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**AN OVERVIEW OF POWER GENERATION & ENERGY MANAGEMENT FOR
INFRASTRUCTURE DEVELOPMENT OF SMART CITIES IN INDIA : AN EMERGING
APPLICATION OF NETWORK SYSTEM & CHALLENGES**

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Abstract

Power generation and Energy management is the two distinct features of industrial life which is mostly depend upon the nature of production of energy and utilization of communication technology, where power is the source of inspiration and motivation to perform any type of

work and activities. Thus, it is the basic necessity for life. But for energy no form of life would have ever emerged. We all know energy for providing us light and comfort but also feeding us by providing our desired products for consume in our daily life. It spreads its arm in every aspects of human life such as infrastructure development, communication, Agriculture, industry, manufacturing, medicine, research, Business and even product recycling for further usable etc. Besides that it can help us to cool down during summers and feel warm during winters. It also helps us to go from one place to another by the consumption of fuel, electricity.etc. Each and every company, factories needs to energy to operate various machines, motors through the supply of energy by which a company able to produce products, all automobiles need energy to run; but even otherwise all other means of transport need energy. Obviously we need to know as well as how power generation and its distribution system how influenced on the infrastructure development of smart cities in India and how it should be more stream lining through the practices of supply chain management system is the fundamental discussion in the a fore mentioned research title.

Keywords: *Power Generation (PG) Power Supply System (PSS) Power Generation and Energy Management (PGAEM), Net-Work System (NS) Network - Application Technology (NWAT), Infrastructure Development (ID), Smart cities (SC).*

1. Introduction

Power generation & Energy management are the major task of the department of energy because of its necessarily requirement in our day-to-day life .where power is the source of inspiration and motivation by which any type of work can be performed with the installation of power, for example ,construction , manufacturing , transporting ,running of motor, machines , vehicles, lighting, shifting of huge quantity of products etc. energy is highly required .Similarly ,power distribution is a crucial job to perform by the managers of the energy department in order to supply the continuous energy (Power) to the esteemed consumers door step without any disturbances .

Now-a-days due to advanced technology, it is quite easy to disburse the power (energy) in right time and right location with the affordable price to the consumer. In this invited article whether wind turbines, photovoltaic or hydropower, CAN and TCP/IP are used for the control of these systems which are distributed over large distances. The required repeaters, bridges and gateways as well as the interface boards used for connection to the control of energy solution & its management, Whether wind turbines, photovoltaic's or hydropower, CAN and TCP/IP are used for the control of these systems which are distributed over large distances. The required repeaters, bridges and gateways as well as the interface boards used for connection to the control centre need to fulfill demanding requirements in terms of overvoltage protection and reliability. Our products are used successfully in these applications and have been proven robust and reliable for many years.

In addition to our service on power products, we also offer OEM solutions or develop completely customized hardware and software on behalf of our customers. An overview of our services can be found in the invited research paper.

We emphasized, the role and importance of Power generation and its supply how related with the structural development of smart cities as well as networking system of application, how it helps to supply the power for not only lighting the cities but also it enhanced the beauty of sweet hundred smart cities.

2. Literature Review

In the literature review section of the invited paper "*An Overview of Power Generation & Energy Management for Infrastructure Development of Smart Cities in India: Emerging Application of Network System & Challenges*". The researchers were feeling quite comfortable in the word "Infrastructure development" because the word "infrastructure" is used more loosely in Indian official literature and often includes tradable items such as steel, cement, fertilizers and petroleum products... The expansion of domestic supply of these items in that context has to be justified as part of an optimal production response to balance of payments problems, taking account of other possibilities of expanding production of exports and other import substitutes of high quality power, free of interruptions and voltage fluctuations. Similar up gradation of quality is relevant for other infrastructure services also. Construction of Smart cities must therefore be accompanied by a strategy for infrastructure development which can meet the increased demand for infrastructure services both in terms of quantity and quality. Does India's reform programme have such a strategy for infrastructure development? This paper analyses the approach to power generation & distribution for infrastructure development in order to build smart cities adopted in

the reform programme does not only evaluates performance in individual sectors but also evaluates the development of different segmentation of urban life, by maintaining a smarter life, with having all amenities of luxurious life i.e. modern transportation ,a well advanced communication such as Wi-Fi communication , Twenty four hour Power Supply ,Eco-Friendly environment Pollution free Environment, well planned drainage and sewerage System, and well and planned roads etc. Some lessons are drawn for the future from the experience so far.

3. Objectives of Power Generation & Energy Management

The main objectives of Power Generation & Energy Management (**PGAEM**) are to be fulfilled the legendary vision of Indian Prime Minister Mr. Narendra Damodar Das Modi regarding his dream project of building hundred Smart cities in India, Power generation and its well distribution plays a first and foremost role to complete the said project work through a well objectives of power generation department of Government of India and the concerned state's electricity department .i.e.

- To generate sufficient power to achieve GDP growth rate of 8%
- Supply Reliable power to consumers
- Supply Quality of power to the smart cities and consumers
- No optimum power cost from the consumer
- Commercial viability of power industry
- Power for all

4. Energy - Networking System

Power generation and its smooth Management depends upon its networking system, if communication system is good, then the transporting system proceeds in a systematic way through the supply chain Management .where, solar energy or wind power plants are often divided into smaller system groups. For the interconnection of these systems and the connection to the central control unit IXXAT **Bridges** and **Gateways** are used. IXXAT components enable e.g. the wireless coupling of systems groups or to connect systems over large distances by using Ethernet.

5. Strategies

(a) Power Generation & distribution Strategy with focus on low cost

(b) Power generation, optimization of capacity utilization, controlling the input cost, optimization of fuel mix, Technology up gradation and utilization of Non- Conventional energy sources and given importance to more and more create and use.

(i) Transmission Strategy with focus on development of National Grid including Interstate connections, Technology up gradation in the smart cities & optimization of transmission cost.

(ii) Distribution strategy to achieve Distribution Reforms with focus on System up gradation through the practices of supply chain Management System (SCM) , loss reduction, theft control, consumer service orientation, quality power supply to the consumers, offices, industries etc. by means of commercialization, Decentralized system of distributed generation and supply for rural areas.

6. Why We Need Smart Cities in India?

As India's population continues to grow, more citizens will move to cities. Experts predict that about 25-30 people will migrate every minute to major Indian cities from rural areas in search of better livelihood and better lifestyles. It is estimated that by the year 2050, the number of people living in Indian cities will touch 843 million. Henceforth, we need smartness to maintain our life more comfortable in order to enjoy our life more comfortable, hence forth, we have focused on the infrastructure being developed by the power generation & its supply to the sector of railways, i.e. run of Bullet Train, Metro train , Mono Rail, IT, Park , Industrial Park etc. in India.

- Regulation Strategy aimed at protecting Consumer interests and making the sector commercially viable.
 - (a) Financing Strategy to generate resources for required growth of the power sector.
 - (b) Conservation Strategy to optimize the utilization of electricity with focus on Demand Side management, Load management and Technology up gradation to provide energy efficient equipment / gadgets.
 - (c) Communication Strategy for political consensus with media support to enhance the general public awareness.

7. Vision of the Smart Cities

Modi's vision for built up many smart and advanced cities that benefit from the latest technology has finally begun to take shape with the Ministry of Urban Development identifying almost 98/100 probable future smart cities all the locations where they will be built as well as existing cities that are to be remodeled on these lines.



[Smart city Visionary Map of India]

This done, the ministry has asked the 22 states where the programme will be implemented to send detailed project reports so a final blueprint can be outline



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[Intelligent: Prime Minister Narendra Modi's vision for advanced cities that benefit from the latest technology has finally begun to take shape. Pictured, a Delhi Metro train passes over Gurgaon Rapid Metro trains in the satellite city]



[Integrated: Smart cities have an integrated transit system where BRT corridors, such as the one in Delhi (pictured), as well as suburban train networks are linked with pedestrian and cycle lanes for easier travel]

It need some of luxurious things such as well furnished house with modern amenities, recreational clubs, swimming pool, well road, and transportation system, Wi-Fi system, eco environment etc. To accommodate this massive urbanization, India needs to smarter ways to manage complexities, reduce expenses, increase efficiency and improve the quality of life.

Government of India has allocated ` 70.6 billion (USD 1.2 billion) for Smart Cities in Budget 2014-15

India plans 100 new smart cities and will develop modern satellite towns around existing cities under the smart city program me.

8. Smart Governance

Investments of about USD 1.2 trillion will be required over the next 20 years across areas like transportation, energy and public security to build smart cities in India

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9. Smart Energy Smart Environment Smart Governance

Budget 2014-15

- USD 1.2 billion allocated for smart cities and FDI norms relaxed
- USD 83 million allocated for Digital India Initiative
- PPP Model to be used to upgrade infrastructure in 500 urban areas.
- Smart City projects to create 10-15% rise in employment.
- Ministry of Urban Development has plans to develop 2 smart cities in each of India's 29 states.
- Delhi Mumbai Industrial Corridor Development Corporation Ltd (DMICDC) plans seven "smart cities" along the 1,500 km industrial corridor across six states with a total investment of USD 100 billion.

10. Application of Smart Energy

The researcher has focused about the Power Generation & Management (PGAM) how emerged with a wide variety of Net -work Application in various segmentation of Smart Energy Consumption .i.e.

10.1 Power Generation & Management:

(a) Sample of application



10.2 Net Work system of Distribution

Solar energy or wind power plants are often divided into smaller system groups. For the interconnection of these systems and the connection to the central control unit IXXAT **Bridges** and **Gate ways** are used. IXXAT components enable e.g. the wireless coupling of systems groups or to connect systems over large distances by using Ethernet.

10.3 Time Synchronization of Energy Distribution System



Switching power sources within distributed energy management systems often requires precisely timed processes. Using the IXXAT IEEE 1588 protocol software packages such processes can be synchronized to guarantee an uninterrupted and trouble-free power supply.

10.4 Energy Management Application on Products:

(a) Net-work Infrastructure:

(i) Network to Network Gate ways

Over 200 different network combinations to choose from



(ii) Wireless Bridges

Easy bridging of industrial Ethernet networks or connecting serial devices



(iii) PC Interfaces

Field bus and industrial Ethernet connection for your PC, either to control or to analyze your systems



(iv) Tools

for analyzing of network traffic and physics as well as network and device configuration.



***(v)Protocol Software
and APIs***

Highly flexible embedded or PC-based implementation with higher layer of protocols

11. Concept of Smart Grid

A smart grid is a modernized electric grid which is mostly useful for the analog or digital information in the process of communication technology where it helps together and act an information such as information towards the behavior, supplier and consumers as well as people in an fully automated fashion, more reliable, efficiency, economics, sustainability of the production and distribution of electricity in more scientific way.

Thus, the smart grid is most important for the development of infrastructure in the dream projects and smart cities in India. Let us come to discuss how smart grid is helpful to construct smart cities in India that

- Electrification of all households with power available for at least 8 hours per day by 2017
- Indigenous low cost smart meter by 2014 • Establish smart grid test bed by 2014 and smart grid knowledge centre by 2015.
- Implementation of 8 smart grid pilot projects in India with an investment of USD 10 million

12. Energy Storage

- Addition of 88,000 MW of power generation capacity in the 12th Five Year Plan (2012-17)
- India needs to add at least 250-400 GW of new power generation capacity by 2030

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- The Power Grid Corporation of India Ltd has planned to invest USD 26 billion in the next five years Smart Meters
- India to install 130 million smart meters by 2021

13. Renewable Energy:

- Ministry of New and Renewable Energy has plans to add capacity of 30,000 MW in the 12th Five Year Plan (2012-17)

14. Water and Waste Water Management

- The Indian Ministry of Water Resources plans to invest USD 50 billion in the water sector in the coming years
- The Yamuna Action Plan Phase III project for Delhi is approved at an estimated cost of USD 276 million

15. Sanitation

- About 67 per cent of the rural population continues to defecate in the open, and India accounts for about 50 per cent of the world's open defecation
- The Government of India and the World Bank has signed a USD 500 million credit for the Rural Water Supply and Sanitation (RWSS) project in the Indian.

16. Infrastructure Development by Smart Transportation Green Transport

- The Government of India has approved a USD 4.13 billion plan to spur electric and hybrid vehicle production by setting an ambitious target of 6 million vehicles by 2020
- Electric vehicle charging stations in all urban areas and along all state and national highways by 2027

17. Railways

- **Metro:**

Ministry of Urban Development plans to invest more than USD 20 billion on the metro rail projects in coming years

- **High Speed Rail:**

The proposed 534 km Mumbai Ahmadabad high speed rail project will have an investment of around USD 10.5 billion

- **Monorail:**

India's first monorail project at Mumbai will cost around USD 500 million, of which USD 183 million has been spent on phase I

18. Smart Information Technology and Communications

- Cloud computing will evolve into a USD 4.5 billion market in India by 2016
- Broadband connections to 175 million users by 2017.

19. Security and Surveillance

- Under the flagship "Safe City" project, the Union Ministry proposes USD 333 million to make seven big cities (Delhi, Mumbai, Kolkata, Chennai, Ahmadabad, Bangalore and Hyderabad) to focus on technological advancement rather than manpower.

20. Disaster Management

- Government of India and World Bank signed USD 236 million agreements for reducing disaster risks in coastal villages of Tamil Nadu and Pondicherry.
- India is expected to emerge as the world's 3rd largest construction market by 2020, by adding 11.5 million homes every year
- The Intelligent Building of Management (IBM) Systems Market(SM) is around USD 621 million and is expected to reach USD 1,891 million by 2016
- Smart Buildings will save up to 30 per cent of water usage, 40 per cent of energy usage and reduction of building maintenance costs by 10 to 30 per cent USD.

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21. Role and importance of Power Supply System through SCM

It plays an important role among others. With our international presence, we can improve efficiency and create visibility across your supply Demand for energy is increasing everywhere, from one end of the world to the other. There's an emphasis on the environment, sustainability, security, and energy efficiency. Safety is also a primary concern. Energy companies are responsible for keeping up with ever-changing regulations, all while exploring new technologies and maintaining current operations.

We already support many of the largest energy companies on every continent. Find out exactly how we can help you, and why Excel is the best choice for logistics solutions across all sectors of the global energy industry through a systematic SCM mode



[Power supply System through SCM]

22. Oil & Petro Chemicals

Logistics solutions for the storage and movement of chemicals, petrochemicals and commodity plastics .etc. Our direct and indirect supply chain expertise allows you to preserve capital, increase efficiency and minimize operational cost.



[Power Generation through Wind Energy]



[Oil, Sands & Other Mines]

Supply chain solutions to maintain, repair, and build power infrastructure. We combine strong local presence, logistics capabilities and global expertise to help companies tackle new challenges derived from the green initiatives.

23. Oil sands & Other Mines

We have also availed the energy from the source of oils and other stone mines by cross over and heating the raw materials such as coal, oils etc

Excel understands the unique challenges associated with mining operations. We can help you consolidate your supply chain to increase asset utilization with better material availability, resulting in higher uptime for equipment and operations.

Semiotic Model/ Exponential Model:

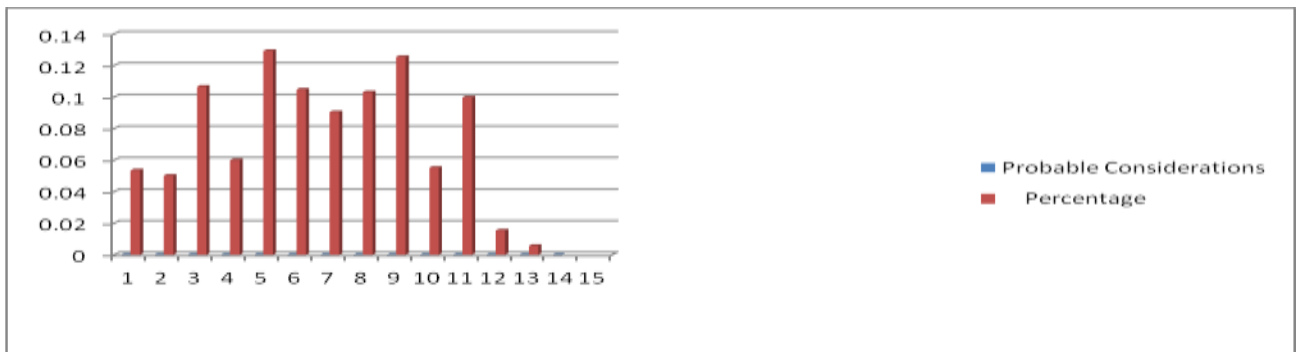
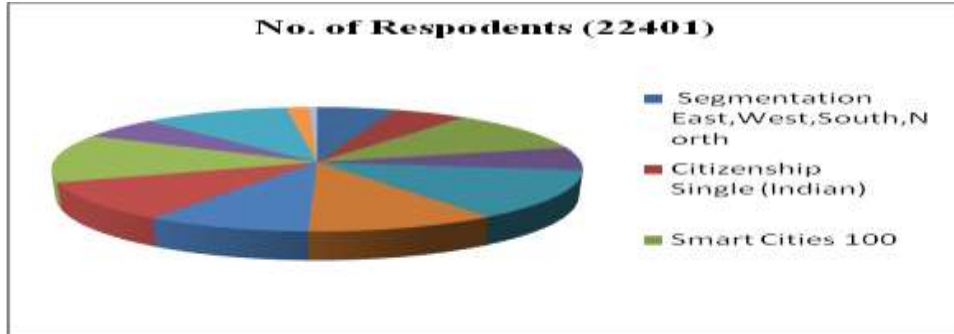
In this model, has represented about the various collected information regarding the said research work, as per the availed data we have taken the pre-suppositional hypothesis of “Built of Smart City in India is an Excellent and visionary step for maintain a modern life Style of living “as per the application of research methodology. Here ,We have taken number of segmentations and 13 probable consideration i.e. Infrastructure development, Education ,Economical condition of the people ,Life Style , Income Sector, Modern Technology ,Local Administration or Government etc .Which are enhancing the possibility of construction of Smart cities, and represented in the following Semiotic Model/Exponential model for the readers kind perusal and perception i.e.

Data Table: 1(Respondent’s Feed-Back)

<i>Probable Considerations</i>	<i>Nature of Work/Item</i>	<i>No. of Response</i>	<i>Percentage</i>
Segmentation	<i>East,West,South, North</i>	<i>1200</i>	<i>0.053569</i>
Citizenship	<i>Single (Indian)</i>	<i>1125</i>	<i>0.050221</i>
Smart Cities	<i>100</i>	<i>2390</i>	<i>0.106692</i>
<i>Political Support</i>	<i>yes</i>	<i>1345</i>	<i>0.060042</i>

Economical Condition	<i>Good</i>	2897	0.129325
Income per Capita(GDP)	<i>Average</i>	2348	0.104817
People's Life Condition	<i>Good</i>	2028	0.090532
Living Style	<i>Moderate</i>	2310	0.103121
Government	<i>Democracy</i>	2812	0.125531
Education	<i>Modern</i>	1236	0.055176
Infrastructure	<i>Good</i>	2236	0.099817
Modern Technology	<i>Average</i>	0346	0.015446
Other Things	<i>Required</i>	0128	0.005714
<i>Total</i>		22401	

[Pie Charts of Semiotic Model of Respondent for Smart Cities: Table: 1]



[Graphical Model of Respodents in Anticipation of Construction of Smart Cities in India as per Table: 1 Data]

NB: The OX axis represents about the number of Consideration and OY represents the respondent's percentages]

24. Research Findings

In the invited research article, we have done extensive research work by taking number of field surveys & studies upon power plant Hydro energy, Coal Plant, Solar plant etc., we observed various information from the said visit of plant site. Collecting data's from various journals, article, periodicals etc. as well as published and unpublished sources in order to completed this

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invited research paper for the needful of readers ,researchers, professors as well as the young intellectual buds It will be benefited a little bit in order to enhancing their future research work. researchers, academicians, future young researchers etc. if they go for studied on Power Energy and its management .Here, this research paper of ourselves is not only the source of inspiration but also it is a motivational factor or source to produce goods /products & providing services of net work application on various products to the peoples where, someone utilizing it and the dreams of building.

Finally, we got the under given essence's and hope that by these little works the professors, Smart cities can be fulfilled.

- By producing more and more energy a country becomes self independent in energy of his own consumption in operation of industry, office power plant etc. the smart cities of India are looks more smartest in the eyes of world.
- Due to sufficient Power (energy) production a country becomes more and the country can sale to other country who needs it, by which a country's economic development in to a great extent.
- By building Smart cities, we are never becomes smart, until and unless we are not shows our smartness in all aspects of modern life. Such as intelligence, innovation, economic, life style etc.
- Power (Energy) should be used as per requirement of the smart cities, industry, domestic and official consumption .in connection with be remember the slogan "Save Energy Save Nation ".by the way we are becomes more smart.
- Emphasize more and more to consume solar energy, Bio-Energy, hydro –energy instead of power plant energy in smart cities. So that it is easy to maintain an eco-equilibrium climate in world.

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Conclusion

At the end, we the researcher, proceeds a yielding conclusion by getting number of research findings and its recommendations.

Here we admit that Power (energy) is the source of inspiration and motivation to start every type of production and action of various works such as manufacturing, transporting, power supply & Energy management in order to meet the requirements consumers as well as construction of smart cities in India. Thus we may recommend ate if more and more natural source of energy shall be used in different conventional & conversational form of energy then the energy crisis of the smart cities will be reduced .similarly, the researchers also strongly recommend that if the analyzed segmentations of infrastructure development shall be planned and emphasized by the experts then it shall be more helpful to fulfill the dreams of building hundred smart cities in India.

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