



# An Approach Towards Green City Concept – Sustainable Development: A Review

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## ABSTRACT

As towns and cities are growing at an alarming rate, with an increasing trend of urbanization, which in turn increases greater demand for urban infrastructure and urban land for accommodating the future urban growth and development. At the same time these aspects became a very significant component to redefine their planning approach by the concerned authorities of the city, such as the urban local bodies like City Corporation which are taking care of urban growth and development in most of the compactly developed areas of the city or town. The urban areas beyond local body's jurisdiction are generally taken care by urban planning and development authorities to accommodate future urban growth and development with a comprehensive approach through proper urban planning processes. In spite of the comprehensive approach in urban planning most of the urban problems remained as irresolvable and becoming beyond the control of planners which in-turn bring down both quality of life and the natural environment. On the other hand a green city planning concept, not a new concept, but it is a new approach in the urban planning processes to overcome existing inabilities in handling the urban problems which were treated as complex and un-resolvable to make urban planning more sustainable without damaging the urban ecology and environment.

Keywords: Ecology; Environment; Green City Concept; Urban Planning.

## 1.1 INTRODUCTION

Green cities are already beginning to emerge. The emergence of more and more green buildings and the transformation of old buildings into green ones is definitely a positive sign. However, few things in this regard need a serious attention. These are:

1. The integrated approach.
2. The rate of green development.
3. The implementation of principles of 'One Planet Living' (OPL). These 10 'One planet living' principles are :

- Zero carbon.
- Zero waste.
- Sustainable transport.
- Local and sustainable materials.
- Local and sustainable food.
- Sustainable water.
- Natural habitats and wild life.
- Culture and heritage.
- Equity and fair trade.
- Health and happiness.

Our study is towards the attainment of zero carbon and zero waste principles.

## 1.2 OBJECTIVE

To provide an integrated approach for fulfilling the energy requirements of an entire city with the help of renewable sources, in an aligned and planned manner.

## 1.3 METHODOLOGY

The objective of the study is to provide an integrated approach for fulfilling the energy requirements of an entire green city with the help of renewable sources, in an aligned and planned manner.

Its scope is vast as the methods involved are from renewable sources and environment friendly. The need of environment friendly methods and techniques are in huge demand due to global issues arising out of use of non-renewable and carbon emitting sources.

The methods adopted for the work are literature review through various journals, books and papers, analytical approach and using formulas for estimation, cost calculation and valuation.

A case study is done on MASDAR city.

A proposed model city is included and its energy demands are worked out through renewable measures.

The economic analysis is then carried out showing the cost effectiveness of the method.

Finally, challenges and recommendations are mentioned and the conclusion of whole study is inferred.

## 1.4 SCOPE

Renewable energy is critical to our fight against climate change. We simply must shift our world to a low-carbon economy and away from oil and coal. Experts agree we need a substantial reduction in CO<sub>2</sub> over the next 40-50 years and this means we need renewable energy. Therefore, there is lot more scope of the work.

## II. LITERATURE REVIEW.

### 2.1 Toward Home-Brewed Electricity With 'Personalized Solar Energy'

**Source:** The journal “science daily”. It was published on December 19,2007.

New scientific discoveries are moving society toward the era of "personalized solar energy," in which the focus of electricity production shifts from huge central generating stations to individuals in their own homes and communities. It describes a long-awaited, inexpensive method for solar energy storage that could help power homes and plug-in cars in the future while helping keep the environment clean. Daniel Nocera explains that the global energy need will double by mid-century and triple by 2100 due to rising standards of living world population growth. Personalized solar energy -- the capture and storage of solar energy at the individual or home level -- could meet that demand in a sustainable way, especially in poorer areas of the world. The report describes development of a practical, inexpensive storage system for achieving personalized solar energy. At its heart is an innovative catalyst that splits water molecules into oxygen and hydrogen that become fuel for producing electricity in a fuel cell. The new oxygen-evolving catalyst works like photosynthesis, the method plants use to make energy, producing clean energy from sunlight and water."Because energy use scales with wealth, point-of-use solar energy will put individuals, in the smallest village in the nonlegacy world and in the largest city of the legacy world, on a more level playing field," the report states.

### 2.2 Nano Flakes May Revolutionize Solar Cells

**Source :** This article has been taken from the journal “questia”.

A new material, nano flakes, may revolutionise the transformation of solar energy to electricity. The nano flakes have the potential to convert up to 30 per cent of the solar energy into electricity and that is twice the amount that we convert today,"A perfect crystalline structure was discovered by Martin Aagesen who is a PhD from the Nano-Science Center and the Niels Bohr Institute at University of Copenhagen. We can reduce the solar cell production costs because we use less of the expensive semiconducting silicium in the process due to the use of nanotechnology. At the same time, the future solar cells will exploit the solar energy better as the distance of energy transportation in the solar cell will be shorter and thus lessen the loss of energy," says Martin Aagesen who is also director of the company SunFlake Inc.

### 2.3 Biomass Energy and the Poor in the Developing World

**Source :** Journal article by Douglas F. Barnes, Willem Floor; Journal of International Affairs, Vol. 53, 2009

Renewable energy technologies are receiving heightened attention, and modern biomass-based energy--the use of wood, crop residues and dung as fuel--is increasingly seen as an important component of the transition to a low-carbon energy future. Several recent long-range sustainable energy studies, including the 2nd Assessment Report

of the Intergovernmental Panel on Climate Change (IPCC), the United Nations Development Programme's Energy After Rio and Shell Petroleum's Energy for Development, have all suggested that large-scale modern biomass might contribute to global energy supplies in the next century to a degree comparable to the use of fossil fuels today. As a renewable energy source, biomass has several compelling features. Biomass can provide electricity on demand rather than intermittently like solar and wind power. It can be turned into liquid fuels such as alcohol or transformed into gaseous fuels through gasification. In addition, the production of biomass can be integrated with wasteland restoration through programs for rural economic development. These benefits could be realized over the next decades if sufficient research is devoted to promoting the development of related technology; such as direct combustion generation of electricity and gasification.

## 2.4 Green Cities Model- Concept Design

**Source:** The journal “ Eco Friend ” Green Cities Concept Designed To Be A Green Powerhouse , August 2010.

The concept is based on three models – energy-efficient buildings, solar-powered bus stops and motion-powered vehicles. The city should have mixed-used buildings that will generate wind and solar energy for power. All surplus electricity will be directed to the city’s electrical network. The building will have a green roof and walls that will not only purify surrounding air but also reduce the building’s energy demands.

The second model is the development of solar and wind powered bus stops and bike stands. The stations will act as small powerhouses and will generate energy to keep them powered and transfer all excess electricity to the main grid.

The city can have kick scooter stores that will be powered by human energy. The stores will be used as small shops and the vehicle will be equipped with a dynamo that captures kinetic energy for nighttime illumination.



## 2.15 Green Cities in India

(Source: Economics Times - India to Build 24 Green Cities in Delhi-Mumbai Industrial Corridor, by Timon Singh, 12/13/10)

As a rapidly developing country, India still makes heavy use of fossil fuels (especially coal) — however in recent years it has worked to diversify its energy supplies and make its infrastructure ‘greener’. The largest infrastructure project currently underway in the country is the Delhi-Mumbai Industrial Corridor, and India just announced that it plans to build 24 ‘green cities’ as part of the development.

The Delhi-Mumbai Industrial Corridor is a major infrastructure project that India is developing with Japan. The project will upgrade nine mega industrial zones as well as the country’s high-speed freight line, three ports, and six airports. A 4,000 MW power plant and a six-lane intersection-free expressway will also be constructed, which will connect the country’s political and financial capitals. The DMIC project is already underway and it will cover six states — Rajasthan, Gujarat, Maharashtra, Haryana, Uttar Pradesh and Madhya Pradesh.

The mega-project, which is rumored to cost over \$90 billion, is being partially funded by the government along with Japanese loans and investment by Japanese firms. The 24 green cities are designed to boost India’s infrastructure in the smaller towns along this 1,483km corridor, as well as national economic growth and prosperity. A key part of the green city development will improve and repair the basic infrastructure of two major metropolitan cities that suffer from poor roads due to high levels of transport. A large portion of the funding will go into developing better transport facilities and public transport systems.

The country’s power systems are also to be improved, as electricity and water shortages are among the biggest problems in India. As a result, the green cities will have “optimized power supplies and a 24-hour water supply”. They will also have waste and water recycling plants. Japan is expected to offer its energy-efficient technologies to make the cities as sustainable as possible. Japan has provided substantial financial and technical aid to India for several years, investing in projects such as the Delhi Metro project. Preparatory work for 7 of the 24 green cities has already begun, with Gujarat set to be the first state to undergo an eco upgrade.

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