ACが増え、電気料金よりも快適性を求める生活になると、第2ピークが大きくなっていくのではないだろうか。

添付資料 9-2

Vision, Strategy and Action Plan on ES&L

1. Vision

1.1. NEECA Message

“Save Energy, Mottainai!” was proposed as a vision. The followings are other options. NEECA shall discuss these at a later date.

- Mottainai! Think Conservation
- Smart Choice, Mottainai!
- Mottainai! Wisely Use Energy



“mottainai” is a Japanese concept and word. Kōjien, widely considered the most authoritative Japanese dictionary, lists three definitions for the word “mottainai”:

- 1) inexpedient or reprehensible attitude towards a god, buddha, noble or the like
- 2) awe-inspiring and unmerited/undeserved, used to express thanks
- 3) an expression of regret at the full value of something not being put to good use

In contemporary Japanese, mottainai is most commonly used in the sense of 3) or 2). “mottainai” is commonly interpreted as wasteful or excessive spending. However, it contains respect to everything in its intrinsic nuance, as shown in 3), that is, to be regrettable to lose without making full use of the original ability and its potential usage.” It’s not an economical word, and a sense of esteem and respect for the importance, value, and dignity of everything. When this dignity is damaged or is likely to be damaged, a Japanese feels “mottainai” with sorry, regret, remorse, apology, and thanks. It is a desire to let it (and energy) exert its value and ability to the fullest.

This word became famous by the Kenyan activist, government minister and Nobel laureate Dr. Wangari Maathai. In her speech at the UN¹, she said that “even at personal level, we can all reduce, re-use and recycle, what is embraced as Mottainai in Japan, a concept that also calls us to express gratitude, to respect and to avoid wastage”. We find she understands the meaning truly, since she included the words “gratitude” and “respect”.

Much primary energy used to generate power is not sustainable now. We need to use it with a feeling of “mottainai”. Such a life and way to live will bring us to a society which cherishes limited natural resources

¹ <https://web.archive.org/web/20110601034605/http://www.un.org/wcm/webdav/site/climatechange/shared/Documents/SpeechMaathai.pdf>

and uses them much more rationally. This coincides with the SDGs proposed by the UN.

1.2. Objectives

In “Strategic Plan (2020-2023)”, NEECA shows Key Performance Indicators of Energy Saving by ES&L as follows:

Appliances	Saved Energy by 2023	Funds Required (PAK Rs.)	Remark
Cook Stove	0.08 MTOE	60 million	
Electric Fan	0.10 MTOE	18 million	
AC and Fridge	0.10 MTOE	10 million	
Lighting	0.10 MTOE	10 million	
Motor	0.10 MTOE	10 million	
Total	0.48 MTOE	108 million	

Objective on ES&L scheme shall be 0.48 MTOE energy saving by 2025.

2. Strategy

2.1. Expand scope of target appliances

Target appliances to be covered by the Mandatory ES&L Scheme shall be expanded. Based on the market survey, penetration rate and energy efficiency, added appliances shall be carefully selected.

Even for existing target appliances, expansion of the scope shall be investigated. E.g., as for household refrigerating appliances, there are various types of refrigerating appliances. The current scope of the MEPS and Labeling regulation covers only two (2) door refrigerators/freezers. To increase coverage of the regulation, NEECA needs to develop MEPS and Labeling regulations of one (1) door refrigerators, freezers, and other refrigerating appliances to maximize the effect of the regulation.

2.2. Change target appliances

Technological innovation is recently very rapid. An appliance may be obsolete because of technological innovation. For example, Compact Fluorescent Light bulbs (CFL) have been replaced by LED lamps. It is necessary to take note of technology trends and revise the list of target appliances.

2.3. Enhance accredited testing laboratory and its capability

The most urgent necessary action is to establish an accredited AC testing laboratory. Testing laboratories at PCSIR should be enhanced. To have the capability to conform the verification tests, existing test facility should also be expanded. E.g., the capability of PCSIR’s test facility for refrigerator may be around 15 - 20 units/year.

2.4. Partnership with private sector

Success of the energy conservation scheme depends on the harmonization between NEECA and the private sector, including manufacturers, importers, and retailers. Keeping communication with them is essential to improve/modify/enhance the scheme.

2.5. Cooperation with Designated Agencies

Pakistan is wide and NEECA has limited personal resources. It is necessary to cooperate with provincial governments, i.e., Designated Agencies. Since, especially, PEECA is going to have an AC testing laboratory, work in closer cooperation with it will be very important. Expansion of similar networks in other provinces is also highly expected.

2.6. Training and capacity building of NEECA and Provincial Agencies

Implementing establishment of an institutional system concerning energy conservation through strengthening of support for the development of personnel resources including the dispatch of Japanese long-term experts to Pakistan and the reception of trainees to training courses in Japan, etc.

2.7. Public Procurement in Federal and Provincial Government

In Japan, it is widely acknowledged that whoever suggests something should be the first to start (先ず隗より始めよ). This word comes from China (启动比隗). When a government promotes something, it should be the first to do it. That is, public procurement of labeled product by federal and provincial governments is very important to enlarge/promote the ES&L scheme.

2.8. Maintain integrity of the ES&L scheme

Trust for the energy label is of the utmost importance. To keep the integrity of the scheme, market surveillance should be made continuously. The initial step is to establish a surveillance team within NEECA.

2.9. Incentives

According to NEECA's Strategic Plan (2020-2023), as an incentive for consumers to purchase energy-efficient products with many stars, a distribution company to lend the purchase cost of the appliance with a low-interest loan and then collect the repayment with the electricity bill (On-bill Financing) is planned. (Budget total 100 million rupees)

In future, Export Promotion (incentive) Programs for highly efficient appliances shall be investigated. Tight cooperation with MoI&P shall be established.

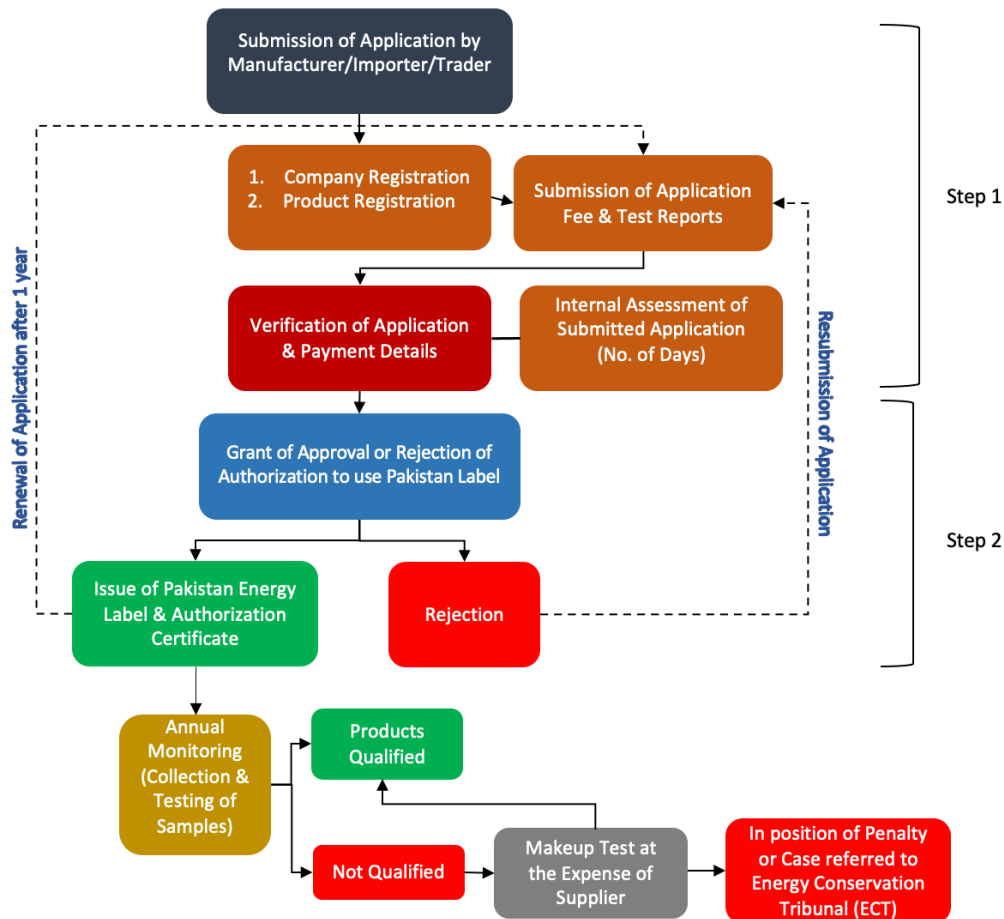
2.10. Evaluation of the impact of ES&L

Get feedbacks on ES&L scheme always, and improve the scheme based on evaluations of scheme. It is recommended to publish annual progress report which shows saved energy.

3. Action Plan

3.1. Overall Flow Chart of Rules & Regulations of Energy Standards

Overall Flow Chart of Rules & Regulations of Energy Standards is proposed as shown below.



3.2. Develop online product registration system

NEECA is developing an online product registration system (PRS) only for LED lighting products. Product registration of other appliances, such as, room air conditioners and household refrigerating appliances may be started by an Excel based manual registration system. Taking into consideration the reduction of required personnel resources of NEECA and applicants, NEECA needs to transfer the product registration system from a manual to an online system as soon as possible.

However, NEECA needs to consider institutional and financial scheme to maintain and update the online system continuously when NEECA develops the online system for another appliance. In particular, continuous updating of hacking blocking system is critically important for an online system. Additionally, NEECA shall have a common online system which can be used by all appliances under MEPS and Labeling regulations. Therefore, applicability of the system to various type of appliances is required.

3.3. Establishment of registered product database

NEECA should establish a registered product database to confirm compliance of the MEPS and Labeling regulations efficiently. The database shall be linked to the PRS, which includes specifications of each product. To maintain up-to-date data, NEECA requests the registered companies to submit quarterly reports (every three (3) months) on production, import and sales of the registered product. This indicates the number of the registered product of a particular model sold in the market. This also indicates availability of a particular model in the market for verification tests.

NEECA examines the consistency of these data with provision of security tags for each model.

3.4. Enhance monitoring, verification and enforcement system

Consumer's trust in 5-star labels of appliances is the key to success of MEPS and Labeling regulations. NEECA needs to establish reliable enforcement scheme of the MEPS and Labeling regulations from product registration, monitoring, market surveillance including verification test and enforcement measures such as penalties for non-compliant companies.

3.4.1. Market surveillance

NEECA should carry out market surveillance periodically, under collaboration with provincial governments, to confirm the registered products in shops, brochures, or internet sites, which carry the labels that are compliant with the requirement of the MEPS and Labeling regulations.

NEECA shall cancel the model's registration, if the model does not display the label directed by the MEPS and Labelling regulations properly. NEECA may also consider additional enforcement requirements. The registered companies shall withdraw all stock from the market immediately.

NEECA may impose fines under section 18, National Energy Efficiency and Conservation Act, 2016 (the Act) to a manufacture, importer etc., if the model does not display the correct label. The manufacture, importer etc. shall withdraw all stock from the market immediately.

3.4.2. Verification test

NEECA carries out verification tests on registered models based on risk-based sampling such as complaints from consumers, manufactures etc., market surveillance and quality management of manufactures etc. All verification tests are carried out in accordance with the applicable test standards and parameters. NEECA requests the verification test to a PNAC accredited third party testing laboratories.

3.4.3. Conformance of verification test

A registered model is deemed to have passed the verification test if the energy performance obtained through the test falls within the conformance limits. Examples of conformance limits for room air conditioners and household refrigerating appliances is specified in Appendix 1 and 2.

3.4.3.1. Procedure of verification test

NEECA carries out risk-based sampling in the market and buys models from the market for verification tests.

Manufactures and importers of labeled appliances, whose model is to be tested, shall provide information on the test mode which is required by the testing laboratory.

If the model fails to pass the verification test, the registered company of the model is notified and given an opportunity to decide either to cancel the registration of the model or to request NEECA to carry out a second check testing of the model at the registered companies' expense.

In the case of a second verification test, NEECA buys three (3) samples of the same model from the market and test the samples. NEECA informs the registered company of the models about the date of the second check test so they are able to witness the test.

The model shall be considered to comply with the MEPS and labeling requirements, if the average of the three samples is within the conformance limits shown. NEECA notifies the registered company and no further action is taken.

NEECA shall cancel the model's registration, if the model fails to pass the second verification test. NEECA may also consider additional enforcement requirements. The registered company shall withdraw all stock of the failed models from the market immediately.

Registered companies are allowed to apply the model registration after correcting the label level.

To implement reliable verification tests, NEECA shall request the following to testing laboratories.

- Develop common agreement on practice of measurement of energy consumption between accredited testing laboratory and inhouse testing laboratories of manufactures and importers through continuous round robin tests and analysis of differences of testing results between them.
- Expand capacity of accredited testing laboratories for verification tests.
The market of appliances in Pakistan is growing year by year. It is necessary to expand capacity of accredited testing laboratories to be able to carry out a high enough number of samples to be tested.

3.5. Cooperation with Custom office

NEECA should communicate with Customs and the Federal Bureau of Revenue, on the import of appliances and ask Customs to prohibit the import of products without product registration under Section 10 (c) of the Act.

3.6. Enforcement

The NEECA act provides the measures to enforce the MEPS and Labeling regulations as follows. NEECA shall use these measures to enforce the MEPS and Labelling regulations effectively.

<p>Article 15. Powers of inspection</p> <p>(1) The designated agency may appoint, after the date of commencement of this Act, as many inspecting officers as may be necessary for the purpose of ensuring compliance with energy consumption standards specified under section 10 or ensure display of particulars on label on equipment or appliance specified under clause (b) of section 10 or for the purpose of performing such other functions as may be assigned to them.</p> <p>(2) Subject to any rules made under this act, an inspecting officer shall have power to –</p> <p>(a) inspect any operation carried on or in connection with equipment or appliance specified under clause (b) of section 10 or in respect of which energy standards under clause (a) of section 10 have been specified.</p> <p>Remaining paragraphs of this section are omitted.</p>
<p>Article 16. Powers to issue directions.</p> <p>The Federal Government or a Provincial Government may, in exercise of its powers and performance of its functions under this Act and for efficient use of energy and its conservation, issue such directions in writing as it deems fit for the purpose of this Act to any person, officer, authority or any designated consumer shall be bound to comply with such directions.</p> <p>Explanation. - For the avoidance of doubts, it is hereby declared that the power to issue directions under this section includes the power to direct-</p> <p>(a) regulation of norms for process and energy consumption standards in any industry or building complex, or</p> <p>(b) regulation of energy consumption standards for equipment and appliances.</p>
<p>Article 18. Imposition of fine.</p> <p>(1) Failure on part of any person to comply with the provisions of this Act shall constitute an offence, which shall entail a fine commensurate with the gravity of offence, as determined by the Board from time to time.</p> <p>(2) The amount of fine imposed, in case of default, shall be recovered as arrears of land revenue.</p>

3.6.1. Periodic review and update of the standards

NEECA should review MEPS and Labeling standards every 2 years in terms of technology, market trends and amendment of testing standards.

1) Technology

Energy efficiency of appliances is improving continuously via technological development. Taking into consideration the strong needs for energy saving to mitigate climate change in the world, manufactures are competing to improve energy efficiency of these appliances. Therefore, NEECA should always watche the latest energy efficiency technology and make updates to MEPS and Labeling regulations when required.

2) Market trends

Consumer choice of appliances may change via the willingness of payment and provision of more attractive appliances. E.g., the market share of inverter driven room air conditioners is

sharply growing in recent years. Additionally, the market share of frost-free refrigerators is growing gradually year by year. MEPS and Labeling regulations should be updated considering these market trends.

3) Amendment of ISO/IEC standards

Testing standards of ISO/IEC are frequently amended or updated to improve the accuracy of energy efficiency tests. PSQCA should apply these international standards to Pakistan standards immediately and NEECA should use the latest testing standards for MEPS and Labeling regulations.

3.7. Enhance awareness campaign and consumer education

3.7.1. Approaches

To extract public awareness, the following approaches shall be considered and introduced.

- Besides SNS campaign, tv/cable tv commercial, advertisement in the train, bus and airplane
- Periodical public awareness campaign (once a year, e.g., Energy Saving Month)
- To cooperate and utilize valuable influencers
- To expand collaboration with donors in Pakistan (USAID, GEF, WB etc.)
- To expand collaboration with provincial government and NOGs (WWF Pakistan, woman's groups, youth groups, etc.)
- Focus to women and young generation as a target
- Investigate to use religious sector

3.7.2. Consumer education

Prevention of global warming is now a global concern, also in Pakistan. In addition, energy saving (especially electricity) contributes to global warming and reduce electricity energy consumption. Therefore, education of energy conservation needs to be enhanced as a countermeasure for the future.

- Enhancement of energy-saving education for elementary and junior high school students.
- In addition, women are key people to keep their homes by using refrigerators and other appliances at home. Therefore, to provide energy conservation education for women, it is necessary to implement energy conservation education for female groups.
- It is also necessary to expand energy conservation to non-young people and other than women by taking advantage of government's energy conservation education campaign opportunities.
- Development of energy saving education tool (software used in mobile/pad) and use in elementary and junior high school.
- Contents shall be translated from Urdu to other regional languages in the second stage.

3.8. Incentives to more star appliances

Government and provincial government should have clear procurement policy to buy more star appliances to encourage providers to supply more energy efficient appliances as well as to reduce electricity cost of government sector.

- To establish system to increase incentive of consumers to buy energy effective appliances (ACs, fridges), for example, giving the points which can be used to purchase other small appliances (purchase point system) and governmental finance support to consumers to buy energy efficient appliances.
- To expand the purchase class from high income class to middle income class and for that purpose, purchase point system and government financial support to buy energy efficient appliances are necessary.
- To promote discount sales of retailers and wholesalers

Reference

- 1) Statement by Prof. W. Maathai, Nobel Peace Laureate, on behalf of Civil Society
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- 2) Mottainai, <https://en.wikipedia.org/wiki/Mottainai>
- 3) Energy-Efficiency Labels and Standards: A Guidebook for Appliances, Equipment, and Lighting, 2nd Edition, CLASP, 2005
https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwivraHErKb0AhUZSPEDHcP6BC8QFnoECAMQAQ&url=https%3A%2F%2Fescholarship.org%2Fcontent%2Fqt01d3r8jg%2Fqt01d3r8jg.pdf&usg=AOvVaw0zyljaSW2swf4NU-oe_aB8
- 4) Strategic Plan (2020-2023), NEECA,
[https://neeca.gov.pk/SiteImage/Misc/files/NEECA%20Strategic%20Plan%202020-23%20Final%2028%20October%202020\(1\).pdf](https://neeca.gov.pk/SiteImage/Misc/files/NEECA%20Strategic%20Plan%202020-23%20Final%2028%20October%202020(1).pdf)
- 5) Communication Strategy (2020-2023), NEECA,
- 6) Social Media Strategy (2020-2023), NEECA, December 2020

Appendix 1. Required data for the product registration system (Room air conditioners and refrigerating appliances)

Table 1 Company data

Data	Remarks
Company registration number	
Date of the company registration	
Name of company	
Sales Tax number	
NTN number (National Tax Number)	
Address of the company	
Contact information (name of contact, phone number and e-mail address)	
Type of business	
Type of products which the company wants to register	
ISO 9000 (Quality management systems) certification number (where applicable)	Identify the certification number of individual manufacturing factory and testing laboratory of registered product.

Table 2 Data of registered room air conditioner

Data	Remarks
Product registration number	
Date of the product registration	
Brand name	
Model name and manufactured or imported year	Model name/year
Origin of the country of the product	
Voltage in volt	
Phase	
Rated cooling capacity in kW	
Compressor type	
Rated cooling seasonal performance factor (CSPF)	
Rating of the label standard (No. of Stars)	
Refrigerant type	
Label period	
Rated annual energy consumption in kWh/year	
No. of Manufactured, imported and sold per quarter in unit	
Example: 1/1/2022 to 3/31/2022 manufactured	XXXX units

Table 3 Data of test report of registered room air conditioner

Data	Remarks
1. Testing laboratory	
1.1 Name of the testing laboratory	
1.2 Laboratory address where testing was conducted	
1.3 Contact details (name of contact, phone number and e-mail address)	
1.4 Date of specific tests	
1.5 Relevant accreditation(s) (where applicable)	
2. Client (This part can be skipped, in the case of in-house testing laboratory)	
2.1 Company registration number	
2.2 Manufacture/importer/supplier's name	
2.3 Address of manufacture/importer/supplier	
2.4 Contact name and title	
2.5 Contact details (Phone number and e-mail address)	
3. Test methods	
3.1 Test standards and editions used	
3.2 Test method (to identify "calorimeter test method" or "indoor air enthalpy test method")	
4. Energy consumption of room air conditioner	
4.1 Brand	
4.2 Model	
4.3 Serial number	
4.4 Rated voltage and frequency in volts and hertz	
4.5 Phase	
4.6 Refrigerant	
4.7 Test results for cooling mode	
4.7.1 Tested full capacity – Standard T (35C), in watts	
4.7.2 Tested full power input – Standard T (35C), in watts	
4.7.3 Tested half energy capacity – Standard T (35C), in watts	Variable only
4.7.4 Tested half power input – Standard T (35C), in watts	Variable only
4.7.5 Cooling seasonal performance factor (CSPF), Wh/Wh	

Table 4 Data of registered household refrigerating appliance

Data	Remarks
Product registration number	
Date of the product registration	
Type of product	
Brand name	
Model name and manufactured or imported year	Model name/year
Origin of the country of the product	
Total volume in litre	
Adjusted volume, in litre	
Rated annual energy consumption (CEC) , in kWh/year	
Rating of the label standard (No. of Stars?)	
Appliance type	
Refrigerant type	
Label period	
No. of Manufactured, imported and sold per quarter (e.g., 1/1/2022 to 3/31/2022) in unit	

Table 5 Data of test report of registered household refrigerating appliance

Data	Remarks
1. Testing laboratory	
1.1 Name of the testing laboratory	
1.2 Laboratory address where testing was conducted	
1.3 Contact details (name of contact, phone number and e-mail address)	
1.4 Date of specific tests	
1.5 Relevant accreditation(s) (where applicable)	
2. Client (This part can be skipped, in the case of in-house testing laboratory)	
2.1 Company registration number	
2.2 Manufacture/importer/supplier's name	
2.3 Address of manufacture/importer/supplier	
2.4 Contact name and title	
2.5 Contact details (Phone number and e-mail address)	
3. Test methods	
3.1 Test standards and editions used	
3.2 Applied ambient temperature	
4. Energy consumption of household refrigerating appliance	
4.1 Brand	
4.2 Model	
4.3 Serial number	
4.4 Rated voltage and frequency, in volts and hertz	
4.5 Refrigerant	
4.6 Test conditions (ambient temperature and humidity)	
4.7 Total volume and volume of each compartment, in litre	
4.7.1 Total volume, in litre	
4.7.2 Volume of fresh food compartment, in litre	
4.7.3 Volume of freezer, in litre	
4.8 Adjusted total volume and adjusted volume of each compartment	
4.8.1 Total adjusted volume, in litre	
4.8.2 Adjusted volume of fresh food compartment	
4.8.3 Adjusted volume of freezer compartment	
4.9 Daily energy consumption, in kWh	
4.10 Annual energy consumption, in kWh	

Appendix 2. Conformance limit for room air conditioners and refrigerating appliances

Table 6 Conformance limits

Regulated appliances	Limit	
Room air conditioner	CSPF ² computed from results of the verification test	> 0.9 × rated CSPF which is submitted for product registration.
Household refrigerating appliance	Energy consumption computed from results of verification test	< 1.10 × CEC ³ which is submitted for product registration

² Cooling Seasonal Performance Factor (CSPF)

³ Comparable Energy Consumption per Year (CEC)