The 10% Energy Challenge is a 5-year energy efficiency awareness campaign launched by NEA in April 2008. Under the 10% Energy Challenge, NEA, HDB and EMA have entered into a voluntary agreement (VA) with retailers and suppliers to promote energy efficient (EE) appliances. In this VA, EE appliances refer to 3-tick and 4-tick air-conditioners, refrigerators and clothes dryers.

The main objectives of this VA are:

(a) To have more EE appliances sold in the market

(b) To raise consumer demand for EE appliances at retail stores

How You Can Play A Part

As a trained energy efficiency advisor, you can help us make the VA a success by:

(a) Providing customers with accurate EE and cost savings information and actively encouraging the purchase of EE appliances

(b) Ensuring VA educational materials are prominently displayed near the EE appliances at each retail store

Selling Energy Efficient Appliances

Below are some tips on how you can promote EE appliances to customers:

(a) Find out the needs of the customer (e.g. number of rooms to cool, number of people in family) and guide customer to select a right-sized EE appliance (for tips refer to VA brochures)

(b) Use the VA brochures and posters to help customers choose energy efficient models

(c) Find out what is important to them (e.g. low cost, environment, quality) and recommend the EE models, highlighting features that will appeal most to them, e.g.

- **Cost-conscious customer:** Highlight the annual energy costs on wobblers, perform life cycle cost calculations on the cheaper models and compare to life cycle costs of EE models.

- **Quality-conscious customer:** Highlight the better technology and better reliability of EE models.

- **Environmentally-friendly customer:** Direct them to choose models with 4 ticks and the lowest energy consumption on the energy label.
Household Energy Use

The electricity consumption breakdowns by appliance for a typical 4-room and 5-room flat are shown below.

4-Room Flat Electricity Consumption Breakdown

- **Air-conditioner**: 30%
- **Refrigerator**: 17%
- **Lighting**: 10%
- **Water Heater**: 10%
- **Kitchen Appl (Rice-cooker + Kettle)**: 9%
- **Video Eqpt (TV/VCR + Computer)**: 8%
- **Washing (Washing mc + Iron)**: 6%
- **Fans**: 6%
- **Others**: 6%

5-Room Flat Electricity Consumption Breakdown

- **Air-conditioner**: 30%
- **Refrigerator**: 15%
- **Lighting**: 11%
- **Water Heater**: 10%
- **Kitchen Appl (Rice-cooker + Kettle)**: 10%
- **Video Eqpt (TV/VCR + Computer)**: 7%
- **Washing (Washing mc + Iron)**: 6%
- **Fans**: 6%
- **Others**: 6%

Source: Energy Market Authority

The most energy-intensive appliance in the home is usually the

- **Air-conditioner**, for homes with air-conditioners
- **Refrigerator**, for homes without air-conditioners

The Energy Label

NEA mandated energy labelling for air-conditioners and refrigerators in Jan 08. This was extended to clothes dryers in Apr 09. Energy labels allow the consumer to compare and select energy efficient appliances.

The main components of the energy label are:

- **Number of Ticks**: The number of ticks shows the energy efficiency rating of a model. Models of similar size with the same tick rating can still have different energy consumption, because each tick covers a range of values.
  - To choose an EE model, look at the number of ticks first and then compare the energy consumption figures for similar capacity.

- **Capacity of the Appliance**
  - Litres for refrigerators.
  - kW for air-conditioners.
  - Kg for clothes dryers.

- **Energy Use**
  - Energy used per year (kWh a year) for refrigerators.
  - Energy used per hour (kWh per hour) for air-conditioners.
  - Energy used per wash (kWh per wash) for clothes dryers.

- **Type of Appliance**
  - Refrigerator with frost-free freezer; refrigerator without frost-free freezer.
  - Split type (inverter) air-conditioner; split type (non-inverter) air-conditioner; window type air-conditioner; casement type air-conditioner.
  - Clothes dryer (condenser); clothes dryer (air-vented).

Brand and Model

Number of Appliance

Test Standard

Used
Life Cycle Cost

We can estimate the life cycle cost of an appliance with the formula:

\[
\text{Life Cycle Cost} = \text{Purchase Price} + \text{Annual Energy Cost} \times \text{Lifespan}
\]

**Air-conditioner**

From the graphs, you can see that 4-tick air-conditioners generally have the lowest life cycle costs.

**Usage Pattern 1:** Air-conditioner is used 12 months a year, 8 hours a day.

**Usage Pattern 2:** Air-conditioner is used 4 months a year, 8 hours a day.

To help customers compare life cycle cost of different models, you can make use of the table in the air-conditioner VA brochure:

<table>
<thead>
<tr>
<th>Brand</th>
<th>Capacity (kW)</th>
<th>Purchase Price ($) (A)</th>
<th>Annual Energy Cost ($) (Check number on wobbler) (B)</th>
<th>Lifespan Energy Cost ($) (B) x 7 years (C)</th>
<th>Total Life Cycle Cost ($) (A) + (C)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

**Refrigerator**

From the graph, you can see that 4-tick refrigerators generally have the lowest life cycle costs.

To help customers compare life cycle cost of different models, you can make use of the table in the refrigerator VA brochure:

<table>
<thead>
<tr>
<th>Brand</th>
<th>Volume (L)</th>
<th>Purchase Price ($) (A)</th>
<th>Annual Energy Cost ($) (Check number on wobbler) (B)</th>
<th>Lifespan Energy Cost ($) (B) x 10 years (C)</th>
<th>Total Life Cycle Cost ($) (A) + (C)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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**Frequently Asked Questions**

**ENERGY LABEL**

(a) How are the number of ticks assessed for each model?

We have adopted certain test standards to test the energy efficiency rating for each appliance type, namely:

- ISO test standard for refrigerators, casement, window and split (non-inverter) air-conditioners
- JIS test standard for split (inverter) air-conditioners
- IEC test standard for clothes dryers

Appliance models are tested based on these test standards, under a fixed set of conditions (e.g. ambient temperature, loading), to determine the energy used. With the tested energy usage and capacities, we can determine the energy efficiency rating of the appliance model.
Refrigerator with freezer
For the refrigerator, the energy determined in the test and the volume of the refrigerator are the factors that determine the number of ticks assigned. For example, a refrigerator with a tested annual energy consumption of 600 kWh and an adjusted volume of 500 litres, will be rated as 3 ticks as shown in the graph below.

(b) Why do appliances with the same number of ticks consume different amounts of energy?
From the graphs above, you can see that each energy efficiency band includes a range of energy consumption values.

(c) Why is the volume of the refrigerator on the energy label different from the volume declared by the supplier?
Although two refrigerators may have the same total volume, the refrigerator with a larger freezer compartment and a smaller fresh food compartment will consume more energy. Therefore to calculate the volume of a refrigerator on the energy label, the freezer volume is adjusted and added to the volume of the fresh food compartment to get the adjusted volume. For this reason the adjusted volume will be different from that which is stated by the supplier.

(d) Will the rating on Singapore’s Energy Label for a particular model be different from the ratings given in energy labels of other countries?
It can vary. Other countries may have more bands of energy efficiency rating, e.g. the European Energy Label uses rating system that ranges from A to G, the Australian Energy Label has a rating system that ranges from 1-star to 6-star. There are also variations in the test standards and test conditions among the various countries. For Singapore, we adopt international ISO test standards as far as possible instead of regional test standards.

(e) Are different types of refrigerators, air-conditioners and clothes dryers rated differently under the energy labelling scheme?
There are 3 types of refrigerators under MELS and they are rated independently to allow consumers to compare the energy efficiency of models within each type of refrigerator.
Similarly, split-type (inverter), split-type (non-inverter), window type and casement type air-conditioners have their individual rating systems.
Clothes dryers (condenser) and clothes dryers (air-vented) are also rated separately.

(f) Why are standalone freezers not labelled?
They are currently not labelled but we will look into labelling them in the future.

(g) Are 2-in-1 washer-dryers labelled under the energy labelling scheme?
They are currently not labelled but we will look into labelling them in the future.

(h) Why is energy labelling only for air-conditioners, refrigerators and clothes dryers? Why is it not for other appliances too?
Energy labelling is introduced for air-conditioners, refrigerators and clothes dryers because these 3 appliance groups are among the most energy intensive appliances in a household. NEA is considering extending the scheme to other household appliances.
(i) What if a customer wants a refrigerator with a small volume but there is no refrigerator of such a volume with 4 ticks? There are 4-tick refrigerator models for a wide range of volumes, but if there is no 4-tick model in your store for the volume your customer is looking for, simply recommend the most energy efficient model available in your store.

LIFESPAN

(j) On what basis do we use a 10 year lifespan for refrigerators, a 7 year lifespan for air-conditioners and a 10 year lifespan for clothes dryers? Refrigerators and clothes dryers are usually placed indoors and with proper care, the typical lifespan is assessed to be about 10 years. As parts of air-conditioners are placed outdoors and subjected to the weather, a shorter lifespan of 7 years is assumed.

ANNUAL ENERGY COST OF APPLIANCES

(k) What is the electricity tariff used in the energy cost on the wobbler? It is the average 2010 electricity tariff, which is $0.2348 per kWh.

(l) How are the annual energy consumption on the energy label and annual energy cost on the wobbler calculated for air-conditioners? The formulae used are:

- **Non-inverter air-conditioners**
  
  \[
  \text{Annual Energy Consumption} = \text{Energy Consumption per Hour (on Energy Label)} \times \text{Hours Used a Year (Assumed 8 hours a day, 365 days a year)}
  \]

- **Inverter air-conditioners**
  
  \[
  \text{Weighted Energy Consumption per Hour} = (0.4 \times \text{Full load Energy Consumption per Hour}) + (0.6 \times \text{Part Load Energy Consumption per Hour})
  \]
  
  \[
  \text{Annual Energy Consumption} = \text{Weighted Energy Consumption per Hour} \times \text{Hours Used a Year (Assumed 8 hours a day, 365 days a year)}
  \]

- **Both types of air-conditioners**
  
  \[
  \text{Annual Energy Cost} = \text{Annual Energy Consumption} \times $0.2348 \text{ per kWh (average 2010 electricity tariff)}
  \]

(m) How is the annual energy cost on the wobbler calculated for refrigerators? The formula used is:

\[
\text{Annual Energy Cost} = \text{Annual Energy Consumption (on Energy Label)} \times $0.2348 \text{ per kWh (average 2010 electricity tariff)}
\]

(n) How are the annual energy consumption on the energy label and annual energy cost on the wobbler calculated for clothes dryers? The formulae used are:

\[
\text{Annual Energy Consumption} = \text{Energy Consumption per Wash (on Energy Label)} \times \text{No. of Washes a Year (Assumed 3 hours a week, 52 weeks a year)}
\]

\[
\text{Annual Energy Cost} = \text{Annual Energy Consumption} \times $0.2348 \text{ per kWh (average 2010 electricity tariff)}
\]

(o) How can we calculate the annual energy cost of other appliances? If the appliance’s rated energy consumption is in watts (W), use the formula:

\[
\text{Annual Energy Cost} = \text{Rated Energy Consumption of Appliance} \times 1000 \times \text{Number of Hours Used a Year x Electricity Tariff}
\]

If the rated energy consumption is in kilowatts (kW), use the formula:

\[
\text{Annual Energy Cost} = \text{Rated Energy Consumption of Appliance} \times \text{Number of Hours Used a Year x Electricity Tariff}
\]

(p) What is the monthly energy cost of an air-conditioner, refrigerator or clothes dryer? Divide the annual energy cost on the wobbler by 12 to get the monthly energy cost.

(q) What if the real life energy cost of an appliance differs from the number on the wobbler? It is stated in the Energy Label that actual energy consumption of an appliance may vary from test results. As the usage conditions in a home setting may vary from the test conditions, some variation in energy cost is to be expected. However, the energy cost figure on the wobbler provides a good basis to compare the relative energy costs of different models.

PROMOTING ENERGY EFFICIENT MODELS

(r) How does inverter technology work? Inverter technology, in the case for air-conditioners, employs electronics that vary the compressor speed to adjust to changes in room temperature. They are usually more energy efficient than conventional air-conditioners.

(s) Are inverter refrigerators more energy efficient? Consumers are able to compare the efficiency of these refrigerators with other refrigerator models by checking the energy label.