WFEO-CIC

International Webinar

Green Technologies: Precursor for Transition to Smart Sustainable Cities

The Institution of Engineers (India)
in association with
The Institution of Engineers, Malaysia

Smart City
MISSION TRANSFORM-NATION

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Green Technologies: Precursor for transition to Smart Sustainable Cities

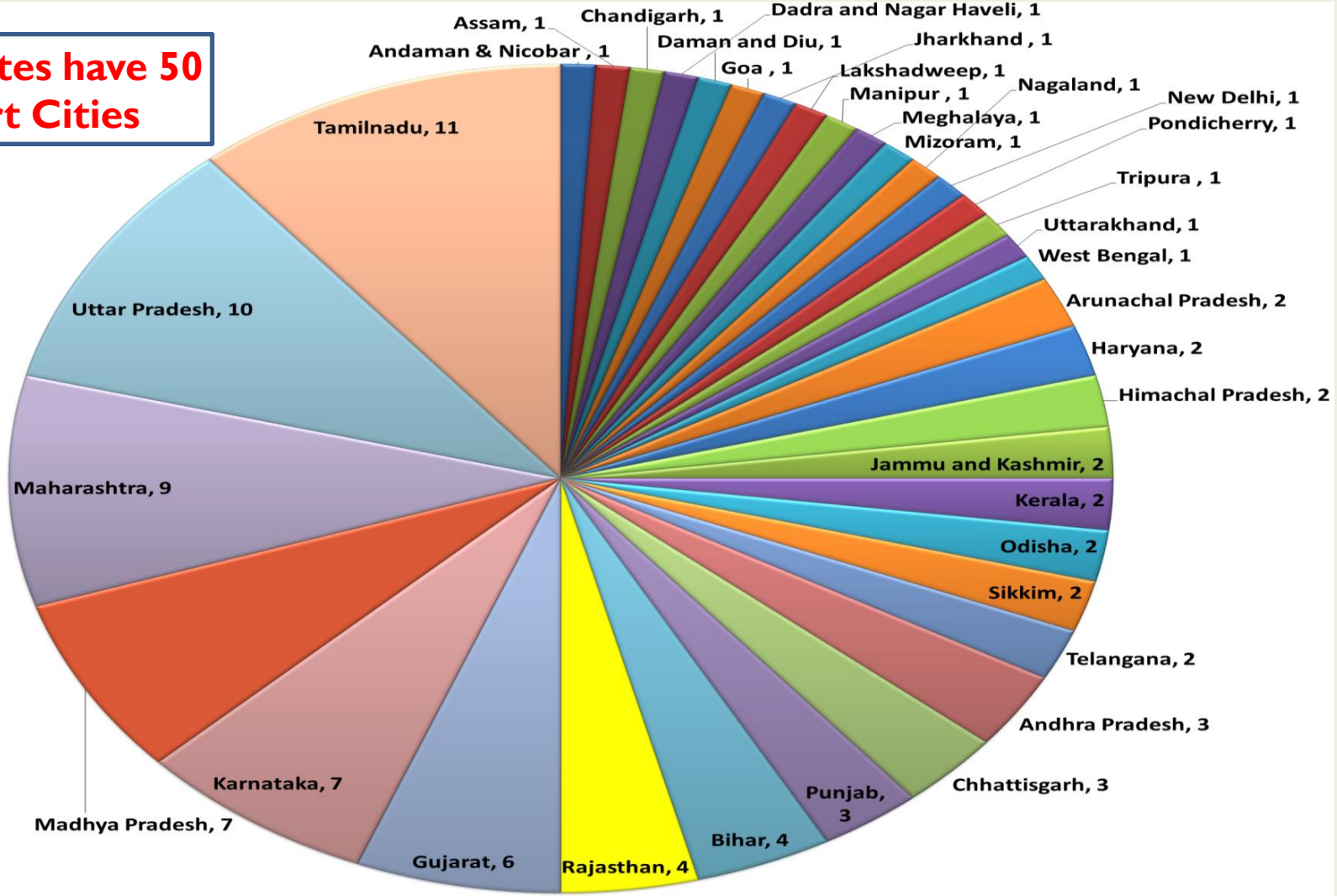
Green, Sustainable & Smart is possible through

- Environmental Safeguards
- Societal objectives (people oriented)
- Governance functions

- A smart city is a city that may aims to make itself "smarter," more sustainable, efficient, equitable, and liveable (NRDC, 2012). There are numerous definitions of smart city in the literature many of which are diverse in nature.
- 11th UN Sustainable Development Goal (SDG) aims on making cities inclusive, safe, resilient and sustainable (UN, 2018).

Everything Wanted Smart

8 States have 50 Smart Cities



SMART CITIES
UNDER " SMART CITIES MISSION "
Shillong
Srinagar
Jammu
Dharmsala
Amritsar
Jalandhar
Ludhiana
Shimla
Chandigarh
Dehradun
Saharanpur
Karnal
Moradabad
Delhi
Faridabad
Bareilly
Aligarh
Agra
Lucknow
Jaipur
Ajmer
Gwalior
Kanpur
Jhansi
Allahabad
Varanasi
Muzaffarpur
Patna
Bhagalpur
Bihar Sharif
Kota
Udaipur
Satna
Sagar
Gandhinagar
Ahmedabad
Dahod
Ujjain
Bhopal
Jabalpur
Indore
Vadodara
Rajkot
Surat
Diu
Silvassa
Nashik
Aurangabad
Thane
Kalyan
Pimpri-Chinchwad
Pune
Solapur
Nagpur
Raipur
Naya Raipur
Bilaspur
Rourkela
Ranchi
Newtown
Bhubaneswar
Karimnagar
Warangal
Visakhapatnam
Kakinada
Amaravathi
Belgaum
Panaji
Hubali-Dharwad
Davangere
Shivamogga
Tumakuru
Tirupati
Mangaluru
Bengaluru
Vellore
Chennai
Puducherry
Salem
Tiruppur
Erode
Coimbatore
Tiruchirappalli
Thanjavur
Kochi
Madurai
Tirunelveli
Thoothukudi
Thiruvananthapuram
Kavaratti
LAKSHADWEEP (INDIA)
Namchi
Gangtok
Pasighat
Itanagar
Guwahati
Kohima
Imphal
Agartala
Aizawl
ARABIAN SEA
BAY OF BENGAL
INDIAN OCEAN
Port Blair
ANDAMAN & NICOBAR ISLANDS (INDIA)
LEGEND
International Boundary
State Boundary
Smart City

‘Smart City’ has been a somewhat misunderstood concept…

- Some believed it to be only some hardware/software/ infrastructure, which can make cities more efficient (i.e. smarter…)
- Others believed it to be an IT Expert’s job to make a city smart…

Actually…..

Smart City = f { Smart Citizenry }

Smartness in City's Activities/Working = $f\{X, Y, Z\}$

X = Smart Infrastructure
Y = Smart Governance
Z = Smart Management of Services

Above all, a **Smart Attitude** is required

For Empowering Smart Solutions for All……

Calling of Future

The LOUD & CLEAR ***mantra*** for going to the future is

Digitize or Die

Adhoc developments does not contribute to ***SMARTNESS***

Urban India by 2030

A Future Shock

590million

urban inhabitants

nearly twice the population of US at recent time

91million

urban households will be middle-class compared to 22million in 2011

70 cities

with 1million+ people

compared to 53 in 2011

7,400 km MRTS

will need to be constructed

20 times capacity added in past decade

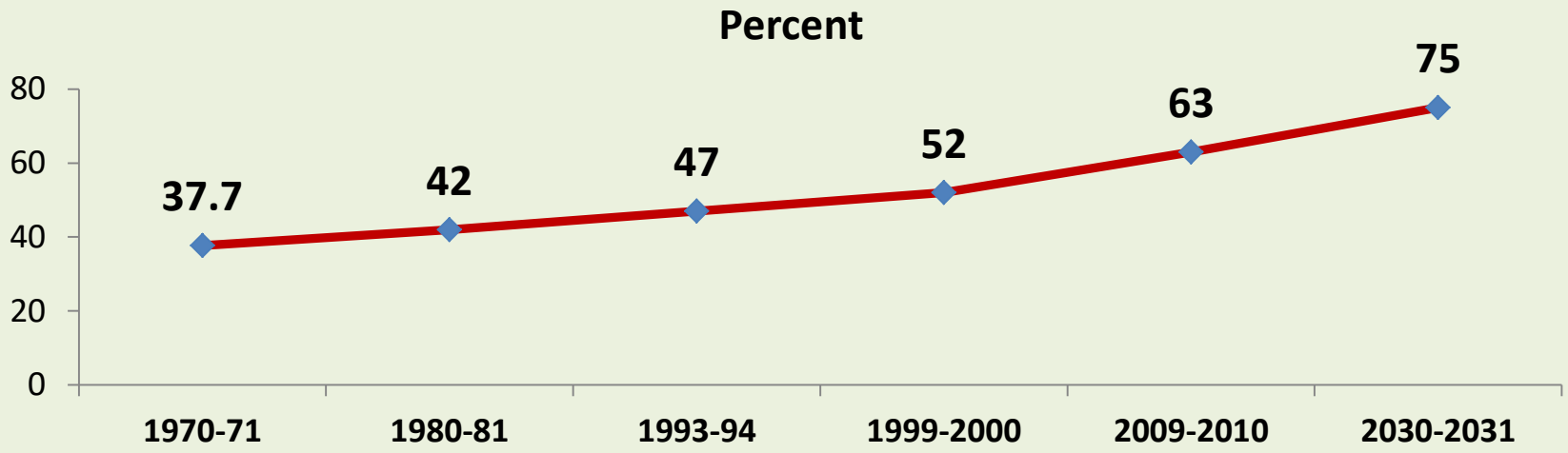
2.5bn sqm

of roads to be paved

20 times capacity added in past decade

Source: 20 times capacity added in the past decade, April 2010 McKinsey Global Institute

GDP Contribution from Cities (India)



Source: CSO, Eleventh Five Year Plan and the Mid-Term Appraisal Document of the Eleventh Five Year Plan

Year	1981	1991	2001	2011	2030
% Urban Population	23.3	25.7	27.8	31.2	40*

** Source: McKinsey Global Institute Analysis, April 2010*

Smart Cities Mission in India

The Smart Cities Mission can be regarded as one of the most ambitious plans of the Prime Minister for revolutionising urban India. The tagline of the project is "**Smarter Solutions for a Better Tomorrow**", which says what the project wants to achieve for the common people of India.

Launched in 2015 and the Government had approved an amount of Rs 98,000 crores initially for rejuvenating 500 cities and developing 100 smart cities. The project is aiming to cover 100 cities in a span of 20 years. The estimate was later revised to Rs. 700,000 crores for the 20 years. Government is looking for cooperation from the private sector to fund the Smart City Mission.

In India, the context of smart cities evolved as a notion to revive the cities on the ground of sustainability and competitiveness by adopting state of art technology. Smart Cities Mission, the flagship programme launched by Government of India, embarked upon creating a sustainable and an inclusive development through the provision of core infrastructure and a decent quality of life for 100 selected cities.

Smart City Mission of the Government (Refer MoUD)

Smart Solutions (core infrastructure elements) are required for…..

- adequate water supply,
- assured electricity supply,
- sanitation, including solid waste management,
- efficient urban mobility and public transport,
- affordable housing, especially for the poor,
- robust IT connectivity and digitalization,
- good governance, especially e-Governance and citizen participation,
- sustainable environment,
- safety and security of citizens, particularly women, children and the elderly, and
- health and education.

Focus: Sustainable, Equitable & Inclusive Smart Development

15 Essential Elements of a Smart City

1. Assured electricity supply (min. 10% energy requirement from solar)
2. Smart metering; Energy efficient street lighting
3. Adequate water supply
4. Waste water recycling, storm water reuse, rain water harvesting
5. Sanitation including solid waste management
6. Robust IT connectivity and digitalization
7. Visible improvement in the Area
8. Encroachment-free public areas
9. Intelligent traffic management
10. Smart parking
11. Non-vehicle streets/zones
12. Encouragement to non-motorised transport (e.g. walking and cycling)
13. Pedestrian friendly pathways
14. Innovative use of open spaces
15. Ensuring safety of citizens, especially children, women and elderly

ILLUSTRATIVE LIST

Smart Solutions

E-Governance and Citizen Services

1. Public Information, Grievance Redressal
2. Electronic Service Delivery
3. Citizen Engagement
4. Citizens - City's Eyes and Ears
5. Video Crime Monitoring

Waste Management

6. Waste to Energy & fuel
7. Waste to Compost
8. Waste Water to be Treated
9. Recycling and Reduction of C&D Waste

Water Management

10. Smart Meters & Management
11. Leakage Identification, Preventive Maint.
12. Water Quality Monitoring

Energy Management

13. Smart Meters & Management
14. Renewable Sources of Energy
15. Energy Efficient & Green Buildings

Urban Mobility

16. Smart Parking
17. Intelligent Traffic Management
18. Integrated Multi-Modal Transport

Others

19. Tele-Medicine & Tele Education
20. Incubation/Trade Facilitation Centers
21. Skill Development Centers

Smart Cities Mission

Smart Cities Mission recommends 4 types of solutions…

1. City improvement (retrofitting),
2. City renewal (redevelopment),
3. City extension (greenfield development), and
4. Pan-city initiative covering larger parts of the city.

Smart Cities (1/2)

The cities have to be performing well on six characteristics: environment, economy, mobility, people, living and governance (Giffinger and Pichler-Milanović, 2007).

- According to British Standards Institute (BSI), a smart city includes the efficient integration of physical, digital and human systems in the built infrastructure in order to create a sustainable, prosperous and inclusive future for its inhabitants (BSI, 2014).
- Bureau of Indian Standards (BIS) had also embarked on development of standards IS:18000 series from 2020 (so far 10 standards published)
- An urban environment can be sustainable and smart when social equity, conservation of the natural environment and its resources, economic vitality and quality of life are achieved. Therefore, a smart city is one that strives to become "smarter," meaning more sustainable, efficient, inclusive, and pleasant.

Smart Cities (2/2)

Successful smart cities in developing world (including India) are generally rare;

Because developing nations lack their own policy institutions, they are generally attracted to adopt policy frameworks established and tested in more developed countries, which are not always optimal for adoption under their own circumstances.

- obvious disparities in economic and digital capabilities
- lack of research capability for contextualization for Smart City projects

- Smart cities gather and analyze data using Internet of Things (IoT) devices such as sensors, cameras, lights, and meters.
- Digital technologies like Cloud Computing or Open Data, IoT, etc helps connect different city stakeholders with improved citizen involvement, and
- Offers new and enhanced services by providing real-time information on city operations

Cities in Europe (London, Amsterdam, Vienna, Barcelona, Stockholm) and others in the world (New York, Los Angeles, Seattle, Seoul, Melbourne, Vancouver, Shenzhen) have started in the last ten years to address their own efforts towards the development of sustainable mobility, the energy regeneration of building stock, the increase in energy production from renewable sources, the improved management of waste and the implementation of ICT infrastructures.

Concept of Sustainable Cities

- It is estimated that by 2050, about 70% of the global population will be residing in cities, compared to ~60% residing now (UNEP, 2018).
- Cities use <2% of the earth's surface, yet consume more than 75% of the natural resources available globally.
- The smart city concept has emerged as one of the possible solutions for sustainability.
- Commonly-used set of characteristics of urban sustainability are:
  - intergenerational equity, intra-generational equity (social, geographical, and governance equity),
  - conservation of the natural environment,
  - significant reduction of the use of non-renewable resources,
  - economic vitality and diversity,
  - autonomy in communities,
  - citizen well-being, and
  - gratification of fundamental human needs (Maclaren, 1996).

Sustainable & Smart Cites

- Development strategies of cities should be towards **smart policies aimed at sustainable mobility, energy upgradation of the building stock, increase of energy production from renewable sources**, improvement of waste management and implementation of ICT infrastructures.
- The goal is to turn into Smart Cities, able to **improve the quality of life of their inhabitants** by offering a lasting opportunity for **cultural, economic and social growth within a healthy, safe, stimulating and dynamic environment**.
- Expected features of a smart city will, therefore, should be focussing on **technology innovation, smart governance and main financing** and support programs.
- Cities of the future will **survive by transforming into Smart Cities** and focusing on **Green Building and Smart Mobility**. Because of the low energy efficiency of buildings and transportation systems, the cities of today are responsible, on average, for 70% of greenhouse gases emissions and over 60% of energy consumed worldwide.

Ingredients of Sustainable Smart City (1/2)

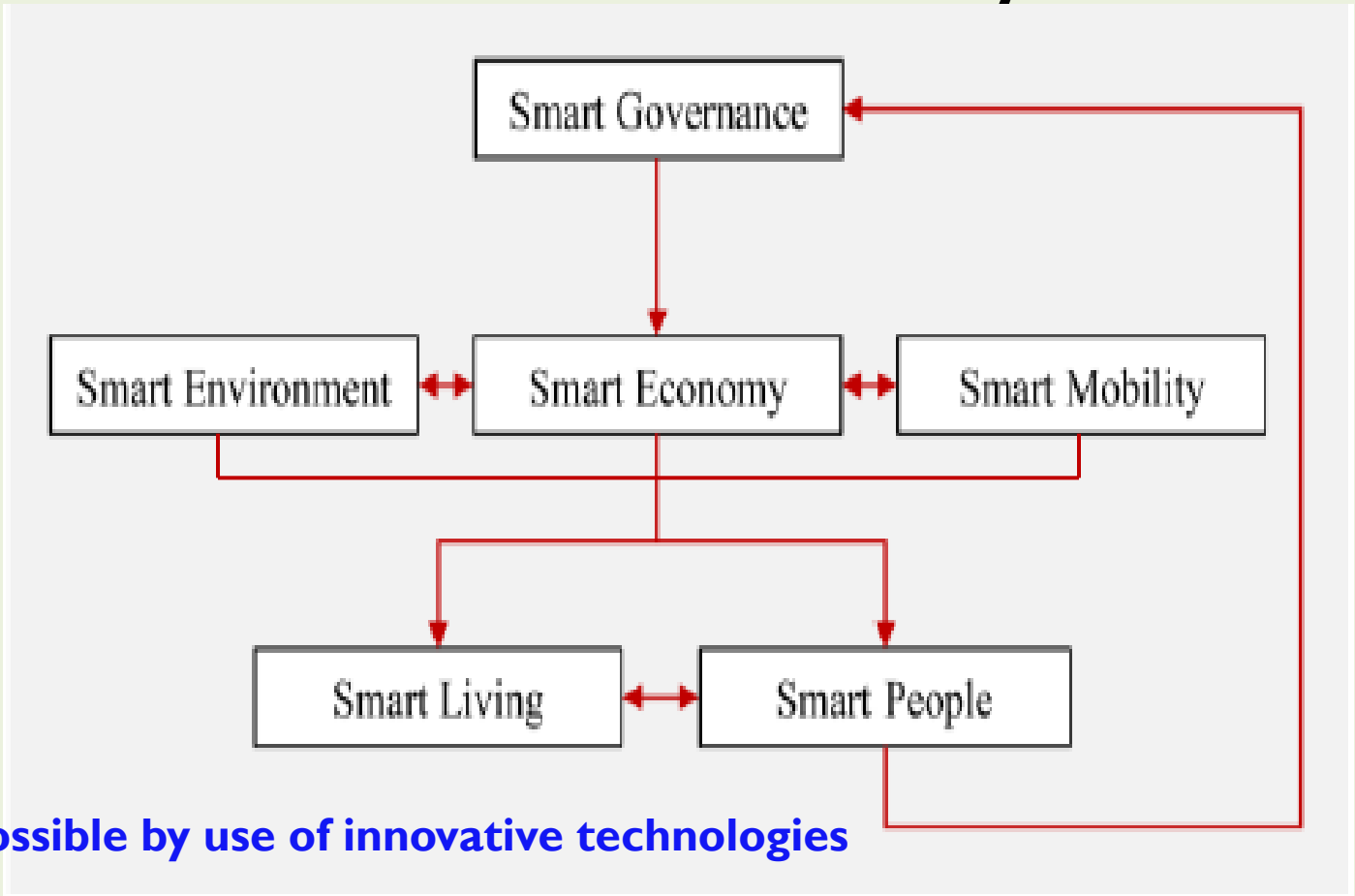
A Smart City, or intelligent city shall be with

- economic competitiveness (**smart economy**), innovation, enterprise, economic image and brands spirit, productivity, job market flexibility, international integration, transformation capacity;
- training and social interaction of citizens (**smart people**), qualification level, long-term training, social and ethnic plurality, flexibility, creativity, cosmopolitanism and mental opening, participation to public life;
- functioning of administration and services (**smart governance**), participation to decisional processes, public and social services, transparent government activity, politics strategies and perspectives;

Ingredients of Sustainable Smart City (1/2)

- availability of information and communication technologies and modern and sustainable transportation systems (**smart mobility**), local accessibility, international accessibility, availability of IT infrastructures, sustainable, innovative and safe transportation systems;
- high environmental quality (**smart environment**), attractiveness of natural conditions, pollution, environment protection, sustainable management of resources;
- life, culture, health and safety quality (**smart living**), social structures, health conditions, individual security, dwellings quality, educational structures, touristic attractiveness, social cohesion.

Smart-Sustainable City Model



It's all possible by use of innovative technologies

Technology Innovation (1/2)

Technology innovations for charting the path of transition to green and smart & sustainable cities:

- Today, reaching these strategic goals is quite possible - thanks to the **availability of cutting-edge technologies** that are changing the aspect of the city, functioning of services and users' behaviour: renewable energies, advanced materials, innovative transportation systems, ICT, broadband, geolocation systems, Internet of Things, smartphones and tablets, social networks, city apps and urban data.
- One thing is of particular importance in the development of a Sustainable Smart City is the **Smart Governance tools** such as: Digital Democracy, Open Governance, Citizen Empowerment, Participated Urbanism and Urban Data.
- There is not a single existing city, big or small, that has not launched at least one project to be able to enjoy the title of **"smart"**, focusing essentially on digital technology, environmental sustainability, civic initiatives, mobility and businesses.

Technology Innovation (2/2)

- Half of the world's internet users live in Asia (huge population).
- Technology is the key to unlocking the world's power to deliver inclusive SDGs.
- It really matters how do we engage technology in smart & sustainable development?
- Artificial intelligence; blockchain technology; 5G; and the internet of things (IoT) alongside a myriad of digital services and devices have been considered as essentials to new economies.
- Technology-based and data-driven solutions be applied to long-standing social challenges to connect with the consumers.
- Today any business is expected to deliver positive social outcomes as well as financial returns – that is successful technology.

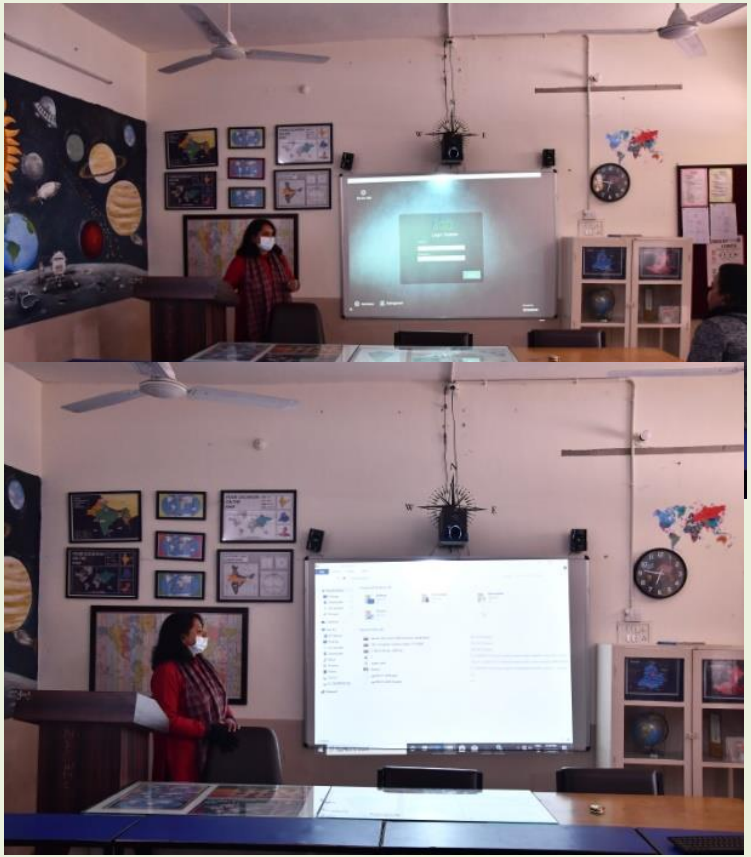
Status of Projects Undertaken

In a Smart City

Sr. No	Description	No. of Projects	Cost (Cr.)
A	Works Completed	25	66.67
B	Works Under Execution	36	764.83
C	Works under Tendering Stage	5	22.83
D	DPRs Under Preparation & Approval	7	168.51
	Total	73	1022.84

Solar panels on top of Govt. buildings

Integrated Command & Control Centre

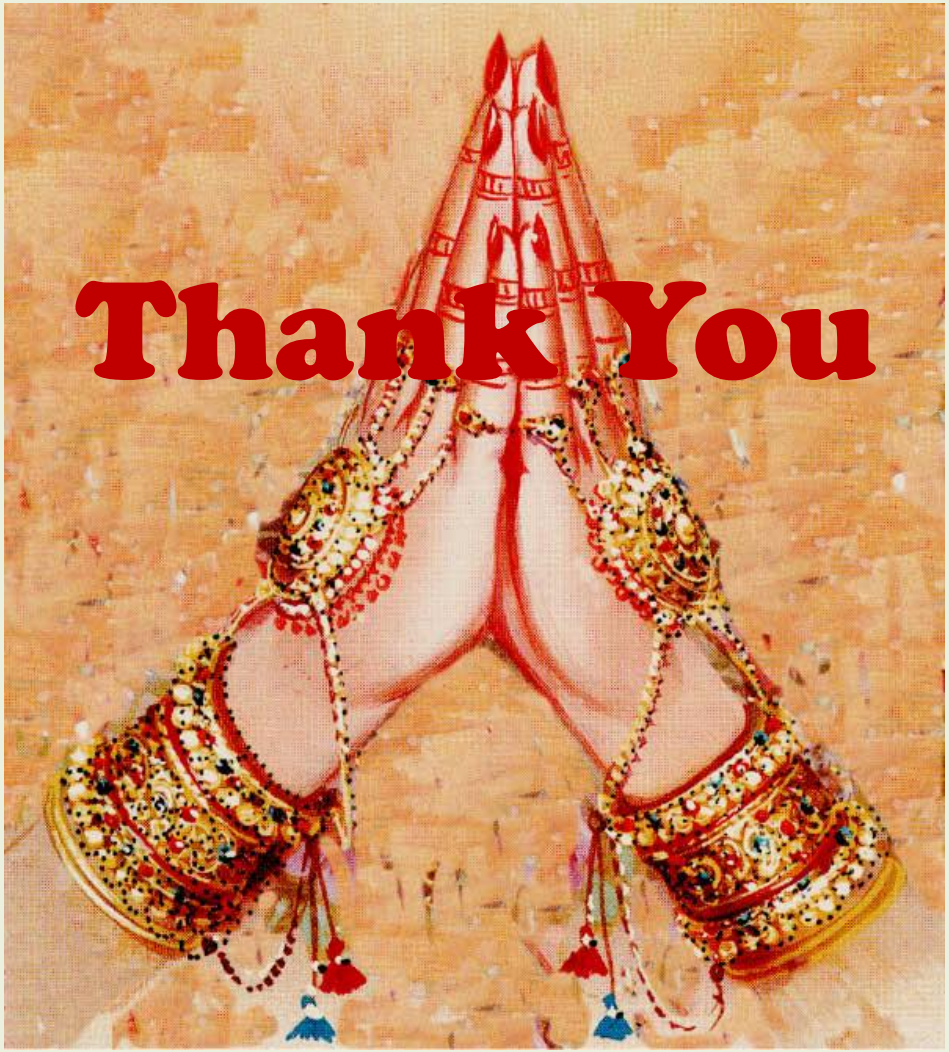


Smart Class Rooms

Road Sweeping Machines

Sewer/Drainage De-Silting Machine

Green Area Development


Thank You