

**Technical brochure on rationalization in the consumption of
electric energy**

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Rationalization in the consumption of electric energy

Introduction

The objective of this brochure is the rationalization in the consumption of electric energy, it is necessary to know the devices which operate on electric energy that consume energy to be converted to different kinds of uses. Human has known the electrical devices since he knew electricity, these devices developed dramatically in the twentieth century, and the electrical devices have spread quickly in the kingdom because of the high level of living and the followed open economy system, which allows entering all kinds of necessary and secondary electrical devices.

In order to preserve the national wealth from waste and improvidence it was necessary to maintain the electrical energy and to use it in the right way.

The rationalization of electricity consumption and maintaining the electric energy is reflected positively and directly on the consumer, and when the consumer follows the ways of rationalizing electricity consumption, this would lead to the reduction of bill costs. The means to rationalize the electricity consumption in electric devices differ from one to another, and because of the increment of the demand on energy we will address the definition of rationalization, goals and rationalization slogans that must be deployed, in addition to how to rationalize consumption through the use of electrical devices by the following points:

A- Areas in which the electrical devices operate.

B- Common types of electrical devices which are used by the consumer in the Hashemite kingdom of Jordan.

C- Ways of rationalization for the widely used electrical devices.

Definition of rationalization

It is the best use of the available resources and the electric energy needed to operate the facility without prejudice the comfort of users or their productivity or prejudice the efficiency of used devices and equipment.

Goals of rationalization

- a- Reduce the value of the consumption bill.**
- b- Stay away from forbidden extravagance.**
- c- Continuation of electrical service with required efficiency by reducing the loads.**

The slogans of rationalization

- Rationalization of electricity ... Saves the economic resources**
- Rationalization is the moderate and rational use of electricity away from extravagance and wasting.**
- Rationalizing the consumption of electricity reduces the wages of electricity list.**
- The saving in electricity consumption is an evidence of awareness and interest.**
- Turning off one lamp of each house saves a large electric power enough to feed one governorate.**
- Take advantage of daylight in lighting your home and your office.**
- The most developed countries have a rationalization in consumption electricity more than any other countries.**
- Thermal insulation of buildings saves lot of electric energy.**

-Rationalization of electricity consumption contributes to reduce environmental pollution.

-Rationalization of electricity consumption contributes to save electricity to you and to others.

- Rationalization of electricity consumption is a civilized phenomenon.

-Rationalization of electricity consumption is a good behavior required from all individuals.

- Turn off the lights and other electrical devices when you leave the place.

- Stealing electricity deprives others from it.

How to use electric devices and rationalize consumption

Ways to rationalize the widely used electrical devices

Air conditioner device

In summer, air conditioners devices are installed by citizens to reach comfortable and acceptable temperatures (20-25c), before starting the installation of the air conditioner device you have to know the appropriate type for this place which depends on some factors such as building space, the sites of these devices and the resulting sound.

Types of air conditioners are: Central condition, SPLIT TYPE, PACKAGE UNIT, WINDOW TYPE, we will provide a detailed explanation about WINDOW TYPE, because it's the most used type.

A-Air conditioner components and how it works:

WINDOW TYPE consists of three main parts : compressor, evaporator and the condenser, it is installed on walls , so that the compressor and condenser and the condenser fan are out the building , the evaporator and its fan facing the inside of building.

The work of air conditioner summarized in the use of Freon gas (which characterizes of unique properties) as a main assistant factor in transferring heat from and to the building. In summer and because of the high temperatures we operate the air conditioner where the compressor moves the Freon gas inside the condenser pipes which condenses the gas by throw the temperature out with the assistance of condenser fan , then it cools the gas and turns it into a liquid that passes to the inside of evaporator pipes which transfers the heat from the internal air and cools it, while the temperature of Freon liquid rises and turns into a gas and back to the compressor to repeat the cycle again during the time of operating the air conditioner

The compressor works to move Freon gas for longer periods if the temperature inside the building is very high, and you can adjust the required temperature by the controller which disconnects the compressor automatically as soon as the we reach to the required temperature.

The period of operation the air conditioner is ostensibly static but the big difference in temperatures in the summer months leads to a big change in the period of operating compressor in these air conditioners. So if the hours of operating the compressor increases, the consumption of electrical energy will increase.

B-Special instructions for the use of air conditioner device which helps to rationalize the consumption of electric power:

1-Maintenance of air conditioner and cleaning it at least once a year, because the accumulation of dirt and dust reduce the efficiency of air condition.

2-Clean the air filter once a week because accumulation of dirt and dust prevent warm air to pass from the inside of room to outside and thus reducing the efficiency of air condition.

3-Shading the equipment of air conditioner , where the studies have shown that the efficiency of air conditioner rises when it is shaded

4-When using cooling channels they must be isolated well to reduce wastage from the cooling of air inside them.

5-Adjust the key of temperature controller to a moderate temperature to reduce the difference between room temperature and required temperature, this reduces the operating hours of the compressor and thus saves energy.

6-Close the doors and windows in case of operating air conditioners to maintain the required temperature of air conditioner, it is recommended to install (door auto closer) for the doors overlooking the outdoor air as the interior entrances in building.

7-Closing the side openings for the air conditioner to prevent the air leakage to the outside and vice versa, it is desirable to put insulating materials as Cork to resist heat transfer.

8-Put air conditioner in the right place of the room away from the entrance to prevent air leakage, you must make sure not to put pieces of furniture in the front of the conditioner.

9-When the temperature is 25, do not use the air conditioner.

10-The fan is enough to moderate the temperature in some summer days.

11-Read how to use air conditioner well.

Lighting devices

Lighting is the second largest load in the buildings after the air conditioner, so we must use these devices well to reduce the energy consumption, therefore , it is necessary to take advantage from the natural lighting (the sun) during daylight hours ,the proportion of

lighting load in some buildings is from 30-50% , therefore, the use of minimal number of lighting devices will reduce the monthly consumption bill, in addition to reducing the heat effect on buildings from the inside which leads to saving in the purchase of conditioning equipment.

Types of the most used light lamps:

-Normal light lamps (Tungsten): the capacity is often from (20-100 watts)

-Fluorescent light lamps: the capacity is from (20-40 watts)

Factors that help to rationalize the consumption in lighting:

We can reduce the cost of lighting up to 15% by carrying out the following behaviors:

- Architects choose the best type of lighting with the exploitation of the natural lighting provided for free by the sun.

- Reduce the use of Tungsten light devices and use fluorescent light lamps as much as possible, also you can use the (Mercury and Sodium) lights due to the increasing of the efficiency of these devices in lighting with less loads.

- Use lighting devices with good reflectors in order to reflect most of the rays to the place which we want to light, it is recommended to install the lighting devices at the roof to reduce the number of lighting devices as much as possible with providing adequate lighting.

- Use internal light color paints to reflect the lighting, thus, the building needs a small number of lighting units, and this leads to the saving of energy consumption and the saving in purchasing additional lighting devices.

- Turn off lighting in the unoccupied places as soon as you leave.

- Clean the lamps cover.

- Use the electrical lamps which save energy (C.F.L) which also give the same lighting.

(C.F.L) it is an electrical lamp close to the size of the ordinary lamp consumes only 20% from consumed electrical energy by a regular lamp.

Water heaters

Water heaters are often used in winter, therefore, it is recommended to follow the instructions below in order to rationalize in consumption of energy:

1- Set a regulator at a temperature of 60 C or less than the maximum temperature to avoid the explosion because of the boiling of the water.

2- We can rely on sun's heat in the summer to heat water without operating heaters.

3- Using high efficiency heaters.

4- Water temperature should be reduced to a reasonable temperature by thermostat.

5- Isolate water pipes well.

Television

Switch off the TV when you leave the room.

Electric iron

Electric iron's ability is from 1000 to 1500 watts and this is almost equivalent to the capacity of 50-75 of normal fluorescent lightings units (20) watts, it is recommended to use this device as follows:

1-Use the device only at the time of need.

2-Disconnect the device from electricity when it is not in use.

3-Avoid using iron during the period of the big electrical loads.

Refrigerator and freezer

- Always check the cleanliness of condenser located at the back of refrigerator.

- Close the door tightly and do not try to open the refrigerator door without any need, when you open the door close it quickly to prevent the leakage of cold air outside.

- Take into account the order of things inside the refrigerator to facilitate the process of putting in and taking out the things from it.

- Melting the snow from time to time and it is preferable to fill the freezer totally and to fill spaces with bags filled with water.

Factors affecting the increase of energy consumption for electrical devices:

The consumer manages and operates some of the electrical devices inside the building at the time he needs...However, there are some other devices that require a permanent electric source without interruption due to the nature of their work such as refrigerators, freezers, and water heaters, so we should know the factors and causes that lead to the increment of energy consumption for such devices:

1- Maintenance of electrical devices.

2- Efficiency of electrical devices.

3- The effect of using thermal insulations.

1-Maintenance of electrical devices

Maintenance of electrical devices is necessary to keep them as long as possible, and to maintain the performance and the efficiency of the device, for example, the air conditioners need the following:

a- Examine the compressor and the temperature regulator to make sure of operating safety.

b- Clean the air filter regularly and wash the internal parts of the device to remove dust and dirt.

c- Examining air conditioner to prevent air leakage.

2-Efficiency of the electrical devices

Device efficiency is the percentage between the energy that we get from the device (output power) and the energy required to operate that device (input power) or it is calculated as a percentage for example we can say the efficiency of this device is 90% or 80%...., if the percentage of efficiency reaches to 100% that means the device loses a small percentage of the energy needed to operate it.

When purchasing any electrical device you must make sure of its operational efficiency to choose the good types with high efficiency to reduce the loss of consumed electrical energy and thus help in rationalization process.

3-The effect of using thermal insulations

The use of thermal insulations has a significant role in saving the consumption of electric energy especially that energy used in air conditioners. Studies have shown that the thermal insulations system in buildings reduces the consumption in electric energy 40% this leads

to the saving in the value of monthly consumption bill. Also we can purchase air conditioner devices with low capacities and low costs.

How to reduce the cost of using electrical devices

The right choice for the electrical devices, right operation, and take other accompanied procedures can sometimes reduce the cost of repeated use.

Did you know?

- To calculate the cost of the use for any device we have to know the expected electricity consumption of the device and the price of consumption unit.

- Electricity consumption in refrigerator increases when the capacity of refrigerator is excessive.

- Electricity consumption for heating by air conditioner is less than the required electricity consumption for heating by electric heater.

- The duration of exposure to sunlight in the room affects electricity consumption for cooling.

- Lamp consumption of electricity is the multiplication of lamp ability in the period time in which it operates.