Chapter 5

Education and Campaigns

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Chapter 5

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1. Introduction

Energy efficiency and conservation (EEC) is an important agenda in every country's economic development because it contributes to two critical issues common to most economies: energy security and environmental sustainability. As a first step of EEC promotion, a responsible government body should implement its education and campaign programmes. The education and campaign surely contribute to encourage Cambodians to be aware of and acquire interest in EEC. Saving energy, especially electricity through EEC promotion including education and campaigns, can delay the construction of power plants. It can also cost less than generating, transmitting, and distributing electricity from power plants, hence, providing multiple economic and environmental benefits. For EEC programmes to have impact, every aspect of information on EEC activities needs to be disseminated to the whole population nationwide, which includes the business, professional, and academic communities as well as the public.

This chapter discusses various communication and promotion methods for education and campaigns through public and professional forums, printed media with practical EEC information, websites, home energy reporting, school system, etc. EEC activities involve a wide spectrum of methods and technologies, which can be broadly classified as no or low-cost, medium-cost, and high-cost or investment-scale measures. In general, the planning and implementation of education and promotion campaign activities will require both technical input and government administrative effort with commitments.

2. Role of the General Department of Energy

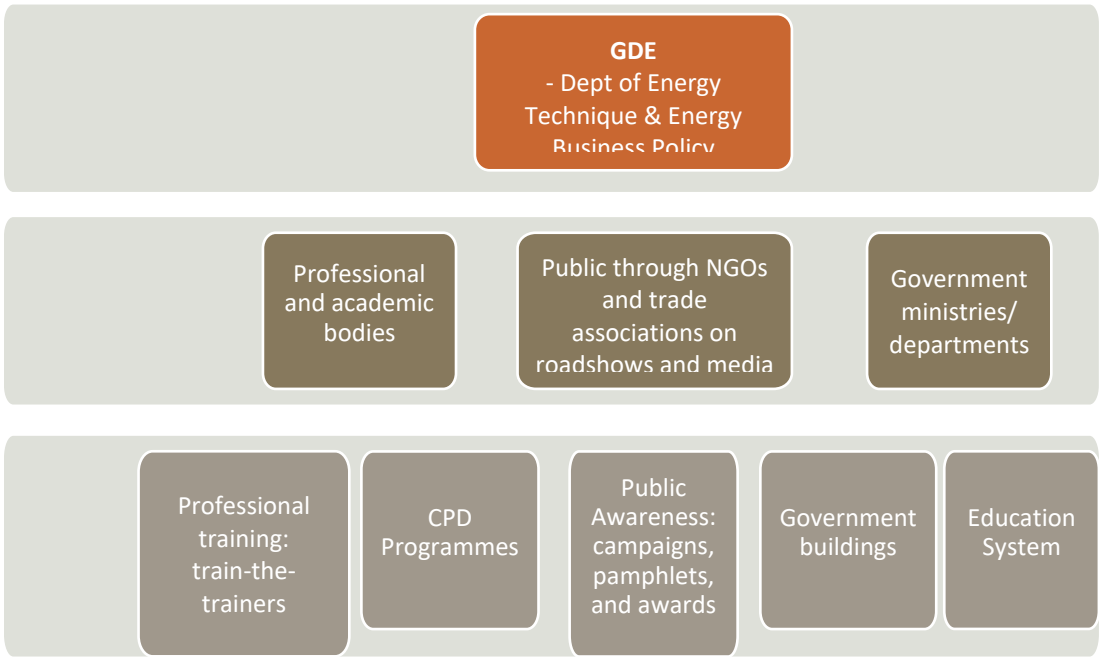
The success of education and campaigns depends on the effective planning and execution of the plans. The functions of the General Department of Energy (GDE) are summarised as follows:

1) Plan education and campaign activities, including estimation of budget and resource requirements.
2) Generate awareness and interest of EEC in the residential, commercial, and industry sectors.
3) Assign a responsible person or a committee to plan and implement EEC education and promotion campaign activities.
4) Generate awareness and interest of EEC in the educational system.

Figure 5.1 shows the structure for GDE's roles in organising and interacting with stakeholders in other government departments, professional and academic bodies, and non-governmental organisations. A consultative approach with these organisations and bodies is recommended, such that (i) the professional and academic bodies will provide input in developing professional training and continuous professional development (CPD) programmes; (ii) non-governmental organisations and trade associations will provide input in developing roadshows and media campaigns; and (iii) other government ministries or

departments will provide input in developing EEC programmes of activities for government buildings and school syllabuses.

Figure 5.1: Structure of GDE's Role in Implementing EEC Education and Campaign



CPD = continuous professional development, GDE = General Department of Energy, NGO = non-governmental organisation.
Source: Author.

3. Content of EEC Education and Promotion Campaigns

There is no single measure to achieve EEC. Therefore, the planning and implementation of EEC education and campaign activities would require a multifaceted approach. This approach can be simplified by categorising various EEC education and campaign activities under clusters of activities (Figure 5.2).

The following describes the various clusters of EEC education and campaign activities:

1) General awareness: The cluster of general awareness campaigns should be targeted mainly at the public and the household sector. This cluster aims to generate basic awareness amongst the public on the needs and simple ways of energy conservation and savings.

2) Fundamentals: The cluster on EEC fundamentals should be introductory targeting at the commercial and industry sectors, especially on 'low-hanging fruits' in the EEC. The objective of this cluster is to introduce the concepts and fundamentals of EEC measures to the business communities in the commercial, residential, and industry sectors. For the residential sector, the target would be the housing developers and builders.

3) Roadshows and forums: This cluster aims to disseminate information on the practices and benefits of EEC measures in various business operations, such as hotels, shopping malls, restaurants, hospitals, and office buildings in the commercial sector, and textile factories, food and beverage

factories, breweries, furniture factories, cement plants, etc. in the industry sector. Regular roadshows and forums will provide updates on EEC practices and government EEC plans.

4) EEC information: For the cluster of EEC information, pamphlets, guidelines, and standards, such as minimum performance standards (MEPS), will be developed. This cluster highlights that appropriate selection and use of appliances and equipment will save energy.

5) Media campaigns: This cluster aims to generate awareness and disseminate information through printed media, television, and websites to reach out to the whole population.

6) Education for professionals: Education is an important part of the EEC campaign because the professionals and practitioners in the commercial and industry sectors are the ones who operate the machineries and equipment that consume energy.

7) Education in the school system: Educating schoolchildren and university students would provide the best opportunity to inculcate behavioural changes towards the adoption of the EEC in daily lives. This cluster would involve the development of syllabus in the education system.

8) Publicity and national awards: As part of the publicity programmes, national energy awards would provide official recognition of EEC efforts to the commercial and industry sectors. The school system may introduce EEC project competitions and awards to encourage the uptake of EEC practices and culture amongst the younger generations.

Figure 5.2: Cluster of EEC Education and Campaign Activities

CPD = continuous professional development, EEC = energy efficiency and conservation.
Source: Author.

4. School Syllabus

The adoption of EEC concepts and practices by people would involve behavioural changes. The best way to achieve this objective is to start with educating schoolchildren and university students in adopting EEC lifestyles. The development of the EEC school syllabus should consider the elementary, intermediate, and advanced levels. It is recognised that the development of the school syllabus is within the authority of Cambodia's Ministry of Education, Youth and Sport. Therefore, the GDE needs to consult with the ministry and other stakeholders to work out the best arrangement for the development of an EEC syllabus. This section provides guidance and input for the development of an EEC syllabus.

4.1. Elementary level

The elementary level school syllabus aims to educate primary school students on a basic understanding of energy and environment, and the benefits of the EEC. The following topics are recommended to be included in the primary school syllabus:

1) Energy and environment
    a) Types of energy: non-renewable energy (diesel, petrol, natural gas, liquefied petroleum gas (LPG), coal, electricity); renewable energy (solar energy, biomass, biogas, etc.)
    b) Forms of energy: heat, light, sound, electrical energy, etc.
    c) Use of energy
    d) Effects of energy usage on environment
2) Energy conservation and energy efficiency
    a) What is energy conservation and energy efficiency?
    b) Can energy be saved? What is the difference between energy conservation and energy efficiency?
    c) Simple and practical ways to conserve energy
    d) Simple and practical ways to reduce energy consumption
3) Benefits of the EEC
    a) Conserves energy
    b) Reduces energy
    c) Reduces energy bills

4.2. Intermediate level

The objective of the intermediate level school syllabus is to target secondary school students with EEC topics that can provide these students greater knowledge and skills. The scientific principles of the EEC to be taught at this level should correspond with the level of science subjects being taught in secondary schools. The following topics are recommended to be included in the secondary school syllabus:

1) Conversion of energy sources
    a) Electricity
    b) Solar photovoltaic (PV)
    c) Thermal energy (heat, steam, etc.)
2) Application of energy
    a) Building services (air-conditioning and mechanical ventilation, lighting, refrigerators, lifts and escalators, etc.)
    b) Transportation
    c) Medical equipment
    d) Manufacturing processes
    e) Building construction
3) Principles of EEC
    a) Energy units and measurements
    b) Specific energy consumption
    c) Energy efficiency indicators (EEIs)
    d) Basic heat transfer
    e) Basic EEC measures
4) Basic EEC problem–based learning project assignment
    a) Examples: walk-through audit of school facilities; small solar PV project, etc.

4.3. Advanced level

The objective of the advanced level school syllabus is to target college and university students to impart higher level of skills and knowledge in EEC. The syllabus should be developed to enable students to appreciate and correlate the application of principles learned in their science and technical subjects. The following topics are recommended to be included in the secondary school syllabus:

1) Understanding of energy units, conversion, and measurements
2) Understanding and application of EEC practices
    a) Buildings: the concepts of passive and active energy efficiency design measures
    b) Manufacturing process: understanding of significant energy users and potential energy measures
3) Understanding of energy performance data and trending

a) National energy statistics

b) EEI for the commercial sector

c) EEI for the industry sector

4) EEC problem-based learning project assignment

a) Examples: Identify and quantify the energy saving potential of a facility through walk-through audit, conduct of interviews, and collection of energy consumption data and other required data. The project assignment will evaluate the economic viability of implementing EEC measures that the student project team identifies.

5. Media campaigns

Media campaigns are significant because they can potentially reach out to the masses in the country within relatively short time. Media campaigns can be designed and strategised to reach out to different target groups, for example, household owners, consumers, and business communities. For more effective media campaigns, the GDE should consider using an EEC mascot design that would appeal to the public and capture people's attention and interest.

The objectives of media campaigns under these two broad sections of the population are as follows:

1) Household owners and consumers

a) Generate awareness on the benefits of the EEC, which can be translated as 'putting money back to their pockets' based on the concept of 'using less energy to obtain the same service';

b) Generate positive attitude towards energy efficiency and energy savings, i.e. towards changing behaviour;

c) Disseminate information on labelling of appliances and equipment that can help identify energy-efficient products.

2) Business communities

a) Generate awareness on the benefits of EEC practices that would result in energy-efficient operations;

b) Generate positive attitude with confidence towards energy efficiency and energy savings through highlights of success stories or case studies;

c) Highlight and educate stakeholders on the availability of energy-efficient techniques through various measures:

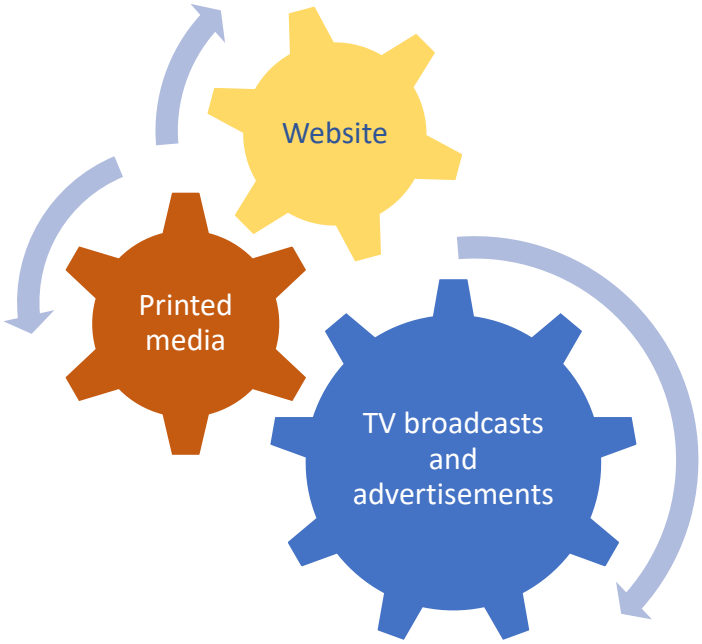
- No/low-cost measures
- Medium-cost measures
- Investment-scale measures

d) Educate stakeholders on the significance of EEC practices towards national energy security, energy equity, and environmental sustainability.

With today's advanced communications, more options are available to disseminate information. Media campaigns can be grouped under three types of action plans as detailed below and as illustrated in Figure 5.3.

1) Printed media – newspapers, pamphlets, publications, banners, buntings, and posters.
2) TV broadcasts and advertisements – broadcast of EEC events and documentaries, and TV advertisements
3) Dedicated EEC website – announcement of EEC activities; energy saving measures for the commercial, residential, and industry sectors; success stories or case studies; new developments in EEC locally and overseas

Figure 5.3: Methods of Media Campaigns



Source: Author.

6. Pamphlets to Promote Energy Efficiency and Conservation

Pamphlets for promotional activities have been the traditional method of disseminating information to the public. Despite the advancement in communication, this traditional method of printing and distributing pamphlets is still being practised in many ASEAN countries. EEC pamphlets should be prepared to meet the requirements of the respective sectors. In view of the extensive and technical nature of EEC

information, it is more practical to prepare guidebooks instead of pamphlets for the commercial and industry sectors. Therefore, this section will only address the pamphlet contents for the residential sector.

6.1. Contents of EEC pamphlets for households

EEC pamphlets should comprise basic energy-saving tips such as the following:

1) Introduction of EEC at home

   a) Explain what energy efficiency is.

      Energy efficiency means using energy (which is mainly electricity) wisely, without wasting it, so that its consumption is reduced. Such reduction will mean lesser electricity bills. In other words, practicing EEC can save money.

   b) Why is it necessary to use energy efficiently?

      The objectives are

      - to save fossil fuel (oil, gas, and coal) as increasing energy consumption depletes resources, increases prices (dependent on importation), and produces greenhouse gases (GHGs) that contribute to climate change;
      - to preserve the environment; and
      - to save on energy (electricity) bills

2) Understanding household electricity consumption, by providing examples

   a) on how to read the monthly electricity bill, i.e. besides finding out the amount to pay, what is the electricity consumption unit?

   b) to illustrate that the air conditioner is the largest energy-consuming appliance in the monthly electricity consumption of a typical household; and to show the energy consumption of an air conditioner, which is based on the power rating of the air conditioner and usage hours.

      Example:

      A typical 1.5 hp air conditioner has a nominal power rating of 1.2 kW and an approximate load factor of 0.6. The estimated electricity consumption for the use of 1.5 hp air conditioner for 5 hours per day for 30 days is given below.

      $$Air\ conditioning\ kWh = 1.2\ x\ 5\ x\ 0.6\ x\ 30 = 108\ kWh$$

      If the household used two units of 1.5 hp air conditioners in a month, the estimated total electricity consumption for this household would be:

      $$Total\ air\ conditioning\ kWh = 108\ x\ 2 = 216\ kWh$$

      If this household's electricity consumption is 500 kWh per month, the percentage share of air-conditioning consumption of electricity would be about 52%.

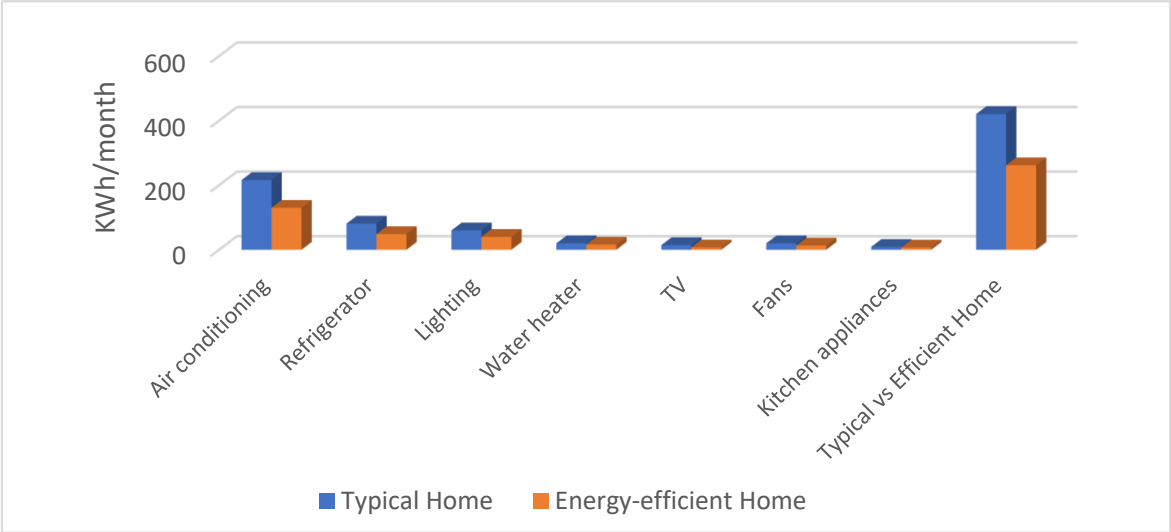
The key messages of this example are:

- The largest share of electricity consumption in a typical household in hot and humid climate is the use of air conditioners.
- The electricity consumption of appliances in a household can be reduced by (i) reducing the usage hours, e.g. switch off electrical appliances when it is not required; and (ii) having energy-efficient appliances with lower power rating but can meet the capacity requirements.

3) Tips on reducing electricity bills at home

There are opportunities to improve the efficiency of electricity use at home. Wise and efficient use, including the selection of energy-efficient appliances, can conserve energy, save money, and help protect our environment. The primary method is to analyse our electricity usage and assess where it can be comfortably controlled or used more efficiently. One can conduct his/her own energy audit at home. Figure 5.4 illustrates the electricity consumption pattern of a typical home vs an energy-efficient home.

Figure 5.4: Electricity Consumption of a Typical Home vs an Energy-efficient Home



Note: Figure 5.4 is for illustration purposes and is not based on actual data.

Source: Author.

Energy-saving tips on reducing electricity consumption of appliances will be useful for household residents. Including these tips on efficient use of appliances in pamphlets is recommended as part of the dissemination campaign on EEC to the public in the residential sector. Tables 5.1 to 5.6 provide practical energy-saving tips for efficient use of common appliances in households.

Table 5.1: Tips for Efficient Use of Air Conditioners

Guide	What to Do
1. Installation	• Select energy-efficient air conditioners. • Make sure air conditioners are installed away from direct sun rays. • Avoid oversizing; ensure that the air conditioner is the correct size for the room to be air-conditioned.
2. Operation	• Do not block air distribution from air vents. • Check and adjust the thermostat to give a comfortable temperature; the recommended temperature setting is between 24°C and 26°C (in steady state operation). • Close windows and doors to stop air leakages to prevent outflow of cool air and reduce cooling load. • Insulate roof or ceiling and shield windows from the sun to reduce cooling load.
3. Maintenance	• Clean air filter periodically to optimise operation. • Clean the outside coil fins twice a year. • Provide regular maintenance to facilitate efficient operation and prolong the equipment lifespan. • Check and adjust the thermostat for a comfortable temperature. • Check the level of system refrigerant once a year. • Clean the blower unit coils once a year.

Source: Author.

Table 5.2: Tips for Efficient Use of Lighting

Guide	What to Do
1. Installation	• Avoid excessively high illuminance level, i.e. too bright for the applications, e.g. 300–400 lux for reading and writing, 150–300 lux for kitchens, 150 lux for bathroom, and 100 lux for bedroom are recommended. • Check that the lights used are energy efficient that has high luminous efficacy, i.e. the ability to emit visible light using less amount of power, e.g. compact fluorescent lamps, LED lamps, etc. • Separate light-switching circuits in large areas, such as the living room, so that unnecessary lights can be switched off when they are not required. • Use timer or photosensor to switch off outdoor night security lights during daytime.
2. Operation	• Switch off lights when not required.

Source: Author.

Table 5.3: Tips for Efficient Use of Electric and Microwave Ovens

Guide	What to Do
1. Oven door gasket	• Regularly inspect the door gasket for signs of wear and tear. • Check for defects in the hinges of the oven door. • If any fault on the gasket or hinges is detected, call an authorised person to repair/replace the part.

Source: Author.

Table 5.4: Tips for Efficient Use of Home Entertainment Devices

Things to Check	What to Do
1. Television, personal computer, music player and radio	• Ensure that the television, personal computer, and stereo are unplugged when not in operation (standby mode consumes electricity). • Make sure that the energy saver function of the computer is activated when left idle in between activities.

Source: Author.

Table 5.5: Tips for Efficient Use of Refrigerators

Guide	What to Do
1. Selection and installation	▪ Select an energy-efficient refrigerator that has an inverter compressor. ▪ Avoid using an oversized refrigerator; choose the right capacity of refrigerator to suit your needs. ▪ Avoid enclosing the sides of the refrigerator with kitchen cabinets. Leave sufficient gaps to facilitate heat dissipation from the condenser coils, which are normally located at the back of the refrigerator. ▪ Do not place the refrigerator in a warm area, e.g. area exposed to direct sunlight or near a stove or oven.
2. Operation	▪ Avoid overloading the refrigerator; unblock or allow space around food in the refrigerator for air to freely circulate. ▪ Leave hot food to cool down naturally before storing in the refrigerator. • Keep the compartments closed to avoid unnecessary loss of cold air when door is opened. ▪ Avoid opening refrigerator frequently; do not leave the door open for a long time.

	▪ Check the temperature of the refrigerator compartment; 5°C is recommended to be set as the coldest. ▪ Check the temperature of the freezer; -18°C is recommended for the freezer.
3. Maintenance	▪ Keep the condenser coils clean. Dust and dirt on the condenser coils will reduce refrigerator efficiency. ▪ Check and ensure the door gasket is in good condition by - closing the door on a sheet of paper - replace door gasket or adjust the alignment of the refrigerator/freezer if the sheet of paper is easily removed ▪ If the refrigerator is not a frost-free model, - check for frost in the freezer compartment; - do not let frost thickness to exceed 6 mm; - switch off to defrost and remove excess water before restarting.

Source: Author.

Table 5.6: Tips for Efficient Use of Electric Instant Water Heater

Guide	What to Do
1. Installation	• Select an energy-efficient water heater with a suitable capacity. • For low-volume requirement such as shower-only water heating, select tankless or demand-type water heater, which can avoid standby energy losses when compared with a storage water heater.
2. Operation	• Fix leaky faucet, showerhead, or pipe. • Avoid setting a high temperature for the shower heater, especially during hot weather. • Reduce temperature setting after the shower is turned on and when lower water temperature can be tolerated. • Avoid prolonged shower time. • Switch off electric water heater when not in use.

Source: Author.

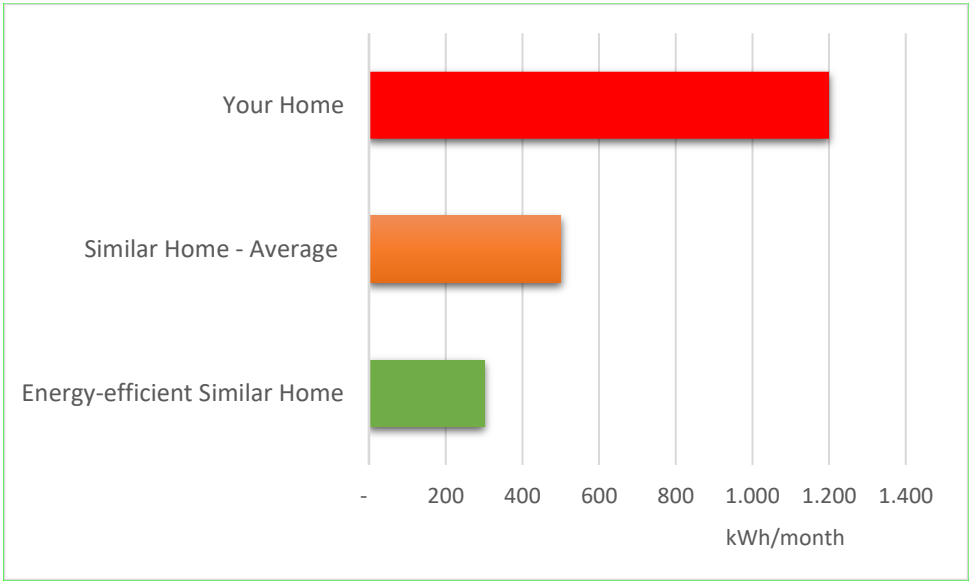
7. Home Energy Report

A home energy report is a useful tool to inform household owners if their electricity consumption for the month exceeds the corresponding average consumption per household in their area or district of residence. This reporting aims to provide a friendly feedback to the household owners concerned so that they get a chance to review and try to reduce their electricity consumption based on the recommendations, which will be provided in the home energy reports. It is intended to help household owners better assess their electricity consumption and effectively pay less for their effort in reducing their energy use.

Household electricity consumption data by district or area would be available with the power utility company, the Electricite du Cambodge (EDC). Such data can be put to good use by comparing electricity consumption of their home customers by area or district. As illustrated in Figure 5.5, households whose electricity consumption exceeds the average consumption of similar homes in the same area or district for, say, 3 consecutive months will receive a friendly notification in the form of letters or emails giving the following information:

1) A statement that the household concerned has consumed electricity much higher than similar homes in the neighbourhood;
2) A graph illustrating the comparison similar to Figure 5.5;
3) Energy efficiency tips on how to manage and reduce energy consumption in typical households; GDE's web portal with EEC tips and tools, if available, should be referred to in the notification.

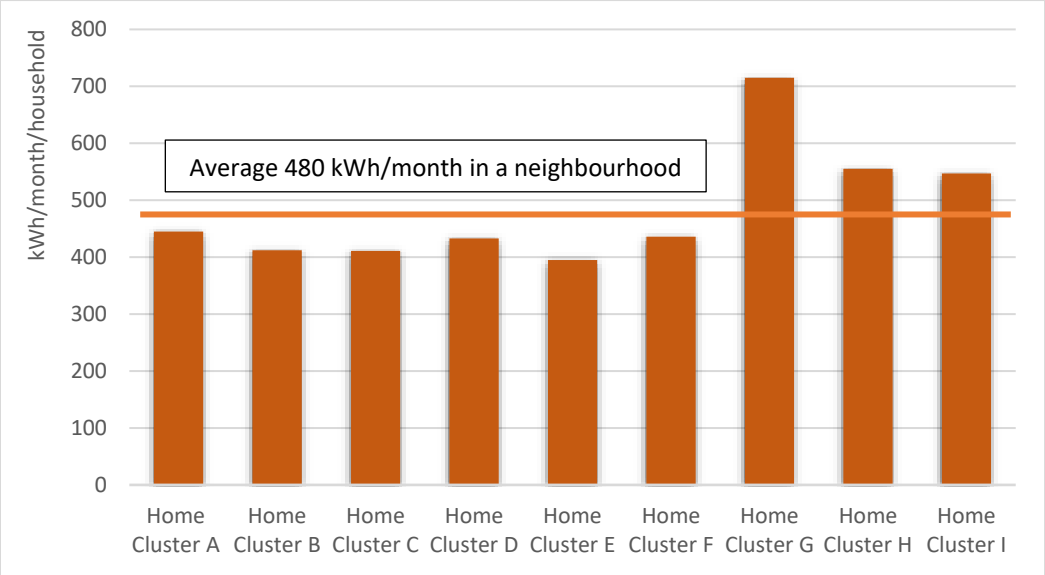
Figure 5.5: Home Energy Report Comparing Electricity Consumption in the Same Area



Note: Figure 5.5 is for illustration purposes and is not based on actual data.
Source: Tenaga Nasional Berhad, Malaysia, https://myelectricitybill.my/green_tips.html

Figure 5.6 illustrates a method of deriving the average value of monthly electricity consumption based on the electricity consumption data in the neighbourhood of a chosen area or district. Compiling the cluster of average home data to work out the average monthly electricity consumption is a simple method in view of the large amount of data that can be anticipated in data collection and analysis.

Figure 5.6: Example of Deriving the Average Monthly Electricity Consumption in a Neighbourhood

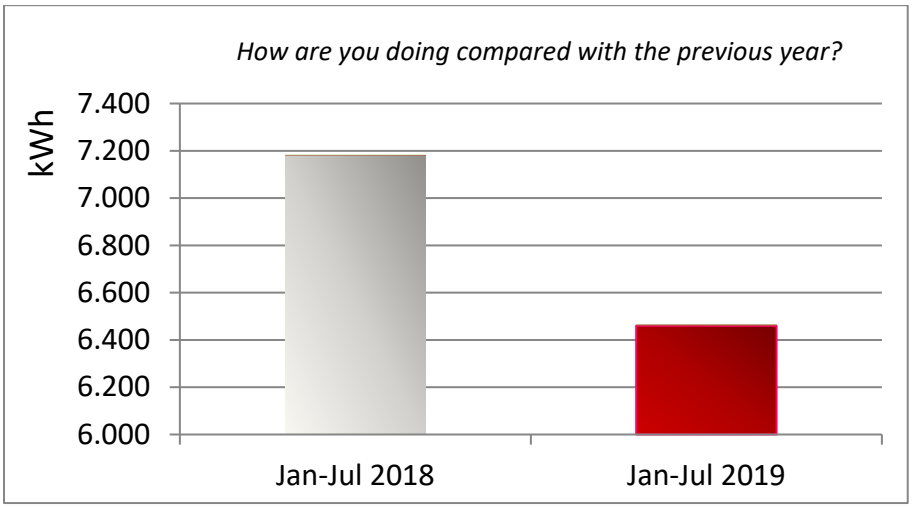


Note: Figure 5.6 is for illustration purposes and is not based on actual data.

Source: Author.

As a follow-up, a feedback report should be sent to homeowners to inform them of their individual household electricity consumption compared with the same period in the previous year. Figure 5.7 illustrates such comparison of electricity consumption for self-monitoring purposes. Such follow-up reporting will be useful and effective to generate continuous awareness and interest amongst homeowners in the residential sector, so that the EEC will continue to be practised in people's daily lives. The points made in the above have shown that home energy reporting is an easy and practical way of generating awareness and interest in people to adopt EEC practices. The implementation of this programme should be worked out and developed by the GDE and the EDC.

Figure 5.7: Comparison of Personal Electricity Consumption of the Same Periodin the Preceding Year



Note: Figure 5.7 is for illustration purposes and is not based on actual data.
Source: Tenaga Nasional Berhad, Malaysia.

8. Road Map (2020–2025)

The key factor for the EEC plan to succeed is to reach out to the masses in the three sectors – commercial, residential, and industry. If the public and business entities are fully aware and interested in EEC practices, people will change their behaviour, which can be translated into energy savings nationwide. Education – through the introduction of EEC topics in the syllabi of primary and secondary schools and universities – should have a greater impact on behavioural change amongst the younger generation. The impact will be great. Overall, this chapter has addressed the task of education and campaigns to reach out to the masses. Table 5.7 outlines the road-map activities, which can be conducted in parallel. Some of the activities may be carried forward to the following year.

Table 5.7: Education and Campaign Road-map Activities (2020–2025)

Phase	Description of Activities	Remarks
Phase 1a: 2020–2021	The GDE to head the formation of a task force to plan education and campaigns	To generate interest in EEC campaigns, it is suggested to design and develop an EEC mascot that champions the EE agenda.
Phase 1b: 2020–2021	Conduct EE awareness campaigns, roadshows, mini exhibitions, and technical forums to disseminate information on EEC measures and savings.	Awareness campaigns to generate interests in EEC measures and energy savings
Phase 1c: 2020–2021	Publication of EEC pamphlets	To publish energy-saving tips and measures

Phase 2a: 2021–2025	Based on data collection and analysis, home energy reports to be distributed to affected households	The GDP and the EDC to work out the preparation of home energy reports for distribution
Phase 2b: 2021–2025	Media campaigns	Continuous campaigns through website, printed media, and television
Phase 2c: 2021–2025	EEC school syllabus	Continuous development
Phase 2d: 2021–2025	Professional training courses	Continuous development
Phase 3a: 2022–2025	Technical forums to disseminate information on EEC achievements	To share success stories and experiences
Phase 3b: 2023–2025	Conduct national EEC competitions and awards to recognise EEC efforts and achievements	Commercial and industry sectors

EE = energy efficiency, EDC = Electricite Du Cambodge, EEC = energy efficiency and conservation, GDE = General Department of Energy.
Source: Author.