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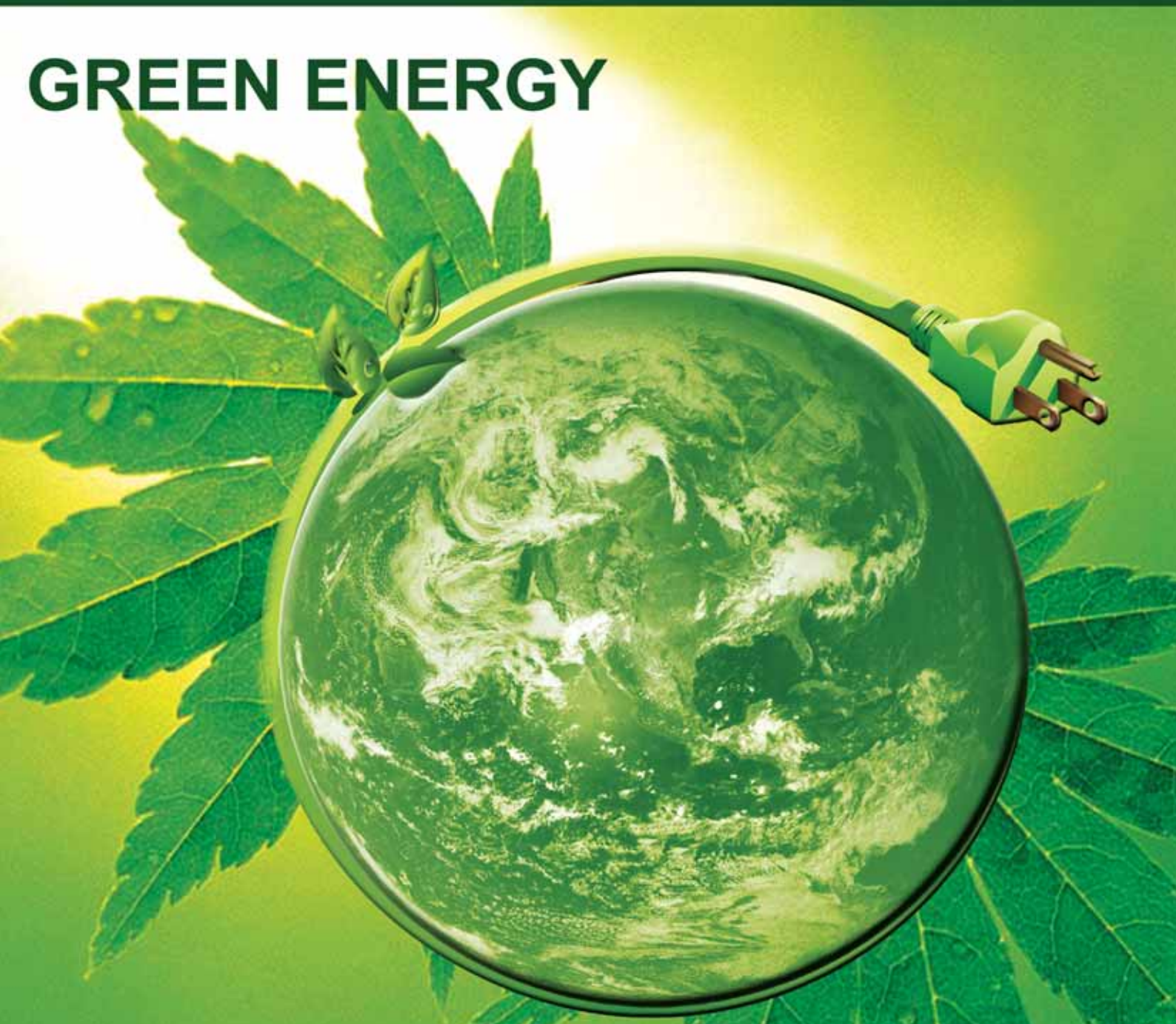
GREEN ENERGY



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Introduction

Energy is a basic necessity for all of us to lead a normal life in this world. In the stone ages, the need for energy was limited and the people met their energy needs directly from nature. With advancement of civilization and invention of new machines and increase in demand for energy, people exploited coal, oil etc. to meet the energy needs taking advantage of inventions and new technologies developed for harnessing them. But its consequences have become alarming in recent years. Apart from the problem of pollution, the society has to grapple with faster depletion and high cost of fossil fuels. The pollution caused by emissions, triggers a chain of events that ultimately lead to global warming. Hence out of necessity, we are once again forced to look up to nature for meeting our energy needs from sources which can be replenished and are free from pollution.

Tamil Nadu is endowed with abundance of natural resources such as solar, wind, biomass etc. which can supply to the energy needs. These are also called as alternative or renewable sources of energy because they are either inexhaustible or can be replenished with human effort. They are also clean and green sources of energy and hence can mitigate the emission of Green House Gas (GHG). It may be noted that the technologies for harnessing some of these sources are fully developed and can be employed on commercial basis. There is, however, need for change in the mindset of the people, to adopt these technologies. Though the initial cost is high, considering the long term benefits, it is necessary to use renewable energy sources

Disadvantages of fossil fuels

- Limited resources of fossil fuels: India has only 0.6 % of world's oil, 0.6 % of natural gas and 6 % of coal reserves
- Faster depletion of resources due to increase in demand for energy.
- High cost of fuel and is uneconomical in the long run.
- Heavy outgo of foreign exchange: almost 70% of requirements of petroleum products are imported.
- Environmental degradation due to Green House Gas emissions, air pollution etc.

Advantages of renewable energy

- Inexhaustile or can be replenished.
- Universal availability of resources.
- Feasible for decentralized power generation.
- Free from pollution and mitigates GHG emissions.
- Can bring additional revenue through carbon trading.

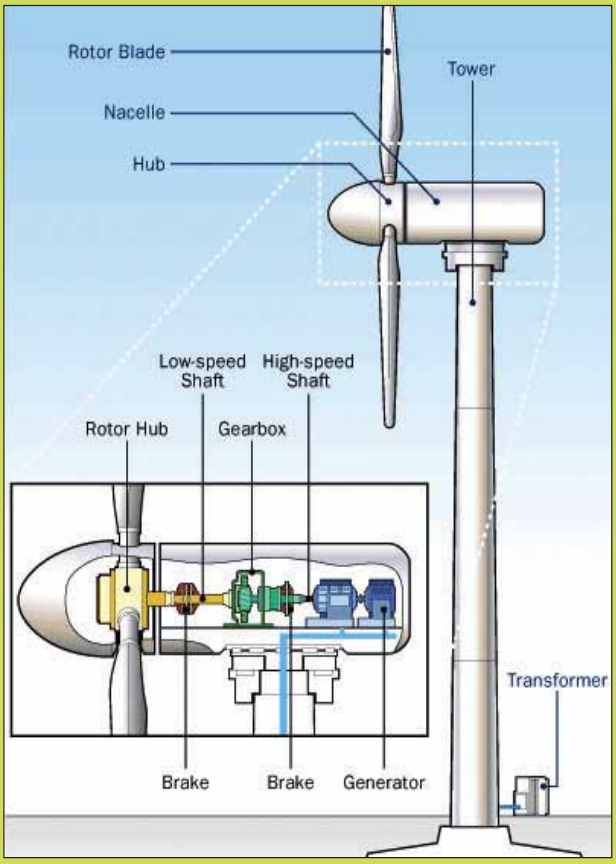
Wind Energy

Wind is generated due to heating of the earth's surface. Uneven heating of different areas of earth causes difference in pressure and makes the air flow from high pressure region to low pressure region, which is termed as "Wind". As wind contains tremendous amount of energy, it can be harnessed to generate power on a large scale matching with conventional sources. India is at present ranked 4th in the world in wind power generation of which Tamil ranks as the number one State in the country in terms of wind power generation. Tamil Nadu produces more than 40% of the wind power generated in India.

Technologies for harnessing Wind Energy

Wind Electric Generators:

A Wind Electric Generator is a mini power plant which generates electricity from wind energy. It consists of a 30 M high tall steel tower with the wind turbine mounted on top. The wind turbine has 3 main components. (i) rotor blades (ii) gear box and (iii) generator. The wind force striking on the blades is initially converted into mechanical energy and this mechanical energy operates the Wind Electric Generator to produce AC. electricity. The Wind Electric Generator has no battery bank and the power produced is directly fed into the grid of the Electricity Board. The entire operation of power generation is controlled automatically by means of electronic control system mounted at the bottom of the tower.

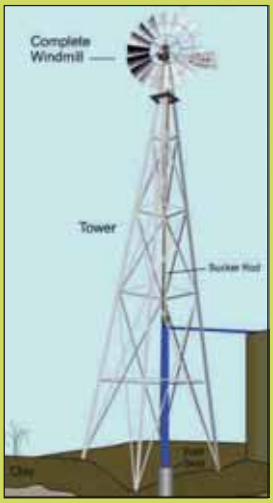


Special features:

- Wind Electric Generators can be installed only at specific locations with adequate wind potential.
- Available in various capacity ranges from 225 KW to 750 KW.
- Tower height can be in the range of 30 M to 50 M to tap wind energy more effectively.
- Wind Electric Generator of 250 KW can generate 4 lakhs to 6 lakhs units of electricity per annum depending upon the wind potential of the area.

Wind Mill Water Pumps

A windmill for water pumping consists of 12 metre high steel structure with 12 to 18 blades mounted on the top and with a pumping device. The wind force striking at the blades is converted into mechanical energy and this energy is used to operate a pumping rod, as in the case of a hand pump, to pump out water from an open or bore well.



Special Features:

- The windmill can be installed in any well which has no obstruction in the form of tall trees or building around the site.
- It can operate in places where the wind speed is about 18 kmph. Gear type wind

mills are available which can operate at a speed of 9 kmph.

- The height of structure can be increased at the time of erection based on site requirements.

- There are only a few moving parts which if maintained properly will render long service.

Small Aero Generator / Hybrid System

Aero generator is a stand-alone type generator which uses wind energy for producing electricity, which is stored in a battery set. The power is conveniently used for feeding small loads upto 30 KW. In the case of hybrid systems, the generator will be run using both wind and solar energy so that the availability of power is increased during the day and at night.

Solar Energy

Solar energy, in the broad sense, is the total frequency spectrum of electromagnetic radiation given off by the Sun. This energy has been harnessed by humans since ancient times using a range of ever-evolving technologies. Solar technologies are broadly characterized as either passive solar or active solar depending on the way they capture, convert and distribute solar energy. The following are the most commonly used solar technologies.

Solar Water Heating Systems (SWHS)

Solar Water Heater is a device which converts cold water into hot water (80° C) making use of solar thermal energy. It has three main components viz., (i) Solar collector (ii) Insulated hot water storage tank (iii) cold water tank and insulated hot water pipelines and accessories. It is basically a device which converts the cold water into hot water by absorbing the heat from solar energy. The solar collector with copper riser, header tubes along with copper absorber sheet gains more heat from the sun and converts cold water into hot water.

The hot water is transferred from the collector to the storage tank by thermosyphon system because of its density being less than that of cold water. The hot water thus obtained could be maintained for 30 hours irrespective of outside climatic conditions. Generally the storage tank is made of stainless steel in order to provide good water to the inmates of hostel, hospitals, etc.

Solar Air Heating Systems (SAHS)

The SAHS raises the ambient air temperature by 30° C to 40° C and provides preheated air as input to the conventional heaters thereby saving fuel like firewood, coal, etc. including the conventional electricity to the extent of 25%. The Solar Air heating Systems are currently used in processing of tea leaves, fruits, vegetables and drying of grains etc. Tamil Nadu is leading in their successful use. 46 such systems have been successfully commissioned in Tamil Nadu so far. The use of SAHS has now been extended to fish drying, dhal, spices, leather and other industrial products.

Solar Cooker

Solar Cooker is similar to conventional cooker used in a kitchen to cook food, but the former does not require any cooking gas or kerosene, neither any coal nor any wood as fuel. There is no need for electricity to run it. Solar

Cooker works only on solar energy. It gives no smoke. No soot spoils the cooking untensils. It keeps the environment clean and causes no health or fire hazards to the personnel who do the cooking. There are different types of solar cookers according to the number of persons for whom the cooking is required to be done.

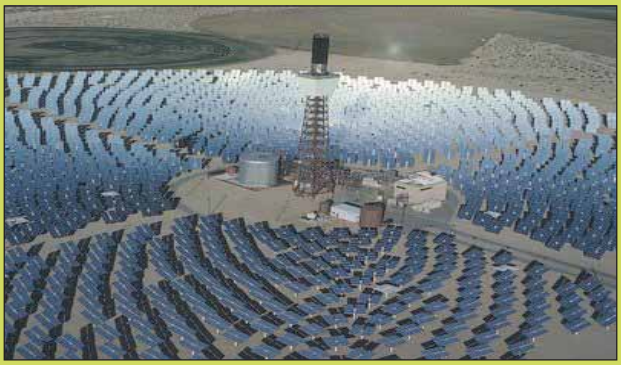
The solar cooker consists of a well insulated box, the inside of which is painted full black and is covered by one or more transparent covers, to trap the heat inside the solar cooker but not to allow the heat to come out of the box. The temperature inside can go upto 140^{o} which is adequate for cooking. A normal box cooker of 0.6 m x 0.6 m in size with a weight of around 12 kgs is capable of cooking 2 kgs of food and will save around 3 to 4 LPG cylinders per year. The cooker is also available with electrical back up so that it can cook food during non-shine hours with nominal consumption of electricity. For cooking for more than 10 persons a Dish Solar Cooker can be used. This type of cooker is made of reflecting aluminum sheets.

Solar Photovoltaic

Solar Photovoltaic (SPV) Systems consist of the following components:

- SPV modules
- Battery Bank
- Electronic circuits (Inverter and charge controller)
- Load (i.e.) devices to be energized viz, lamp, fans, pumps etc.

SPV modules consist of silicon cells. The sunlight falling on silicon cells is converted into D.C. electricity. Standard sizes modules are 37 watt or 74 watt and several modules can be connected together, to get the required wattage. D.C. electricity produced by the SPV modules can be used straightaway for running D.C. motor pump sets for lifting water. Alternatively DC electricity produced by the SPV modules is stored in a battery and converted into AC electricity by using electronic circuits, viz., Inverter and charge controller. AC electricity thus produced can be used to operate lights, fans, or can be fed into the Tamil Nadu Electricity Board grid in case of large scale power generation. SPV systems commercially available now are SPV Lanterns, Home Lights, Street Lights, Water Pumps and SPV Power Plants which are standalone or grid connected.



Bio Energy

Bio energy refers to energy derived from all land and water based vegetation as well as other organic wastes. Biomass is produced by green plants through photo synthesis using sunlight. Biomass is burnt to get thermal energy, which is used to produce steam and then electricity.

Biogas Plants:

Biogas is a flammable gas and is used as fuel. Biogas, a mixture containing 55-66% of methane, 30-40% carbon dioxide and the rest being impurities, can be produced from the decomposition of animal, plant and human wastes, organic matters, etc. It is also possible to generate biogas from crop residues, forest waste, municipal garbage, kitchen wastes, paper wastes, waste from sugarcane refinery, etc. It is very unfortunate that more than 50% of these raw materials are thrown out without proper use or burnt uneconomically.

Uses:

- It can be used directly in cooking stoves or for burning lamps for illumination.
- It can replace firewood, oil, gas etc.
- The material from which biogas is produced retain its value as a fertilizer
- Conversion of biogas to electricity is possible
- The production of biogas facilitates improved sanitation, etc.
- It creates an improved environment.

Bagasse Based Co-Generation

Generation of steam at high pressure for power generation in turbines and subsequent use of the same at lower pressure for process heating application is termed as cogeneration. Conventional combustion technology is used for producing steam by burning bagasse. The sugar mills generate power through burning of bagasse. The bagasse produced during crushing season in a sugar mill is burnt in the boiler to generate high pressure superheated steam. The steam is then fed into the steam turbine - coupled with alternator to produce power. The outlet steam from the turbine coming at a lower pressure is used for processing sugarcane juice to produce sugar.

Tamil Nadu is No. 1 state in the country in co-generation of power from sugar mills - 3 co-operative and 20 private sugar mills have installed cogeneration plant. The total installed capacity under cogeneration is 559.90 MW which is 25 % of the installed capacity in the entire country.

Achievements of Tamil Nadu in harnessing renewable energy

Grid connected power: Tamil Nadu has achieved tremendous success in harnessing renewable energy for generation of grid quality power. It has 33% of India's installed capacity.

Wind power: Tamil Nadu is No. 1 in India with an installed capacity of about 44% of the total installed capacity in India. The private investment in wind

power exceeds Rs.18,200 crores. The power generation has exceeded 40 billion units (cumulative).

Cogeneration & biomass : Tamil Nadu is a pioneer in introducing cogeneration in sugar mills and continues to lead with installed capacity of about 25% of installed capacity in India.

Decentralised systems

25,068 Solar domestic lighting systems installed in Tamil Nadu with assistance from Government.

6,095 Solar street lights installed in pubic places/ streets mostly in village panchayats with Government assistance and active support and involvement of Rural Development Department. Solar water and air heating/drying systems installed for a collective area of 28,791 sq.m.

189 community and toilet linked biogas plants have been constructed in the State under subsidy scheme.

National Energy Conservation Day

National Energy Conservation day is celebrated every year on the 14th December. The day is marked by various programmes with the objective of promoting energy conservation. The Energy Conservation Awards are distributed on this day. These annual awards recognize innovation and achievements in energy conservation by industries, buildings, railways, state designated agencies, aviation sectors; manufacturers of BEE star labeled appliances and municipalities which provide specific examples of best practices in raising awareness about energy conservation potential and implementation.

EVENTS

NGC Training Programme in Krishnagiri District

A One day Training Programme for the NGC Teacher Co-ordinators of Krishnagiri District was conducted at "Don Bosco Matriculation School, Krishnagiri" on 27th October 2010. Around 150 teacher co-ordinators participated in the training programme. Thiru. G. Moorthy, Chief Educational Officer, Krishnagiri, Thriu. M. Baskaran, Chief Educational Officer, SSA Krishnagiri and Thiru. A. Krishnan, Assistant Educational Officer, Krishnagiri participated in the training programme.

Thiru. G. Moorthy in his inaugural address stressed the need for understanding Environmental problems of the present day so that the students can be sensitized about the need for environmental protection. Thiru. A. B. Thiruvengadam, NGC State coordinator gave a brief lecture about the environmental friendly practices to be followed in the schools and to involve the students in various environmental activities such as celebration of green days, conservation of wild life, vermicomposting, planting and protecting trees etc., Thriu. J.D. Marcus Knight, S.P.O, ENVIS Centre gave a lecture on Solid Waste Management with tips on energy conservation and simple ways to reduce, recycle and reuse.

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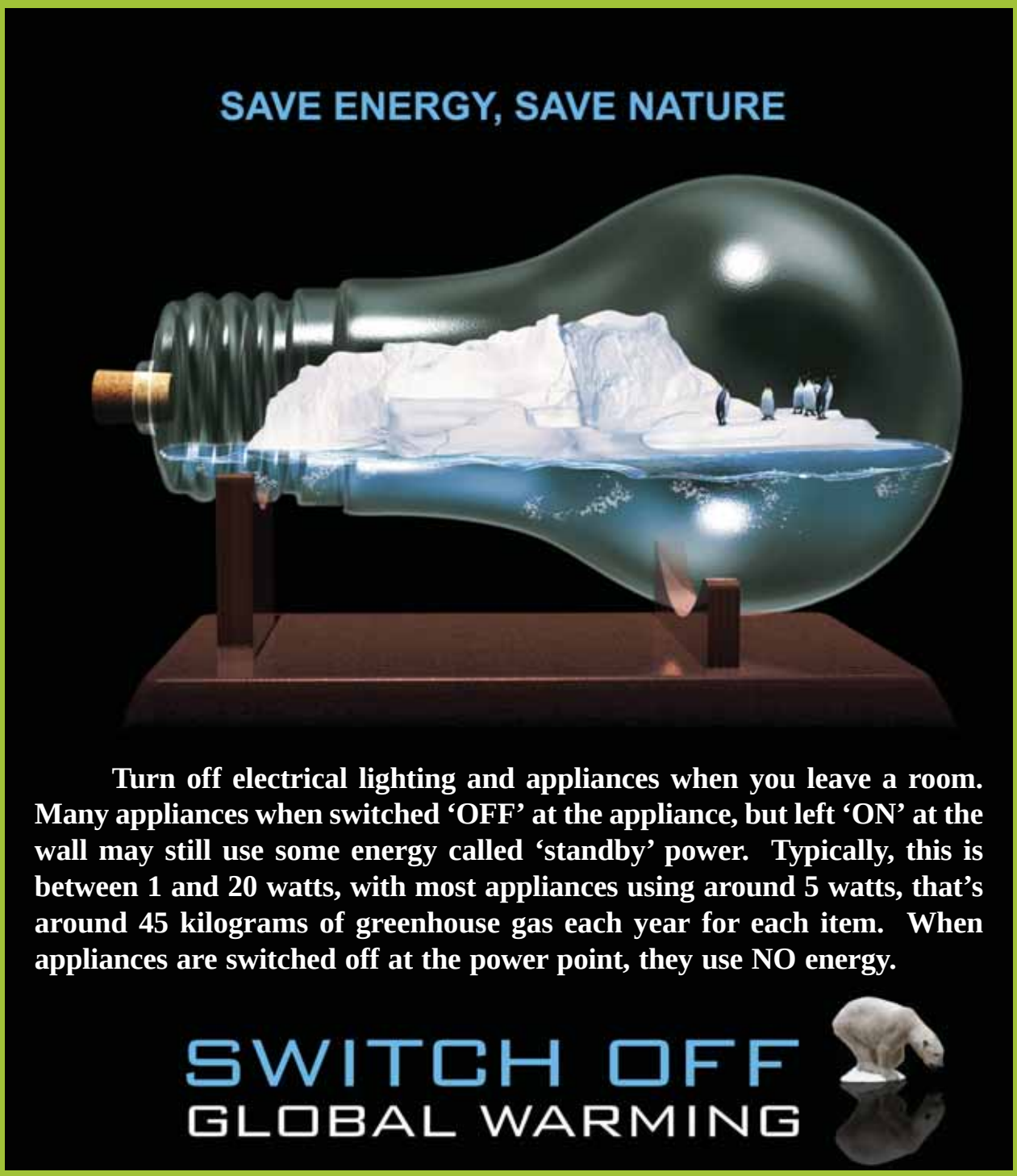

Turn off electrical lighting and appliances when you leave a room. Many appliances when switched 'OFF' at the appliance, but left 'ON' at the wall may still use some energy called 'standby' power. Typically, this is between 1 and 20 watts, with most appliances using around 5 watts, that's around 45 kilograms of greenhouse gas each year for each item. When appliances are switched off at the power point, they use NO energy.

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