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Research Article

ENERGY, INFRASTRUCTURE AND ENVIRONMENT FOR SUSTAINABLE CITIES

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ABSTRACT

Cities need to become smarter by becoming more sustainable, more efficient and more livable. Information technology is helpful in making the city smarter. Smart cities are based on eight pillars comprises of buildings, energy, water, recycling, healthcare, mobility, services and finance. This paper focuses mainly on energy, environment and infrastructure which include all the eight pillars. The key drivers in smart city in terms of energies are maintaining grids reliability and stability, improving energy efficiency across the value chain, integrating intermittent CO₂ free energy and intelligent energy storage. Smart infrastructure in smart cities are sensor networks, digital management of water and waste management, resources awareness, green buildings, renewable energy integration, intelligent building management. Environment of smart cities must have smart education, smart mobility, smart health care, smart governance, smart citizens and technology. Smart water for smart cities i.e.) water sustainability which means ability to manage and provide good quantity and quality of water for smart citizens These concepts all together helps in asset management of large urban system, optimal management of resources, safety improvement, develop innovation and technologies for quality of life [1]. The safety and convenience as well as environment are considered in the concept of infrastructure.

INTRODUCTION

A property town or eco-city ("also eco-city") could be a town designed considerably of environmental impact, populous by individuals dedicated to reduction of needed inputs of energy, water and food, and waste output of warmth, pollution - CO₂, methane, and pollution. Ideally, a property town creates a permanent manner of life across the four domains of ecology, economics, politics and culture (Mvena et al., 1991). But, minimally a property town ought to first be ready to feed itself with a property reliance on the encircling country. Secondly, it ought to be ready to power itself with renewable sources of energy. The crux of this is often to make the tiniest doable ecological footprint, and to supply very cheap amount of pollution doable, to expeditiously use land; compost used materials, recycle it or convert waste-to-energy, and therefore the city's overall contribution to global climate change are going to be bottom, if such practices square measure adhered to.

Data and methodology

Collection of data and justification

Reasons for achieving energy efficiency in buildings-

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A. Economic reasons

1. Financial savings and prosperity.
2. Getting more output through lesser input.

B. Environmental concerns and development of the human race

1. Future progress of human race is possible only through the presence and use of energy in a habitable environment (UN Centre for Human Settlements, 1993).

MATERIALS AND METHODS

Achieving energy efficient buildings

Solutions to achieve energy efficiency in buildings

1. Use of passive techniques to harness available energy like stack effect, optimum use of sun path.
2. Optimum design and placement of openings to collect only the required wind effects, solar energy etc. and thus Dependence on mechanicals means required to heat up or cool the building.
3. Decreasing dependence on off grid energy sources and increasing dependence on site generated energy via use of solar cells, wind turbines, etc.

4. Reducing embodied energy of buildings.
5. Achieving optimum circulation in buildings to reduce dependence on mechanical means of movement like lifts, escalators, etc.
6. Using available biomass as energy source thus reducing financial expenditure and unnecessary use of other sources of energy (Faludi Andreas and Arnold van der Valk 1996).

Sustainable Environment

Following techniques can be used to create sustainable environment

- Reducing or reusing of waste water.
- Bringing sunlight into darkness using sun pipes



Infrastructure

Physical infrastructure can be advanced by following techniques, Water efficiency can be achieved by

- Storm water harvesting
- Gray water management
- Non water urinals

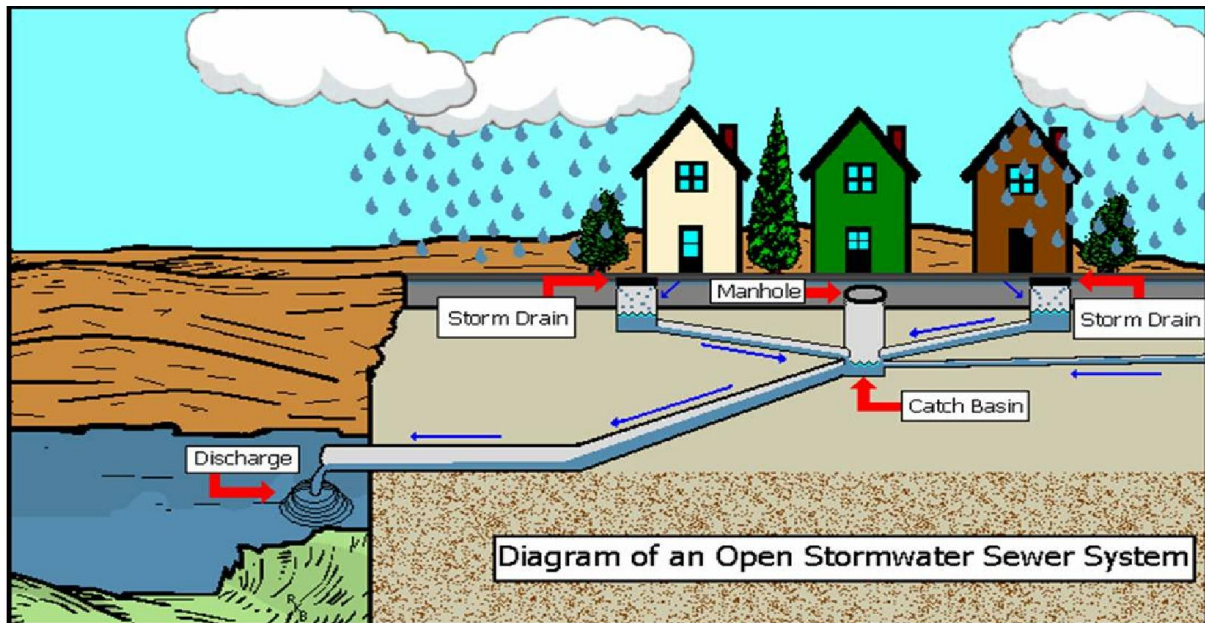
Use of geothermal air conditioning to reduce ozone depletion and global warming, solar energy to produce electricity, achieving sustainable site development through development density and community connectivity (Edwards and Pullin, 1990), (Pescod, 1992).

- Installation of carbon counter
- Using of more energy efficient appliances
- Reducing heating costs and temperatures
- Sustainable building techniques and technologies must be used.
- Converting carbon into free form of energy
- Reusing waste and recycling it
- Optimizing use of technologies
- Biodegradable cleaning products must be used
- Planting of trees
- Avoiding products which is hazardous to environment
- Using of Sustainable friendly building material without asbestos and polystyrene

- Using of solar panels for the purpose of heating water and recycling it using treatment plants and using it for gardening and wash room purposes.
- In terms of marine activities, snorkeling, scuba diving, wreck diving.
- In terms of land –based activities, desert safaris, hiking tours, dune skiing.
- Moon light street barbeques
- Sustainable resorts (Giri and Pabitra, 1995; Nugent and Rachel, 1996).

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Conclusion

The decisions that national leaders, native officers, developers, and planners build these days can confirm however billions of urbanites can relive subsequent century. Already, 0.5 the world population resides in cities. That figure is about to extend to seventy % by 2050 (Schteingart and Marta, 1986), (Bartone and Carl, 1994). Traditional models of town development will hinder economic process, spur gas emissions, and endanger lives. Compact, economical cities will alleviate financial condition, combat temperature change, and build services like water, energy, and transport additional accessible.

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