Science for a Sustainable Future

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The fact that throughout the past decade we have been incessantly hearing the words sustainable living, sustainable use, sustainable development shows the extent of their importance. However, we cannot delay anymore to investigate deeply to see whether we are actually leading a sustainable living.

Human beings have been consuming the limited resources on earth since ancient times. Consumption during the past two centuries has been special, because during this period the manner and the rate at which the resources have been used has been unlimited. The opinion of scientists is that along with the scientific and technological development which followed the industrial revolution, there has been socio economic and attitude changes which in turn has brought about the excessive use of resources.

It is frightening even to think that there will be no resources remaining for the people who will be born tomorrow, at the rate the resources are being used today. If we are to see that some resources, energy and space remain to be used by the future generations, then it becomes necessary for us to lead sustainable living as indivuduals, societies, nations and finally on a global scale. Everybody has to change the life style.

The main challenges that have been identified globally in this context are:

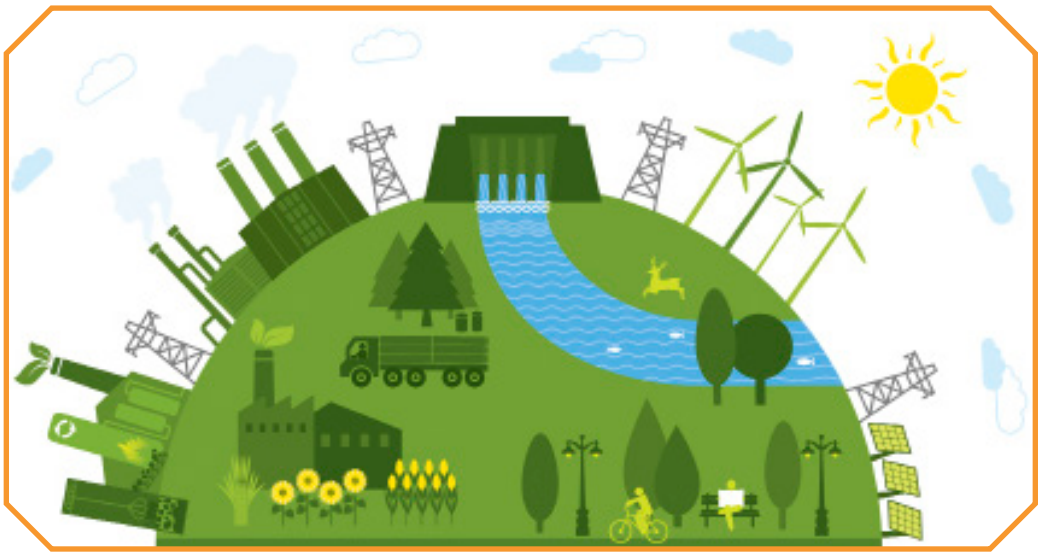
1. Reduction of fossil fuels
2. The climate change factor resulting from CO_2 release
3. The costs of energy and water which are escalating daily

Hence we will examine to what extent science and technology can be used to overcome the above challenges. Today's main energy sources are the fossil fuels which are burnt to produce the required energy. There are two main problems involved here.

1. The rapid decline globally of the fossil fuels.
2. The sharp climate change brought about by the release of CO_2 into the atmosphere through the burning of fuels

Therefore science has now turned to looking at options to produce 'clean energy'.

Australia has invented the implements (technology) to tap

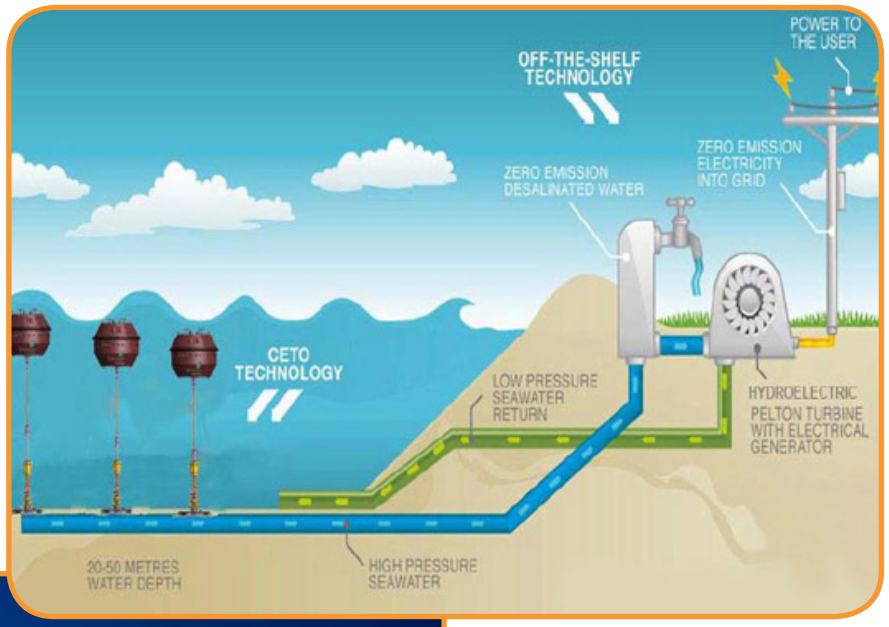


wave energy from waves and tides of the ocean. The production of this 'clean energy' does not involve the release of gases (CO_2 etc). This technology is used not only to produce energy but also to produce fresh water from sea water by removing the salt in it.

A normal solar panel produces electrical energy when the sun's rays fall on it. Such energy production is less efficient on cloudy and rainy days. However China has recently invented solar panels which have overcome this problem. They have added a net of carbon atoms arranged in the form of a honey comb on the solar panel. The resulting increased charge in the water brought about by increased Na^{++} , Ca^{++} and NH_4^{++} ions in the water helps to generate electricity. These novel solar panels function efficiently under all climatic conditions and produce clean energy.

Biologists are contributing towards inventing yet another type of solar panel. They have delegated this task to a group of organisms called cyanobacteria.

Human beings have been making use of wind energy from early days. This is evident by the existence of large wind mills specially in some European countries. In Sri Lanka also there is some generation of electricity using wind power. However the electricity generated from such sources is hardly sufficient to meet the huge demand for electricity. The wind powered electricity generators invented in Japan are very efficient. United States has invented mechanical (artificial) plant 'leaves' which produce a liquid fuel using sun's energy. These artificial plant 'leaves' carry out a process similar to that of photosynthesis, and break up water into H_2 and O_2 using sun's energy. A bacterium that is incorporated into it carries out this process, and at the same time produces a liquid fuel using CO_2. The above examples are only a



few of the novel inventions for producing clean energy. There is the a great expectation that it would be possible in the near future to produce the required energy for tomorrow through the intervention of science and technology. Another field in which this intervention of science is becoming important is in food security. In this context scientists are in search of plants that are naturally adapted for sality as well as, resistant to pests and drought. Through such investigations it is possible to control to a certain extent the damage caused to crops by pests, drought and other natural disasters.

Another way to save energy is to pay attention when planning and designing buildings. It has been shown that it is possible to reduce the energy demand by about 30% when such buildings are being used.

Transport, travel and lighting are the other energy consuming processes. The new inventions for these processes are unbelievably energy efficient. Consider for instance the developments that have taken place in lighting of houses and offices during the past two decades. The filament bulb, fluorescent tube and the CFL bulb has been replaced by LED technology. We can expect even more efficient lighting techniques in the future.

Also the fuel use efficiency of vehicles is increasing in an unbelievable manner. The rate of 'birth' of new inventions in this field can be enhanced by extending global co operation to research. One can observe the rate of increase of hybrid vehicles on the highways.

It is clear that for a sustainable future it is necessary to have a direction not only for science and technology but also for others such as for the environment, social, economic and political activities. Many methods are employed to rectify and orientate the entire compendium of processes. One of these is to change the current trend in consumption, so as to bring about a satisfactory set up for the future by understanding the anticipated use in the future

based on the current consumption pattern. For example estimate for how long the existing quantity of fuel could last at the rate it is being used now, and determining how the consumption should be reduced for sustainable use. Also research should focus on novel methods which will bring about a change in the fuel consumption within a time frame. This is referred to as 'Back casting'.

It is generally accepted that there are a few methods that can be used to re-orient the life style and the economy to adapt to the environment. Novel scientific and technological inventions can contribute immensely towards this end. By the end of the 20th century the industry based economy gradually changed into a knowledge based society. Therefore the knowledge that is increasing daily has to be used in a responsible manner to suit the environment.

It is extremely important that environment friendly activities should to be followed especially in the following areas.

One of the main areas that should receive the attention of scientists is in the use of energy. It is important to develp new methods of energy generation, which will produce less of gases such as CO_2. In order to maintain twice the level of green house gases that existed before the industrial revolution, it is necessary to reduce the present global release of green house gases by 50%.

It will be possible to reduce the energy used to heat buildings in temperate regions by covering the buildings with insulating materials. Use of wind energy and suns energy are wise options.

Water is essential for agriculture, industries, energy generation and direct human use. When assessing the present day status of water use and predicting the future use it is also necessary to investigate the methods that can be used to "safe guard" water (protect) and to obtain clean water. It is therefore extremely important to develop new technologies and inventions for the treatment of water, management, recycling and desalination of sea water.

Balanced and nutritious food is a basic human need. When food has to be supplied to an increasing population, and to reduce the level of malnutrition, it is necessary to pay more attention to better ways of land use, and to determine how climate change will impact on agriculture. In order to produce crops with higher yields and to produce crop varieties which are resistant to drought and pests and which can tolerate very saline soils, biotechnology based studies such as gene technology needs to be used. For these there has to be State intervention.

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