Electricity & Water Rationalization in Buildings
Electricity & Water Rationalization in Buildings

www.mopw.gov.ae
All Praise is due to Allah and may Allah send His peace and blessings upon His Honest Messenger, his family, his companions and all those who follow them.

My fellow UAE Citizens

You are fully aware that the world is experiencing climate changes for many factors and reasons, including increasing pollution caused by heavy gases emitted from vehicles, factories, ACs, electricity generation, and seawater desalination equipment, leading to greenhouse phenomenon, which resulted in global warming and climate change.

The United Arab Emirates is one of the world’s top countries that have the highest rate of carbon dioxide emissions. Hence, I think that nobody will be of a different opinion if we consider reduction of these emissions a patriotic duty for everyone who lives on this good land; given the fact that unless we change, our children and grandchildren will not have enough resources to enjoy as we did and how would we feel if we did not take any action that helps in maintaining such resources.

It suffice to mention that Allah advises us to avoid waste “Eat and drink; but waste not by excess, for Allah loveth not the wasters.” (Surah 7:31)

The author
How can you reduce emissions?

It is so easy; you should only follow some or all of the rules set below in this booklet; thus, you will contribute, even in a little way, to reduce emission. If all of us do that, the effect will certainly be bigger.

What are these rules?

These rules are quoted from Green Building Guide of the Ministry of Public Works. These rules have three key principles:

1. **Long-term building.**
   It means long-lasting housing and liveable communities.

2. **Building for posterity.**
   Making their houses, communities and environment safe.

3. **Building for our planet.**
   By optimal use of our natural resources.

These rules have three key objectives:

1. Optimal use of energy and natural resources.
2. Improving the quality of the internal environment of the house

These rules and divided based on two main elements:

1. Energy efficiency
2. Water efficiency.
First: Energy Efficiency

Before demonstrating the points which should be considered to reduce electricity consumption, we would like to inform you with the following facts:

- Amount of electricity consumption per capita is equivalent of .... KW/day
- UAE’s annual production of electricity is MW of electricity
- Country spending on electricity generation is equivalent of .... billion dirham per annum
- Electricity generation results in ... tons of Carbon Dioxide annually, and it is one of the highest rates in the world.

Below are the most important points which must be taken into consideration when it come to housing design and implementation in order to reduce dependency on air conditioning, which in turn, will reduce electricity consumption.

- It must be taken into consideration when designing a building that it is in the correct direction; a direction which is far from direct sun rays, in order to reduce temperature rise due to the entry of sun rays into the building, which is call Heat Gain.
- The appropriate direction for the environment of the United Arab Emirates is to the north, as solar orientation in summer is about 88 degrees southern and in winter is about 42 degrees southern as in figures (1, 2). Therefore, large windows should be in the northern direction and awnings should be used. In other words, the main façade of the building should be directed to the north as much as possible.
The movement of the sun in the summer Abu Dhabi

Summer mid-June

Abu Dhabi

South

West

Sunset in summer

North

East

Sunrise in summer

Figure (1)

The movement of the sun in the winter Abu Dhabi

Winter December

Abu Dhabi

South

West

Sunset in winter

North

East

Sunrise in winter

Figure (2)
• Large glass surfaces should not be used in southern, south-western, or south-eastern directions and should be limited with awnings put above them as shown in Figure (3)

Figure (3)
• Planting trees in the south-western and south-eastern façades may reduce sun glare falling on windows and walls (Figure 4). It is also preferred to plant deciduous trees, whose leaves fall in winter, in the southern façade so as not to prevent the warm sun rays in winter, while it will prevent them during the other seasons as temperature rises.
- All external windows and doors should double glazed. (figure 6)

- Elements which do not require cooling such as service rooms and garage should be designed as an area which isolates bedrooms, house corridors from the outside, and in turn, wastage of indoor cold and air-conditioned air can be reduced, helping in using air-conditioner for less time, i.e. reducing electricity consumption.
- Using thermal insulating bricks instead of normal cement bricks.
- Using light-colored paints instead of dark-colored paints for external walls, especially in southern, south-eastern, and south-western façades.
- Using light-colored tiles for the roof.
- Possibility of natural ventilation of the dwelling should be taken into account when designing. And in case of doing so, it is recommended that ventilation openings to be close to shaded areas to maintain indoor cold air. Ventilation openings should also be in the façades located northern to ensure the passage of cold air coming from the north or north-west.
• Dark-colored sidewalks should not be used around the house.
• Energy-efficient lamps such as fluorescent white lamps should be used. Their price may be higher than the normal (yellow) lamps, but it saves about 75% of the value of lighting consumption in the electricity bill and outlast them about more than 10 times. It is advised to use T-8 fluorescent lamps.
• Choosing lighting unit that does not contain a large number of lamps will be more conducive for saving as shown in the previous point.
• It is recommended to use solar water heaters, which do not require electricity, if possible.
• Turn on the heater only half an hour before using it, not all the day.
• Air-conditioning device is one of the most widely used electrical appliances in the UAE because of high temperature most of the year, especially in summer. It is the most electricity-consuming appliances and that is reflected on the electricity bill. The avoid hefty electricity bills because of using air-conditioning, please follow the following guidelines:
  • When buying an air-conditioning device, the appropriate size for the room in which it will be installed must be taken into account.
  • Air-conditioner should be put in an appropriate place in the room, and should not be directed towards the entrance of the room to prevent leak of the air-conditioned air. Furniture items hould also not be put in front of the conditioner in order not to increase the voltage consumed by the conditioner or impede air circulation.
• In case of using central air conditioning system in the house, it is preferred to have independent device and switch in every room to control temperature, instead of using only one switch in order not to waste energy in cooling unused rooms.

• Outdoor air conditioner units should be shaded to protect them from the direct exposure to the sun which may lead to a reduction in cooling efficiency.

• Curtains should be closed in the room that is required to be cooled in order not to increase pressure on the conditioner.
Second: Water Supply

- When washing fruits and vegetables, it is preferable to fill a large pot with water to wash them, and the excess water can be used in watering house plants.
- It is preferred to use the shower instead of the bathtub.
- Sponges should be used in washing cars instead of water hoses.
- Automatic water faucet with optical sensors should be installed for children bathroom at least (Figure 6)

Figure (5)
In case of being unable to get the abovementioned faucet, you can use aerators to ventilate water while it comes out of the faucet, you can use aerators to ventilate water while it comes out of the faucet, which increases its size and provides space to cover the hands or other objects to be washed, but with less amount of water as shown in Figures (8, 9, 10).
Electricity & Water Rationalization in Buildings

Figure (8) Aerators

Figure (9) Tap water in normal condition before installing aerator

Figure (10) Water faucet after installation aerator
When you create a backyard garden, you must consider the following:

- Avoid planting grass as possible as you can, but if necessary, it should be small flats because they consume large amounts of water.
- Select local trees and plants which do not need large amounts of water. Images of some species are attached.

Below are some species of local plants:

- Acacia Farnesiana
- Phoenix Dactylifera
- Acacia Tortilis
Guidelines:

1. It is very important before starting the project to underscore the points mentioned in this booklet for the consultant, especially regarding the direction of the building and the use of awnings over windows in the façades that are directly exposed to the sun.
2. The consultant should be informed that internal paints should be lead-free.
3. Oil paints must not be used.