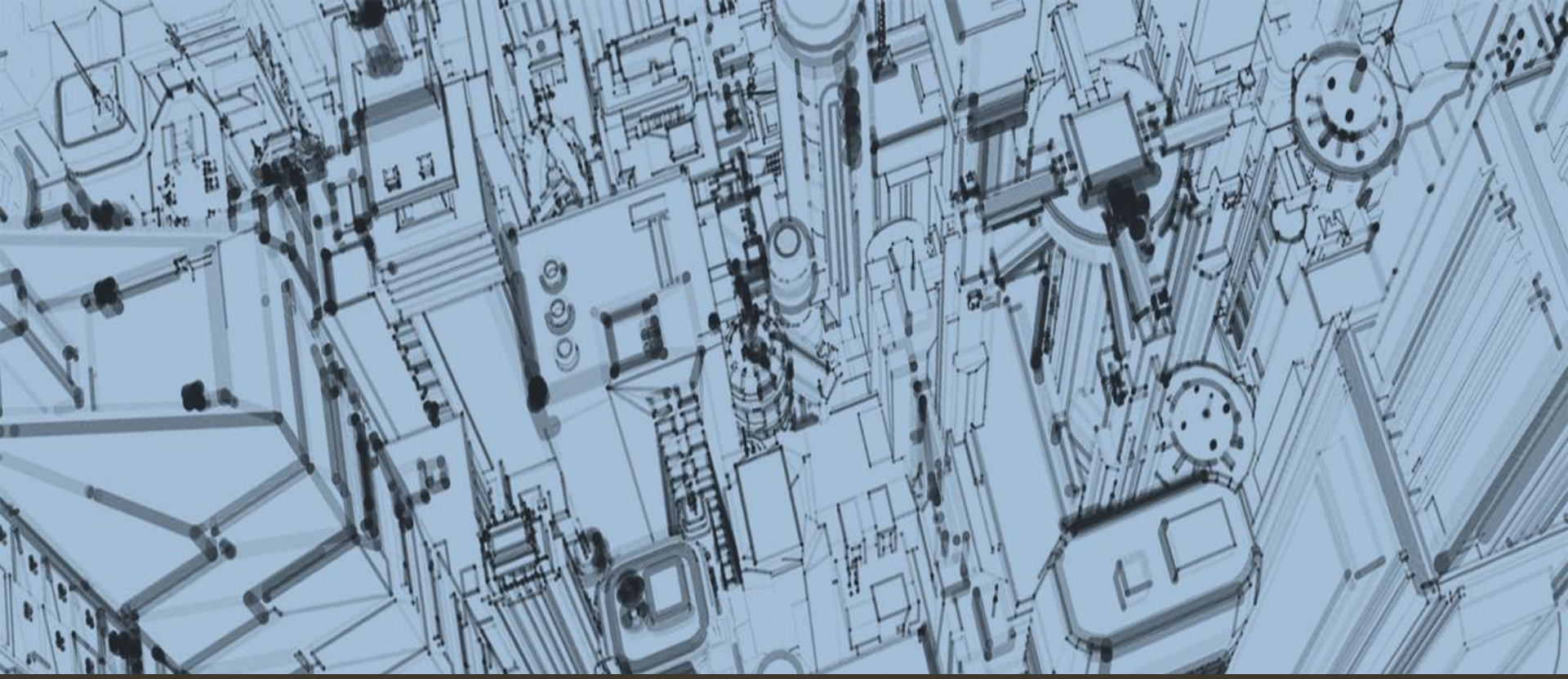

Energy considerations in Smart cities

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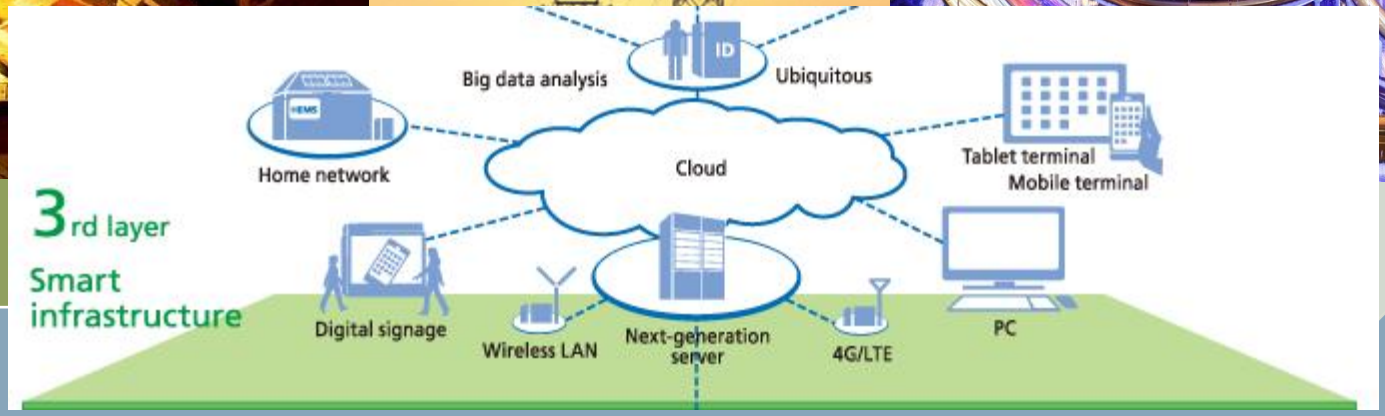
Energy Requirements in Smart Cities

Ensured/ Assured Power Supply

- Smart City functions are dependent on ICT



10% of energy requirement from solar eenrgy

Smart City Indicators – ENERGY
for standardised performance of cities
Bureau of Indian Standards (BIS)

- Percentage of total energy derived from renewable sources, as a share of the city's total energy consumption
- Total Electrical Energy use per capita(kWh/year)
- Total Residential Electrical Energy use per capita(kWh/year)
- Average length of Electrical interruptions (in Hours)

Energy considerations in smart cities…

- **Energy planning and management** is one of the most demanding **issues in smart cities** *(Calvillo.C.F, et.al, 2015)*
- Focus is on –

	City form	*City scale*
Reducing energy consumption	Compact urban development *(Yamagata.Y & Seya.H., 2013)*	Less demographic density and size *(P. Neirotti et.al., 2014)*
Reducing emission	Low-carbon urban development *(Su, M.R., et.al, 2012)*	
Application of renewable energy sources	Dispersed development *(Yamagata.Y & Seya.H., 2013)*	High demographic density and size *(P. Neirotti et.al., 2014)*

Need for a Comprehensive Energy Plan for the Smart city

Energy Plan of the city-Process

GENERATION OF DATA BASE

Area based consumption patterns	Urban Structure and scale
Energy demand	Built form and public spaces
Emissions	Activities

ANALYSIS/ ASSESSMENT

- Energy consumption and resultant Carbon footprint
- Potential for application of renewable sources
- Forecast Energy demand

POLICY/ STRATEGY / ACTIONS FOR

Energy Management through

- Demand side management and
- Energy Conservation : Reducing energy consumption and associated Carbon footprint / achieving low carbon development
- Enhanced Energy Performance through
  - Energy Efficiency

(Better utilisation / Achieving more with less inputs) and

- Incorporation of renewable energy in cities

Energy planning techniques in smart cities…

Generation

- Use of potential urban public spaces: solar PV panels / thermal collectors
- Municipal waste to energy conversion & sewage treatment plants with biogas generation
- Urban farming of biomass crops
- Installation of wind turbines/ Geothermal electricity generators

Distribution

- Smart grid (separated energy networks capable of exchanging power and communication between all participating agents)

Consumption

- Solar street lighting, traffic signals, blinkers
- Solar water heaters and pumps for water lifting
- Green, energy-efficient, intelligent buildings with solar passive designs, rooftop PV systems & non conventional space conditioning systems (solar assisted/ earth tube heat exchanger)
- Energy-efficient and sustainable transport modes

Issues…

- Infrastructure- **Lack of existing data…** Initiate studies on potential assessment
- Approach- **Lack of adequate assessment methodologies…** Initiate studies on more area based assessment methodologies
- Technology- **Lack of adequate studies…** Promote research
- Expertise/skill- **Lack of coordinated efforts…**Ensure co-ordination between the various policymakers
- Implementation mechanism- **Lack of strict enforcement…**Ensure strict regulatory measures
- Public awareness- **Lack of proper co-operation….**Promote dissemination of more information/ benefits