Sustainability in Smart City Development: The Future of India

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The Smart Cities initiative has been launched in India with a clear mandate to improve overall quality of life for today and the future in a sustained manner. The aim of Smart Cities is to drive economic growth and advance the quality of life of people by permissive development and utilization of technology, specifically the technology that leads to Smart living. The concept of a Smart City varies from city to city, country to country depending on the climatic conditions, resources available, the level of development, the willingness to change and aspirations of its occupants.

Taking this approach, cities that provide better infrastructure and give decent quality of life to its citizens will be promoted as Smart Cities. It is important to recognize that the built environment does not solely involve buildings, infrastructure and public spaces – such as parks, open ground, etc., it also involves human interactions and cultural experiences. The rapport between these segments majorly influences the transformation of how the built environment develops and contributes, creating a 'sense of place'. This sense of place is the essence of a location, involving all features whether they are natural or constructed.

The Smart City focus is on 'zero' environmental consequence in terms of carbon emissions, waste generation, safety & security, energy and water use as profitable targets. However, designers and urban settlers of the built environment have the convenience to limit future negative environmental fallout and produce

positive environmental benefits. In order to achieve this, the built environment would need to produce more than it consumes as well as correct past pollution and environmental damage. The process of regenerative development, eco-efficiency, should contribute to the achievement of this goal for safe living of all living species including human capital.

It is imperative to bring a very disciplined approach to ensure that Smart Cities are really emerging as smart and livable for all of us. Below is the list of certain critical green elements expected to present in India's new Smart City development:

- **Green Standards and Rating system:** Having green standards and rating system in place will help to a great extent to enhance building performance. Drawing practices after suitable modifications of current standards and rating systems for deployment, to ensure they are implementable and sustained improved performance for better resource conservation, specific to the location and climatic condition.
- **Climate Specific Design**: Deploy green measures, standards, guidelines, byelaws specific to city, location and culture. The climate design should respond to the local context.
- **Building Exteriors and Cool Roofs:** To choose light colours on building exteriors to decrease heat ingress (IR rays), increase aesthetic and uniformity. Maximise use of cool roofs / roof garden to address the heat island effect & micro climate.

This helps to improve overall energy performance of a building and better indoor environment for occupants' comfort.

- **Energy Efficiency:** Should target 40% better energy performance than ECBC standards and electrical connection with 40% reduced demand from current standard to ensure energy efficient buildings put into the practice. Also, all major commercial and government buildings to install and generate onsite renewable energy through ESCO (Energy Savings Conservation Company) or PPE model to increase share of RE in the smart cities
- **Renewable Energy:** Besides energy efficiency, all exterior lights, street lights and advertising hoardings to run on solar energy. If any of these applications are operated with utility power, the user shall pay energy bills at 50% extra cost to discourage use of conventional energy. Every Smart City should set an internal target of renewable energy portion at least to the tune of 40% based on the overall energy requirement of the city when Smart City operation begins. Ultimately, every smart city to have a clear goal of reaching the status of carbon neutral city in next 10 years.
- **Waste Water Recycle and Reuse:** A centralised STP to treat wastewater and reuse treated water for gardening, flushing and HVAC system through well managed water distribution system implemented across the city. A Proper law enforcement for not using ground water for non-domestic applications should be enforced. The treated waste water shall be distributed to various applications within the city at a price to ensure users are using water resources with utmost care. Also, there is a need to bring bylaws to encourage in going for building level STP for treating black and grey water where the sewerage out flow capacity is more than 5KLD per day.
- **Landscaping:** Mandating 30% landscaping for a bring better environment and creating more open spaces for the community to engage them in various activities.
- **Urban Farming:** At least 50% of the total landscaping should be used for kitchen garden to grow fruits and vegetables to

handle growing food demand. Encourage farming in an organic way for improved health of the local citizen.

- **Centralised System:** Prefer installing centralised HVAC systems (District Cooling System) to achieve greater efficiency and better scale of operation in order to optimise investment and enhanced energy efficiency for the whole city.
- **Water Efficiency:** Aim to reduce 50% in potable water consumption by using water efficient fixtures. 100% rain water harvesting/collection to manage increasing water demand with localised distribution for consumption for better control.
- **Plant Trees in 1:8 Ratio:** Facilitate planting 8 trees per person in the city to enhance air quality and minimize air pollution.
- **Waste Collection and Recycling Facility:** Generation of power and/or bio gas from collecting municipal waste to support growing energy demand and to avoid land filling.
- **Waste Management:** Organic waste converter and/or bio gas system should be provided to all the buildings for localised treatment. E-waste disposal should be done scientifically for the entire city.
- **Construction Waste:** A city should consider having its own construction waste recycling factory/facility to recycle entire construction debris generated from it and make products for reuse and avoid going to landfills.
- **Smart Governance:** An Independent Monitoring Committee should be in place for entire green implementation and sustenance monitoring and operations. There should be a separate cell with qualified experts to spearhead sustainability for better results.
- **Green Certified Materials:** Allow only certified green products and high level of energy efficient technologies for the city to bring efficiency at design stage. For example, allow only BEE 5 star rated products to use. This helps in developing a green supply chain and will become an integral part of normal construction for long term benefits.
- **Continuous Engagement of Citizens:** It is imperative to bring incentives/ awards to encourage active involvement of citizens in the city development for long term sustainability and facilitate transferring ownership to citizens for better city maintenance.
- **Food – Water – Energy Nexus:** Ultimately, society should be integrated across the natural and built environments to provide a growing demand for food, water and energy while maintaining appropriate ecosystem by giving true consideration to the growing population in the country and urbanisation.

Conclusion

By taking this approach, the objective of the Smart Cities is to promote cities that provide sustainable, livable, inclusive and viable core infrastructure and provide quality of life, a clean and sustainable environment of 'Smart' Solutions.

From the utilization perspective, Smart Solutions will enable cities to use technology, information and data to improve infrastructure and services. Exhaustive development in this way will improve quality of life, create employment and improves income, especially the poor, leading to inclusive Cities.

Hence, this development will transform existing areas and slums into better-planned ones, thereby improving the livability of the entire city. New areas will be developed around cities to contain the increasing population in urban areas. However, the concept of Smart City is still in the process of maturation and lacks formalization.