International Journal of Business and Management Invention
ISSN (Online): 2319 – 8028, ISSN (Print): 2319 – 801X
www.ijbmi.org || Volume 6 Issue 1 || January. 2017 || PP—39-44

"Street Lights Replacement System- A Key Necessity for Make in India Campaign"

Smita Shirsale[1]; Prakash Khillare[2]; MissSanjivani Lokhande[3]
[1]*Research Scholar, School of Management Studies, North Maharashtra University, Jalgaon, MS, India*
[2] *Research Scholar, School of Management Studies, North Maharashtra University, Jalgaon, MS, India*
[3]*Assistant Professor, SSBT's College of Engineering & Technology, Bambhori, Jalgaon, MS, India*

ABSTRACT:*The government of India introduced the Make in India Campaign for boosting the growth of economy and GDP. The Make in India campaign mainly focuses on the rapid industrialization through the foreign direct investment (FDI) by other countries in the different sectors. India is a developing country. It has scarce resources. The Make in India campaign needs electrical power to provide to industrial sectors which are going to be newly start up through this campaign. As per the Power Ministry of the government, India has a huge gap between the demand and supply of the electricity since last few years. In such a condition, it is not possible to provide electricity to those industries which will come through Make in India campaign because there is already deficit in existing scenario. In such a condition the government needs to generate more electricity and to generate electricity, huge investment is required as existing coal reserve may not be sufficient. It is not possible for government to invest huge amount on generating the electricity as it is not sustainable. Therefore, researchers try in this research paper to find the alternative solution for this problem. After study, it is found that the replacement of streetlights in the country can fulfill the deficit of demand and supply of electricity and it can be a motivator factor for the successful implementation of the Make in India campaign. In this paper, researchers focus how street lights can play vital role in the economy as well as try to provide alternative solutions to save a huge amount of government.*

Keywords: *FDI, Make in India, Technology, Energy, LED*

I. INTRODUCTION

Make in India is creativity of the GOI to hearten multinational, as well as domestic, businesses to produce their products in India. It was hurled by Prime Minister Narendra Modi on 25 September 2014. India would emerge, after commencement of the program in 2015, as the top destination globally for FDI, exceeding China as well as the United States.

The main objective behind the initiative is to put efforts on job formation and skill development in twenty-five sectors of the economy. The initiative also targets at high quality standards and decreasing the impact on the environment. The initiative focussesto attract capital and industrial investment in India.

There are total 25 different industries that are included in Make in India Mission. They are - thermal power, tourism and hospitality, automobiles, Automobile Components, Aviation, media and entertainment, mining, oil and gas, pharmaceuticals, Biotechnology, chemicals, electronic systems, food processing, Information Technology and business process management, leather, renewable energy, roads and highways, space, ports and shipping, railways, textiles and garments, construction, defense, manufacturing, electrical machinery and wellness.

All the 25 sectors in Make in India campaign are going to accelerate the rapid industrialization in the country. Industrialization enhances the economic growth to achieve the target of GDP of the country. Other countries will come to India and bring investment in above 25 sectors to make this mission work. Although, India has an availability of the resources required for the industrialization i.e. human resource, land, machinery etc., there is lack of one resource which is the most essential for industrialization and without it the industries cannot be developed thus would cause the failure of the campaign of Make in India. Therefore, the government needs to overcome that essential factor which is going to affect the campaign i.e. the lack of electricity.

II. OBJECTIVES OF STUDY

- To study the traditional as well as modern street light management system.
- To find out the gap between demand and supply of electricity.
- To measure the economic value of street lights.
- To study the role of street lights replacement in Make in India Mission.

Electricity and Economic Growth:

Electricity is a key infrastructural component for economic growth. It is a resourceful energy currency that encourages a wide range of products and services that increase the excellence of life, increase worker productivity and cheer entrepreneurial activity. This makes electricity consumption to be certainly connected with real per capita GDP. Electricity is used in both domestic areas and industries. In today's modern world, the rapid industrialization mainly depends upon the continuous and sufficient supply of electricity.

The utility electricity sector in India had an installed capacity of 308.83 GW as of 30 November 2016. Renewable power plants formed 28.9% of total installed capacity. The gross electricity generated is 1,106 TWh and 166 TWh by captive power plants during the year 2014–15. The gross electricity generation includes auxiliary power consumption of power generation plants. India is the world's third largest producer and fourth largest consumer of electricity.

During the fiscal year 2014-15, the per capita electricity generation in India was 1,010 kWh with total electricity consumption of 938.82 TWh or 746 kWh per capita electricity consumption.

Power Supply Position:
The power supply position in the country during 2009-10 to 2015-16:

Although, electrical power plays a key role in the industrialization, the current power scenario of the country is not favorable for the growth of the industries. As per the Power Ministry, India has a deficit between demand and supply of the electricity which is shown below in the table-

Table 1 Source:http://www.cea.nic.in/reports/annual/lgbr/lgbr-2016.pdf

	Energy				**Peak**			
Year	**Requirement**	**Availability**	**Surplus(+)/Deficits(-)**		**Peak Demand**	**Peak Met**	**Surplus(+) / deficits(-)**	
	(MU)	**(MU)**	**(MU)**	**(%)**	**(MW)**	**(MW)**	**(MW)**	**(%)**
2009-10	8,30,594	7,46,644	-83,950	-10.1	1,19,166	1,04,009	-15,157	-12.7
2010-11	8,61,591	7,88,355	-73,236	-8.5	1,22,287	1,10,256	-12,031	-9.8
2011-12	9,37,199	8,57,886	-79,313	-8.5	1,30,006	1,16,191	-13,815	-10.6
2012-13	9,95,557	9,08,652	-86,905	-8.7	1,35,453	1,23,294	-12,159	-9.0
2013-14	10,02,257	9,59,829	-42,428	-4.2	1,35,918	1,29,815	-6,103	-4.5
2014-15	10,68,923	10,30,785	-38,138	-3.6	1,48,166	1,41,160	-7,006	-4.7
2015-16*	8,37,958	8,19,225	-18,733	-2.2	1,53,366	1,48,463	-4,903	-3.2

The total renewable energy sources generation is nearly 15% of the total electricity generation in India.Under the 12th Plan, the total capacity addition for power generation was 88537 MW.The actual capacity added till December 2014 was 49058.22 MW. It clearly suggests that the government has to take up the challenge of improving power distribution and consumption, as much as increasing power generation capacity. Since the demand for power is vastly increased, it'supmost important to save the power as well as power generation to bridge the gap between demand and supply.

Scope and Limitations of the Study:

- The study is conducted in the North Maharashtra University campus only.
- The study is based on Sodium bulb's street lights in NMU campus area.
- The data is collected for the period 2013-15 only.

III. RESEARCH METHODOLOGY:

- Type of Research- Comparative Study
- Sources of Data- primary and secondary sources of data.
- Sample Size- 400 HPS street lights in NMU Campus.

Street Lights:

A **street light**, **light pole** or **lamp** is an uplifted source of light on the edge of a street or highway. They are in use since the invention of lamps by Thomas Edison and are used to in night to illuminate the streets. Many street light systems are connected underground instead of wiring from one utility post to another.

Types of Lamps Used in Street Lamps:

1) Incandescent lamps
2) High Intensity Discharge (HID) Lamps
3) Mercury Vapor Lamps
4) Metal Halide Lamps
5) High Pressure Sodium (HPS) lamps
6) Fluorescent lamps
7) Compact fluorescent lamp
8) Induction lights
9) LED lights

Street lighting technology comparison:

Table 2 Source: http://www.ecosolenergy.com/documents/Why_Go_for_LED.pdf

light technology	life time	Lumens/ watt	color temperature	CRI (color rendering index)	ignition time	considerations
incandescent light	1.000 -5.000	11 - 15	2.800K	40	instant	very inefficient, short life time
mercury vapor light	12.000 - 24.000	13 - 48	4.000K	15 - 55	up to 15 min	very inefficient, ultraviolet radiation, contains mercury
metal halide light	10.000 - 15.000	60 - 100	3.000-4.300K	80	up to 15 min	high maintenance UV radiation, contains mercury and lead, risk of bursting at the end of life
high pressure sodium light	12.000 - 24.000	45 - 130	2.000K	25	up to 15 min	low CRI with yellow light, contains mercury and lead
low pressure sodium light	10.000 - 18.000	80 - 180	1.800K	0	up to 15 min	low CRI with yellow light, contains mercury and lead
fluorescent light	10.000 - 20.000	60 - 100	2.700-6.200K	70 - 90	up to 15 min	UV radiation, contains mercury, prone to glass breaking, diffused non-directional light
compact fluorescent light	12.000 - 20.000	50 - 72	2.700-6.200K	85	up to 15 min	low life / burnout, dimmer in cold weather (failure to start), contains mercury
induction light	60.000 - 100.000	70 - 90	2.700-6.500K	80	instant	higher initial cost, limited directionality, contains lead, negatively affected by heat
LED light	50.000 - 100.000	70 - 150	3.200-6.400K	85 - 90	instant	higher cost(slashed recently)

Below is the comparison between high and low pressure sodium vapor lamp versus LEDs. It indicates how LEDs outperform sodium lamps in every technological perspective, including economic too.

Specification	**High Pressure Sodium Vapor Lamp**	**LED**
Correlated Color Temperature	High Pressure Sodium lights are well-known for their warm yellow glow (CCT values around 2200K). The downside is that there are very few options outside the narrow range to choose from.	LEDs are available in a wide range of color temperatures that generally span from 2200K-6000K (ranging from "warm" yellow to light or "cool" blue).
Cycling (Turning On/Off)	High pressure sodium bulbs may flicker and/or cycle on and off as the bulb reaches the end of its useful life.	LEDs are an ideal light for purposely turning on and off because they respond rather instantaneously (there is no warm up or cool down period). They produce steady light without flicker.
Dimming	HID lights can be manually dimmed through the use of different electric or magnetic ballast but the process changes the voltage input to the light and can consequently alter the light characteristics.	LEDs are very easy to dim and options are available to use anywhere from 100% of the light to 0.5%. LED dimming functions by either lowering the forward current or modulating the pulse duration.
Directionality	All High Intensity Discharge lights (of which HPS and LPS are examples) emit light Omni directionally. This means they emit light for 360 degrees, requiring fixture housings or reflectors to direct a large portion of the emissions to the desired target area.	LEDs emit light for 180 degrees. This is typically an advantage because light is usually desired over a target area (rather than all 360 degrees around the bulb.)
Efficiency	High Pressure Sodium lights are the only light whose source efficiency compares to LEDs (values range between 50 and 160 lumens/watt for LPS and slightly less for HPS). They lose out to LEDs in many cases because their system efficiency is often much lower due to losses associated with omnidirectional light output and the need to redirect it to a desired area.	LEDs are very efficient relative to every lighting type on the market. Typical source efficiency ranges 37 and 120 lumens/watt. Where LEDs really shine, however, is in their system efficiency (the amount of light that actually reaches the target area after all losses are accounted for). Most values for LED system efficiency fall above 50 lumens/watt.
- Heat Emissions	High Pressure Sodium lights emit heat that is absorbed by the ballast and/or lost to the environment. Roughly 15% of the emissions are lost due to energy dissipation and heat losses. In some circumstances heat emissions could be beneficial, however, it is a generally a bad thing to emit heat as it represents an energy inefficiency. The ultimate purpose of the device is to emit light, not heat.	LEDs emit very little forward heat. The only real potential downside to this is when LEDs are used for outdoor lighting in wintery conditions. Snow falling on traditional lights like HID will melt when it comes into contact with the light. This is usually overcome with LEDs by covering the light with a visor or facing the light downward towards the ground.
Failure Characteristics	High Pressure Sodium lights can fail in a number of different ways. Generally they exhibit an end-of-life phenomenon known as cycling where the lamp goes on and off without human input prior to eventually failing entirely.	LEDs fail by dimming gradually over time. Because LED lights typically operate with multiple light emitters in a single luminaire the loss of one or two diodes does not mean failure of the entire luminaire.
Lifespan	High Pressure Sodium lights have excellent lifespan as well (although not as good as LED) which is why they have traditionally been used for outdoor street lighting in municipalities where energy efficiency is at a premium. Typical lifespan values for an HPS bulb are around 24,000 hours.	LEDs last longer than any light source commercially available on the market. Lifespans are variable but typical values range from 25,000 hours to 200,000 hours or more before a lamp or fixture requires replacement.
Warranty	Typically 1-4 years.	Often 5 to 10 years.

Global trends in street lighting show that 18-38% of the total energy bill goes towards street lighting hence that needs major attention. In most cities, the street lights are installed and conserved by municipalities. Most urban cities and towns are still using a combination of fluorescent, CFL, high pressure sodium lamps or metal halide bulbs, which are not designed to meet area wise lighting needs. Very small study is done into the illuminance required in different areas of streets, the needs of pedestrians and street traffic. For example, the lighting needs of vehicular traffic in high speed zones are unlike needs of low speed high traffic zones. The lighting needs of an area with vehicular traffic will vary from that of an area with high pedestrian traffic. A one size fits all approach to street lighting effects in inefficient deployment of power and ends up in wasted use of electricity that could have been better used elsewhere.

The street lights stay on well past sunrise every so often. This is because municipalities switch off the lights based on a pre decided time rather than lighting needs, which changes according to season and city location. Wastage of electricity needs to be prevented.The government may implement Automatic Street Light Control System using LDR (Light Dependent Resistor), which automatically switches off lights on detecting sunlight.Also street lights must be maintained well so that no area is left without lighting.

Chennai city has 214,008 street lights maintained by the Corporation of Chennai. Of these, 84,664 use 70- watt Sodium Vapor lamps, 49,420 use 40- watt tube light, 42,250 use 250- watt Sodium Vapor lamps. The total energy consumption in Chennai, based on above is 19 MW. It costsRs 200 lakhs per month.

Consideringthe advantages of usingLED lamps over High Pressure Sodium Vapor lamp (SVL), switchover to LED is not only financially favorable but also environmentally beneficial.

Municipal council of Mumbai has decided to convert the SVL based street lights of the Marine Drive with LED. Several other cities are now making investments in converting existing street lighting to LED. That is the right thing to do.It is also vital for the state governments to further direct municipalities to convert to LED, if India has to continue to make energy available for other priority areas.

IV. DATA ANALYSIS:(NORTH MAHARASHTRA UNIVERSITY CAMPUS)

PARTICULARS	2013-14	2014-15
Type of light used in street lights	High Pressure Sodium Bulbs	LED Bulbs
Number of Street Lights	400 Lights	400 Lights
Capacity of Light	150 Watt	60 Watt
One light switched on about-	12 Hours	12 Hours
one street light consumes electricity in one night	2 Units	1 Unit
400 lights consumes electricity in one night	800 units (400 lights x 2 units)	400 units (400 lights x 1 units)
400 lights in one year consumed electricity	292000 units (800 units x 365 days)	146000 (400 units x 365days)
The cost of one unit electricity	Rs. 8	Rs. 8
The cost of electricity for 1 year	**Rs. 23,36000 (2,92000 x Rs. 8)**	**Rs. 11,68000 (1,46000 x Rs. 8)**

V. INTERPRETATION OF DATA

From above data analysis, it is clear that in the year 2013-14 in North Maharashtra University Campus there were 400 HPS bulbs which are replaced in 2015-16 with LED bulbs. The capacity of each HPS bulb is 150 watts and LED bulbs is 60 watts. Each street light whether it is HPS bulb or LED bulbs were switched on for 12 hours in one night i.e. from 6 pm to 6 am. One HPS bulb consumes 2 units of electricity for 12 hours where as one LED consumes only 1-unit electricity. If calculation is done for both the street lights for one year for 400 street lights, then it can be observed that the HPS bulb consumes 2,92000 units of electricity and LED bulbs consumes 1,4600 units of electricity i.e. exact 50 % of energy saving.

As per the electricity board, one unit of electricity is charged about Rs. 8 per unit. So, if the cost analysis of both the street lights is done then it is observed that the University spent Rs. 23,36000 for only 400 HPS bulbs in the year of 2013-14 and for 400 LED bulbs in the year 2014-15 is Rs. 11,68000. The cost of electricity is exactly half of the LED bulbs than HPS bulbs.

Findings:

After analyzing the data, the following conclusions are made-

- LED bulbs are highly economical as compared to HPS bulbs since they will be available at Rs. 10 instead of Rs. 400
- LED bulbs are energy efficient than HPS bulbs.
- Replacing HPS bulbs with LED bulbs can decrease the deficit of electricity.
- The saved electricity can be utilized for any of the 25 sectors in Make in India Campaign.

VI. CONCLUSION

Electricity plays vital role in nation building. The Make in India program is completely dependent upon the proper and continuous supply of electric power to the industries. The sources of electricity generation are limited. Hence there is one option to save the electricity and utilize it into required sectors. LED lights may save more than half of the electricity than electricity consumed by the sodium bulbs. There are millions of sodium bulbs used as street lights in India and if other alternatives like LED lights are used instead, it may save billions of rupees of nation which may be utilized for the growth and development of the country.

The government of India has decided to replace all street lamps with LED lamps by the year 2018, but so far only Rajasthan and Karnataka state have started implementing it in some cities under smart city scheme. In Maharashtra state too, only a small scale of Mumbai and Nagpur city lights have been replaced with LED lights. Hence it is the call of hour to speed up the action and replace all of them at earliest. Because like money, energy saved is energy earned too.

VII. FUTURE PERCPECTIVE

India has approximately 3.5 million street lights, which consumes one of the major portion of electric power out of total electricity generated. There are different lights and tubes used in street poles in different areas of country. If all the lights in street poles are replaced by the LED lights, then millions units of electricity can be saved and billions of money which is used for street light systems can be reduced and may utilized for the growth and development of nation.

In Future researchers can think about the replacement of LED bulbs with solar street lights. Solar energy is natural gift for the human being. It is used in various fields. If it is utilized in the street light systems, then it may be more economical and energy efficient than the LED bulbs. Solar street lights are not in use in present because the technology solar system is not so much developed and it has high installation and maintenance cost. If the technology of solar system is developed, then it can be alternative for the LED street lights.

REFERENCES

[1]. 12th five-year plan

[2]. Aditya Nigam, Make in India' – Modi's War on the poor, http://kafila.org/2014/10/20/make-inindia-modis-war-on-the-poor/ October 20, 2014

[3]. http://articles.economictimes.indiatimes.com/2015-07-23/news/64772859_1_m-sipsmotherson-

[4]. http://indianexpress.com/article/cities/mumbai/make-in- India-push- means-large- rise-in- energy-need- report/

[5]. http://powermin.nic.in/en/content/power-sector-glance-all-india

[6]. http://www.cea.nic.in/reports/monthly/executivesummary/2015/exe_summary-11.pdf

[7]. http://www.downtoearth.org.in/news/led-bulbs- to-be- available-at- rs-10- instead-of- rs-400- 47011

[8]. http://www.ecosolenergy.com/documents/Why_Go_for_LED.pdf

[9]. http://www.makeinindia.com/home

[10]. http://www.mapsofindia.com/my-india/government/street-lighting-in-india-and-need-for-energy-efficient-solutions

[11]. http://www.stouchlighting.com/blog/led-vs- hps-lps- high-and- low-pressure- sodium

[12]. sumi-systems-investment-proposals

[13]. VikramVenkateswaran (2015), Home / Business / Make in India, A Possible Reality or Just An Illusion? http://trak.in/tags/business/2015/01/1 4/make-in-India-reality-illusion

[14]. www.worldenergyoutlook.org/media/weowebsite/2015/IndiaEnergyOutlook_WEO2015.pdf