

# Green technology for sustainable urban life

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## Abstract

Human Civilization uses technology for supporting day to day activities of urban life. New technologies are more efficient and environment friendly due to increased awareness and recent development in research areas of energy management. The adoption of technology is limited and has adverse effects on environment and human civilization. Therefore, scope exists for application of new technologies which are more environmental friendly for supporting day to day activities of an urban lifestyle. These technologies are characterized as green or clean technology. Green technologies involve: energy efficiency, recycling, safety and health concerns, renewable resources, and many more. This paper reviews various technologies from view point of adaptability and implementation issues for modern living towards sustainable environment.

**Keywords:** Green technology, environment, sustainability.

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## INTRODUCTION

With the increased efforts in the direction of globalization across the globe also increased the level of competition among companies in various domains of work and in between governments for the sake of development. The fact that globalization has taken the world to new heights of development and it has also increased the pace of development in many developing countries especially, India and China. For the sake of globalization and development we are continuously exploiting our mother nature, the environment. People concerned with environment and ecology suggests that if this rate of exploitation continues then the day is not so far when earth and its environment will be not suitable for sustainable life. That's where the term green technology comes into lime light which uses technology in such a way that in one end development which is a result of globalization continues and on the other end the level of negative environmental impact is reduced to its minimum level.

In later part of this paper we will discuss about various types of green technologies present, scope of these technologies and what are the difficulties connected with them for implementation to have a greener, cleaner earth and for sustainable urban life.

## GREEN TECHNOLOGIES IN BRIEF

Green Technology is a term which came into limelight when the world felt that there is urgency in the direction of environmental and ecological stability. There is no such exact definition of green technology but United Nations [5] defines Green Technology as *"technology that has the potential to significantly improve environmental performance relative to other technology. It is related*

*to the term environmentally sound technology."*

Green Technology is the application part of branches of science which tries to conserve the natural environment and to minimize the adverse impacts of human activity. It is related to sustainable technologies. In this section we will briefly see various green technologies that are in use.

### Energy Conservation

Energy Conservation is nothing but the use of equipment which requires lesser amount of energy, following low consumption of electricity; thereby reducing the use of fossil fuels to generate the same. Energy conservation and efficiency are both energy reduction techniques.

### Water Treatment

It describes processes used to make the water more suitable for the end users. The use of such water categorized broadly among drinking water, industrial use, medical use and other uses. The main objective of water treatment is removal of pollutants in the water, so as to make it suitable for further use. Basically, as we are concentrated on environment, so from the viewpoint of environment water treatment is used to reduce the adverse impact of the water returning to the environment after use.

Settling, filtration, disinfection, coagulation are some of the basic physical and chemical processes employed for water treatment. Also aerated lagoons, activated sludge or slow sand filter are some prominent process.

### Environmental Remediation

Environmental Remediation deals with the removal of pollutants from the natural resources such as ground water, water reserves on earth surface, soil for the protection of environment and human health. Remediation is nothing but a regulatory requirement

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based on data acquired for human health and environment damage risk.

### Air Pollution Control

Air pollution is not wanted change in the overall characteristic or property of air. Pollutants such as asbestos, dust, soot, ash, carbon monoxide, sulphur oxides, chlorofluorocarbons (CFC), lead compounds, etc. are the major contributor in air pollution. The sources of air pollution are broadly classified as natural and manmade. Air pollution control comes under green technologies which minimizes the level of adverse impact in the environment due to air pollution. There are many methods to control it some of the major or important methods employed are (i) Combustion, (ii) Absorption, (iii) Adsorption, (iv) Mechanical Devices, (v) Fabric Filters, (vi) Wet Scrubbers and (vii) Electrostatic Precipitators.

### Sewage Treatment

The concept of sewage treatment is same as that of water treatment. This Treatment has a greater significance as it purifies the water according to its pollution level. It removes pollutants from waste water, household sewage, etc. It involves processes according to the kind of pollutant present. The objective of sewage treatment is to give safe fluid waste stream and solid waste for disposal or reuse which are environmentally correct. Using latest technology, the reuse of sewage water for drinking is also possible.

### ADVANCES IN GREEN TECHNOLOGIES FOR URBAN LIFE

The field of Green Technology is expanding in a very fast manner. The initiatives of United Nation and other countries towards green technology is remarkable and a work of appreciation. These initiatives made awareness about the damages which we are contributing in damaging the environment challenging its sustainability and so compelling to go green to have a sustainable environment.

For the same, different sectors of society are using techniques in their operations which are characterized as Green or Clean Technologies.

### Hydrogen and Fuel Cells

A fuel cell is a device that converts the chemical energy from a fuel into electricity by a chemical reaction with an oxidizing agent such as oxygen. The most commonly used fuel in these fuel cells is Hydrogen, although natural gas and some alcohols are used as a fuel. The main difference between a fuel cell and a battery is that when the constant source of fuel and oxygen is over in a battery then it stops working but in case of fuel cell it works continuously till the source of fuel and oxygen is supplied. The first simple hydrogen fuel cell was invented in the year 1842 by a welsh physicist William Grove, who reversed the process of electrolysis to combine the hydrogen with oxygen to generate electricity leaving pure water as a by-product. After a gap of nearly a century NASA space programs used fuel cells for its space missions.

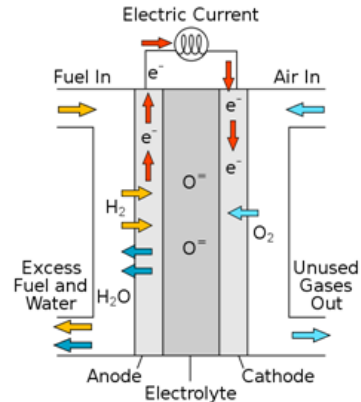


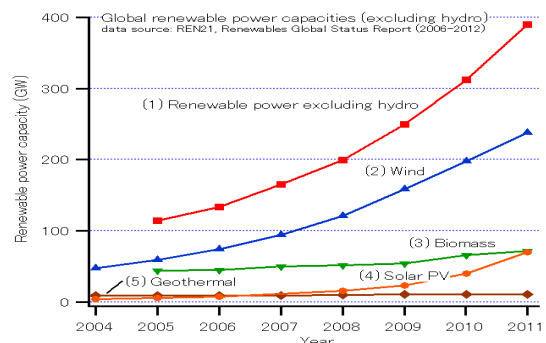
Diagram of a solid oxide fuel cell

Fuel cells are more efficient to power cars when compared to our conventional internal combustion engines. The energy efficiency of these cells can be around 40 – 60% [1]. Its features like no emissions, quiet and vibration free makes it unmatched product in its class. Again as we know that hydrogen is in plenty in our universe. We can get hydrogen from any means such as natural gas, coal, etc. But as we are dealing with only green or clean technology, in that case water is the sole source of pollution free hydrogen. These are used as primary or secondary source of power generation in many commercial, industrial and residential buildings, etc. Also used in fuel cell vehicles of both civilian and military.

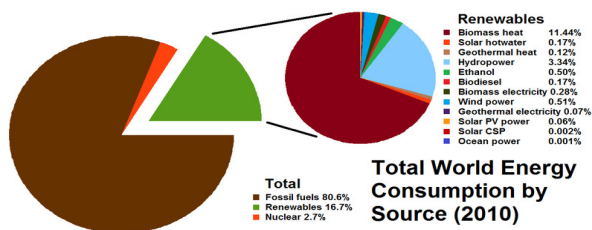
### Renewable Energy

Renewable Energy is a defined as a category of energy sources that are either directly or indirectly related to the sun such as solar, Hydro energies, etc. In other words, described as energy from those sources which are inexhaustible in nature as known to mankind such as sunlight, wind, geothermal heat, etc. As the description tells that renewable energies are nothing but the green or clean energies which is the need of the hour for sustainable urban life.

In past years different agencies across the globe taken measures to increase the value of these energies among the world's population thereby about 16% of world's energy usage comes from these energies with nearly 10% from biomass for heating and 3.4% from hydroelectricity[2]. Projects related to renewable energy are of large scale and more suited to urban population, but these so called green technologies are also suited for rural population, which not only harnesses the potential sources of renewable energies but also help in the sustainable development of mankind.



We have moved further in the subject of renewable energies and still trying to find more type of energies, some of them are (i) Cellulosic Ethanol (ii) Marine Energy (iii) Enhanced geothermal systems (iv) Artificial Photosynthesis.



Courtesy :REN21 Global Status Report 2012

## Green Buildings

Green buildings are also referred as “Sustainable Buildings” that means a building designed to be ecologically correct by using resources efficiently, using internal recycling, renewable energy sources, recyclable or biodegradable construction materials, and blending in with the local environment. Its aim is to reduce to a minimum environment impact and to take human health factors into account.

More specific and accepted definition of green building given by U.S. Environmental Protection Agency[7][9] is “Green building is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life-cycle from sitting to design, construction, operation, maintenance, renovation and deconstruction. This practice expands and complements the classical building design concerns of economy, utility, durability, and comfort. Green building is also known as a sustainable or high performance building.”

### Impacts of the built environment

Aspects of Built Environment:	Consumption:	Environmental Effects:	Ultimate Effects :
Siting Design Construction Operation Maintenance Renovation Deconstruction	Energy Water Materials Natural Resources	Waste Air pollution Water pollution Indoor pollution Heat islands Stormwater runoff Noise	Harm to Human Health Environment Degradation Loss of Resources

Green buildings are designed to reduce the overall impact of the built environment on human health and the natural environment by:

- Efficiently using energy, water, and other resources
- Protecting occupant health and improving employee productivity
- Reducing waste, pollution and environmental degradation

### Cleaner Conventional Energy

This energy is not some special energy but is the same non conventional fossil fuels. The name cleaner conventional energy is said because of the energy from these fossil fuels has minimum adverse impact on the environment and ecosystem. Some of the cleaner conventional energy sources [6] are:

#### Cleaner Coal

It describes the cleaner use of coal by methods which minimize the adverse effect on the environment. Cleaner coal technologies usually address atmospheric pollution from burning coal, and include such solutions as Coal Screening and Scrubbing, Gasification, Flue Gas Desulfurization, Carbon Capture and Storage (CCS), and Coal Blending.

#### Cleaner Oil

Cleaner oil technologies can be applied to oil exploration and extraction (e.g. reinjection of water, steam or gas for improving oil

production and reducing pollutant emissions). These technologies can also be applied to oil transportation and refining, and include oil-tanker automatic dehydrators, vapor recovery and wastewater sulfur removal.

### Cleaner Gas

Cleaner gas technologies facilitate improved usage of Coal Bed and Coal Mine Methane (CBM/CMM), reduction of greenhouse gases through the use of low concentration methane and support of the Natural Gas Combined-Cycle (NGCC) processes.

### Green Industries

Green industries are referred to those industries which try to minimize its affect in the environment by implementation of green investment. This term “Green Industry” was coined by UNIDO which describes it as “economies striving for a more sustainable pathway of growth, by undertaking green public investments and implementing public policy initiatives that encourage environmentally responsible private investments.” UNIDO [12] also explains *Greening of Industry*, as a method to attain sustainable economic growth and promote sustainable economies. It includes policymaking, improved industrial production processes and resource-efficient productivity.

### Green Transport

Green Transport referred as environmentally sustainable transport uses technologies in transport system which are sustainable and have significant positive impacts on the

environment. Thus, it can be said that sustainable transport systems make a positive contribution to the environmental, social and economic sustainability of the communities they serve.

In environmentally sustainable transport the use of green vehicles allows to have less environmental impact than equivalent standard vehicles, although when the environmental impact of a vehicle is assessed over the whole of its life cycle this may not be the case. Electric vehicle has the potential to reduce transport CO<sub>2</sub> emissions, depending on the embodied energy of the vehicle and the source of the electricity. Hybrid vehicles, which use an internal combustion engine combined with an electric engine to achieve better fuel efficiency than a regular combustion engine.

According to the European Union Council of Ministers of Transport, defines [8] a sustainable transportation system as one that:

- Allows the basic access and development needs of individuals, companies and society to be met safely and in a manner consistent with human and ecosystem health, and promotes equity within and between successive generations.
- Is Affordable, operates fairly and efficiently, offers a choice of transport mode, and supports a competitive economy, as well as balanced regional development.
- Limits emissions and waste within the planet's ability to absorb them, uses renewable resources at or below their rates of generation, and uses non-renewable resources at or below the rates of development of renewable substitutes, while minimizing the impact on the use of land and the generation of noise.

## CHALLENGES IN IMPLEMENTATION OF GREEN TECHNOLOGY

The Commonly arising Challenges in the implementation of green technology is listed as

1. Large Funding is needed for Research and Development of green technologies and as economies around the world is suffering makes the way difficult for green technologies.
2. Environmental Impact Assessment process sometime non productive.
3. The incompatibility with the existing infrastructure.
4. Unavailability of auxiliary support systems to harness the green technology to its full extent.
5. Stiff government policies
6. Basic Needs takes the first place in priority list making the green technology to be a luxury need.
7. Lack of knowledge about the benefits out of green technologies.
8. Conservative culture of thinking restricts innovation towards green technologies.

## CONCLUSION

The technologies like fuel cell and renewable energies are getting much exposure as green technologies as they can be easily adapted in the existing infrastructure. Green Transport is an application of fuel cell and renewable energies, so the adaptability of this depends on how well fuel cell and renewable energies are implemented. Also one of the major factors is finance in Green Transport. Green Building and cleaner conventional energy are

suitable from the point of adaptability, but in this finance becomes the major issue with existing infrastructure, government policies and awareness hindering the implementation of the same.

From the above discussion we can conclude that green technology is a must in today's scenario to carry out a sustainable urban life. Because the conventional technology is challenging the sustainability of today's environment. Although some problems are coming in the way of its implementation but if we see its long term implication it's for sure we and our future generation will be benefitted. Also using green technology we can conserve our limited energy sources to some extent

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