



Energy Efficiency & Use of Renewable Sources in Municipal Services

Up to Aug-2014

***Energy Efficiency and Use of Renewable Energy
Sources in Municipal Services***

AUG-20 14



Energy Efficiency & Use of Renewable Sources in Municipal Services

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ABOUT SURAT

Surat is a city located on the western part of India in the state of Gujarat. It is one of the most dynamic cities of India with one of the fastest growth rate due to immigration from various parts of Gujarat and other states of India.

Surat is one of the cleanest cities of India and is also known by several other names like "The Silk City", "The Diamond City", "The Green City", etc. It has the most vibrant present and an equally varied heritage of the past. It is the city where the British first landed in India for trading. The Dutch and the Portuguese also established their business centres in Surat, the remnants of which are still preserved in the modern day Surat. In past this was a glorious port with ships of more than 84 countries anchored in its harbour at any time. Still today, Surat continues the same tradition as people from all around the country flock in for business and jobs.

ABOUT SURAT MUNICIPAL CORPORATION

Surat Municipal Corporation is a local self-government which has come into being under the Bombay Provincial Municipal Act, 1949. It carries out all the obligatory functions and discretionary functions entrusted by the BPMC Act, 1949. It became one of the first municipalities of India in 1852 AD, and a municipal corporation in 1966.

Surat Municipal Corporation through its elected members and the administrative wing manages the city on a highly professional basis generating sufficient revenue to be able to plan and implement programs that have a direct bearing on the quality of life. The progressive growth of health/ hygiene standards, the drop in mortality and infant death numbers, the increase in literacy rate, the cleanliness of city etc. are the yardsticks to indicate the success of all initiatives taken. Planning, design, operation and maintenance of urban services, water supply, drainage, solid waste management, street lighting system, etc., continue to be a challenge for urban authorities at the Surat Municipal Corporation. The think tank of Surat Municipal Corporation has always been proactive in terms of being abreast of the latest technological options available to improve services, to provide a better quality of life and to make Surat a self-reliant and sustainable city with all basic amenities



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BACKGROUND: -

Surat city growth is phenomenal over last couple decades. In the decade of 1991 to 2001 City population increased to 24,33,835 from 14,99,560. It means decadal population growth is more than 62%. Present population of city has reached at 5 million. Due to increased population and consequent increase in industrial & business growth service volume like water supply, sewage disposal, street lighting etc. is also increased considerably.

Consequently, electricity bill is increased by 245% to Rs. 39.54 crores in 2000-01 from Rs. 11.46 crores in 1996-97. Services of water supply, sewage disposal & street lighting accounting for more than 92% of total bill of SMC.

During Year 2001, Municipal Commissioner had visited USA for Study Tour and after the study tour of USA; he had created Energy Efficiency Cell in Oct-2001 for dedicated efforts towards Energy Efficiency in Municipal Services having targets of reducing conventional energy consumption by 15%.

REASONS OF THE INITIATIVE: -

- ◆ Energy conservation activities are done by the concern departments only. Dedicated and concentrated efforts on energy conservation weren't there because dedicated staff wasn't available at the times.
- ◆ Electrical energy is the prime factor for providing the basic services of water supply, drainage and street lighting. Provide these services at optimum cost is the big challenge for SMC, as the sources of income are limited and rate of electricity are increasing every year.
- ◆ Electricity bill increased to almost 3½ times during the period from 1996-97 to 2000-01 and continual increment in the electricity bill, SMC realized that the Energy Efficiency is the key factor to meet this challenge.
- ◆ The rate of rise was enormous due to increase in service volume and lesser operational efficiency of the various electrical machineries/ equipments used to run the basic services.
- ◆ Due preference wasn't given to optimize the energy consumption and proper monitoring of the electricity bills wasn't there.



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DESCRIPTION OF THE INITIATIVE: -

- ◆ Due to huge increase of 145% in energy bill from year 1996-97 to 2000-01 and continual increment in the energy bill, SMC has realized the importance creation of "Energy Efficiency Cell" to increase the energy efficiency of the machineries/ equipments used to run the various services.
- ◆ Two dedicated electrical engineers with experience in street lighting & water supply system were appointed in this cell.
- ◆ The foremost works for these engineers to identify the inefficient operation of the machineries/ process on research & analysis base. The replacement/ modification works shall be done by the engineers of the concern departments.

PURPOSE & PRIORITIES OF THE INITIATIVE: -

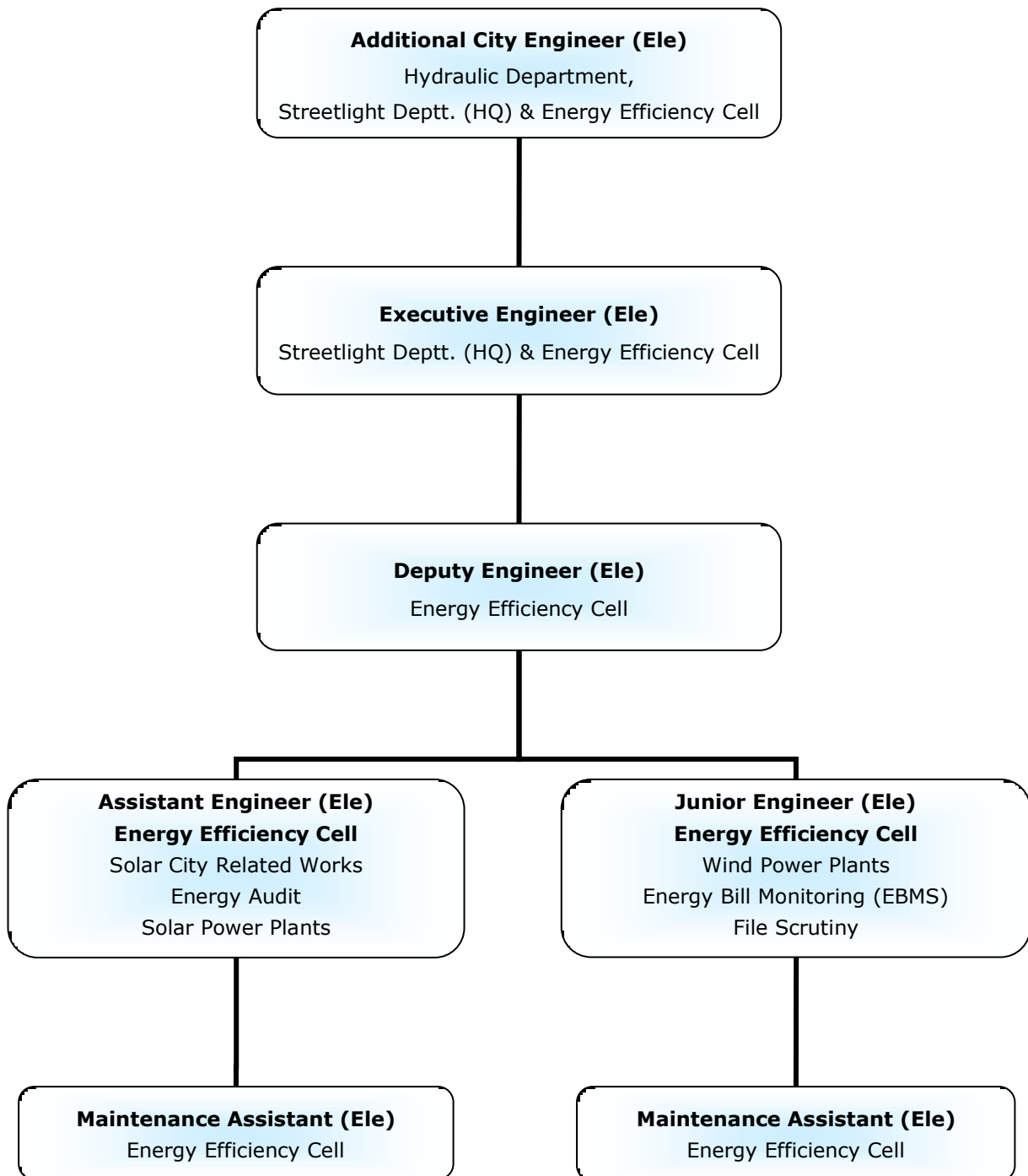
- (1) Energy Efficiency Cell is created for carrying out following functions/ activities: -
 - ◆ To identify & implement energy conservation projects
 - ◆ To find out sources for procuring power at lowest possible price
 - ◆ To conduct in-house & External Energy Audit
 - ◆ Feasibility study for power generation from conventional and non-conventional energy sources.
 - ◆ Represent corporation in Electricity Regulatory Commission (GERC) for availing electrical energy at economical rates.
 - ◆ To scrutinize of files having more than equal to 30 kW power loading.
 - ◆ To monitor the usages of electricity of electrical connections of SMC.
- (2) Water Supply, Sewage Disposal, Street Lighting Departments has been allotted a task of Implementation of energy conservation measures and providing assistance in study of system and finding out energy conservation areas in the concern services.
- (3) All works related to power generation from bio-gas generated from liquid sewage are being carrying out by Drainage Department whereas works related to energy generation from municipal solid waste is being done by Solid Waste Department.



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Organogram of Energy Efficiency Cell





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OUTCOME OF THE INITIATIVE: -

- ◇ As a result of various energy efficiency works, SMC has achieved recurring saving of more than **Rs. 7.86 Crores per annum.**
- ◇ Total Electricity saving from different energy saving measures is **1,85,87,668 KWH/ annum**, by which equivalent reduction in GHG emission achieved is **87,496 tonnes of CO₂ per annum.**



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Energy Efficiency Works: -

(i) **Water Supply System:**

Re-engineering of transmission routes in Water Supply System: -

- ◇ Detailed study of transmission network consists of 4 water treatment plants, 9 water distribution stations and 4 small pumping stations was carried out, which are connected in a "Grid" for reliable & continuous water supply of >500 MLD in 2004-05.
- ◇ Specific Energy Consumption (KWH/ ML) required to transmit water from WTPs to WDSs was determined, accordingly transmission routes were re-engineered.

Summary of energy saving due to re-engineering of transmission routes is as below: -

Sr. No.	WEF	Brief Description of Activity	Recurring Energy Saving (KWH/ annum)	Recurring Energy Saving (Rs./ annum)
Re-engineering of filtered water transmission routes				
(1)	Jul-04	Change in UGT Filling Route for Umarwada WDS	40,48,564	1,63,75,227.00
(2)	Sep-05	Change in UGT Filling Route for Khatodara & Athawa WDS from Rander Water Works	21,34,375	85,37,500.00
(3)	Jul-07	Change in UGT Filling Route (Partial) for Udhana & Pandesara WDS from Katargam Water Works	5,51,287	22,32,712.00
(4)	Apr-09	Full Bypass of Khatodara WDS to Transmit water from Katargam WW to Pandesara & Udhana WDS	14,94,897	72,50,250.00
Sub Total 1			82,29,123	3,43,95,689.00

Other energy saving measures in Water Supply System are as below: -

Sr. No.	Activity	Energy Saving Realized	
		KWH/ annum	Rs./ annum
(1)	Rationalization of electrical contract demand at sites	-----	17,10,149.00
(2)	PF Improvement through installation of Thyristor Based APFC Panel with HT side PF sensing	-----	7,19,396.00
(3)	Replacement of inefficient, inappropriate head pump sets, coating & replacement of impellers for 42 pump sets	42,12,556	1,77,19,521.00
(4)	Replacement of worn out Zero Velocity Valve at Pandesara WDS	10,04,854	51,32,952.00
Sub Total 2		52,17,410	2,52,82,018.00
Grand Total		1,34,46,533	5,96,77,707.00



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(2) Street Lighting System

- ◇ Surat Municipal Corporation is the first corporation in India which has converted all the existing fluorescent luminaires having conventional magnetic ballast & FL Lamp consuming average 50 watt with energy efficient electronic ballast and T-8 FL lamp having three times more life and consuming total power of 28 W, in year 2003.
- ◇ After successful implementation, SMC has made a policy to install all new fluorescent luminaries with electronic ballast and high lumen T-8 fluorescent lamp only.
- ◇ SMC had adopted practice of switching "OFF" 50% streetlights on **major 155 roads** during low traffic period between 12:00 AM to morning.
- ◇ SMC had started the use of efficient HPSV SON-T lamps in 2005 on Gauravpath and now it has been made as a policy to use these efficient HPSV SON-T lamps for all capital and maintenance works in year 2006-07. These lamps have rated life over 28,000 hours and having lumen depreciation of only 10% after 16,000 operating hours.

Sr. No.	WEF	Brief Description of Activity	Energy Saving (KWH/ annum)	Energy Saving Amount (Rs./ annum)
1	Jan-03	Conversion of Conventional FLL Vs Energy Efficient FLL	15,37,528	49,96,965.00
2	Jan-04	Switching "OFF" Streetlights During Low Traffic Period	15,38,462	50,00,000.00
3	Feb-03 Onwards	Policy to Install New FLL with Electronic Ballast & Hi-lumen Lamp (Continuous)	11,91,853	38,73,522.40
4	Sep-10	Installation of Energy Conservation Feeder Pillars based on Centralized Voltage reduction principle.	2,73,580	10,94,320.00
◇ ◇	Total		45,41,423	1,49,64,807.40



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(3) Sewage Disposal System & other services: -

Summary of energy conservation in other sewage disposal & other services: -

Sr. No.	Month	Brief Description of Activity	Energy Saving (KWH/ annum)	Energy Saving Amount (Rs./ annum)
1	May-03	Installation of LED Based Traffic Signals	92,308	3,00,000.00
2	Mar-04	Reduction of CD at Sardar Smruti Bhavan	-----	54,305.00
3	Jun-04	Improvement of Average PF (Except Energy Auditor's Suggestions)	-----	12,94,463.00
4	Aug-04	Installation of LED Based Traffic Signals	1,84,615	6,00,000.00
5	Oct-04	Improvement of PF through Installation of Thyristor Based APFC Panel at Main Office Building	-----	1,51,296.00
6	Apr-05	Improvement of PF through Installation of Thyristor Based APFC Panel at Indoor Stadium	-----	1,46,642.00
7	Jul-07	Trimming of Impeller of 4 pump sets at Umra (N) SPS	76,317	3,03,360.00
8	Aug-08	Installation of 4 Nos. of New Pump Sets at Khatodara SPS	1,99,644	8,97,998.00
9	Dec-08	Switching "OFF" Filtration Plant during non-usage hours at Rustapura Swimming Pool	46,828	2,81,157.00
◆ ◆	Total		5,99,712	40,29,221.00

(4) Electricity Tariff :

☞ Energy Efficiency Cell is constantly looks in electricity tariff matters and visits the GERC {Gujarat Electricity Regulatory Commission} website regularly as well as scrutinizing petitions made by electric power supplying agencies to revise the tariff.

☞ The noteworthy successful achievements are as below: -

Sr. No.	Particulars	Year & GERC's Judgment/ Order details	Benefits per annum {Lac Rs.}
(1)	Successfully representation in GERC against the Tariff revision (From HTP-I to HTP-II {A}) HT Services of Water Supply & Sewage Disposal System falling under DGVCL {Dakshin Gujarat Vij Company Ltd.}	2004-05 Judgment: 01/04/2005 petition no: 842/2005	130.00
(2)	Successfully representation in GERC to Receive Special Consideration in the Demand Charges for the HT Services taken from DGVCL for Water Supply & Sewage Disposal System	2006-07 Tariff Order: 31/03/2007 petition no: 899/2006	18.00
(3)	Successfully representation in GERC to receive separate tariff for TPL {Torrent Power Ltd.}'s HT service category for Water Supply & Sewage Disposal System	2009-10 Tariff Order: 31/03/2010 petition no: 988/2010	20.00



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Use of Renewable Energy Sources: -

☞ Despite of various extensive energy efficiency works, energy bill to run various municipal services is still increasing every year as municipal services volume coverage is increasing and ever increasing energy rates. Therefore, SMC has started to think about using non-conventional sources of renewable energy like energy generation from liquid sewage waste and wind power for water supply system.

Biogas Based Power Generation from Liquid Sewage Waste: -

☞ Surat Municipal Corporation & Ministry of New & Renewable Energy, New Delhi jointly took up the Project of Generation of Electricity from Sewage Gas under UNDP & GEF scheme.

☞ The first "Technology Demonstration Project" for Conversion of Sewage Gas in to Electricity Generation had been commissioned having capacity of 0.5 MWe at Anjana Sewage Treatment Plant of SMC. Running successfully since October 2003.

☞ Details of energy generation & important aspects are as under: -

- ▽ Technology:- **Anaerobic Digestion**
- ▽ Total Project Cost: **Rs. 2.62 Crores**
- ▽ Grant from Ministry of New & Renewable Energy: **Rs. 1.22 Crore**
- ▽ Estimated Energy Generation per Day: **9,000 KWH**
- ▽ Energy Generation till Aug- 2014: **18.50 GWH**
- ▽ Equivalent Savings till Aug- 2014: **Rs. 8.52 Crores**





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- ☞ After successful operation of the aforesaid first biogas power plant, SMC has installed 3 such power plants having capacity of 1 MWe each at Singanpore, Karanj and Bhatar treatment plants in year 2008. Further, a policy has been made to install biogas power plants at all major sewage treatment plants: -
- ☞ Details of energy generation & important aspects of power plants are as under: -
 - ▽ **Composition of Bio-Gas** Methane: **60 -75%**
Carbon Dioxide: **25-40%**
Hydrogen Sulphide: **1%**
Moisture: **2-6 %**
 - ▽ Total Capacity: **3 MWe** (3 x 1 MWe)
 - ▽ Total Capital Cost: **Rs. 18.63 Crores**
 - ▽ Total Grant Received from MNRE: **Rs. 2.54 Crores**
 - ▽ Total Energy Generation till Aug-2014: **42.42 GWH**
 - ▽ Total Equivalent Savings till Aug-2014: **Rs. 11.54 Crores**

Wind Power for Water Supply System: -

Background: -

- ☞ Water Supply System is major consuming service of SMC consuming nearly 60% of total electricity of entire SMC. Hence, EEC has decided to think for using renewable source like wind for water supply system in in 2004.
- ☞ Initiation on installing wind power project was done in year 2004 and primary feasibility study for use of wind power for HT services of SMC was carried out. At that time wheeling of electrical power generated from wind power plant was allowed only to industrial consumers as per Wind Power Policy 2002. Hence, SMC had requested Energy & Petrochemical Department of Government of Gujarat to give benefits of wheeling of power & banking of electricity to SMC in Sep-2004. As per Energy & Petrochemical Department's requirement, in-principle sanction from General Board of SMC was taken vide Resolution No: 89/2005, Dtd: 31-Jan-2005 for installation of wind power plant water works and water distribution station application and it was sent to Energy & Petrochemical Department in Feb-2005.



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Thereafter, Energy & Petrochemical Department had asked to represent the issue before GERC. SMC had made submission on 31-May-2006 to give benefits of wheeling & banking of electricity for HT services of SMC and also to permit wheeling of energy at more than two locations in reference to discussion paper published by GERC on Tariff for Wind Energy Projects on 08-May-2006. In reference to submission made by SMC, GERC had given permission of wheeling and banking of electricity to non-industrial units after 20-Jun-2007 vide their tariff order dated: 11-Aug-2006.

Process: -

Considering requirements, service of experienced consultant has been taken and it is decided to invite the tender for turn-key job to install Wind Power Plant along with O & M up to 10 years. Tender was sanctioned vide Standing Committee's Resolution No: 1157/2010, Dtd: 22/07/2010 of only one offer received from Suzlon Energy Ltd.

Total 9 work orders have been issued to group companies of SEL to carry out the job on 30-Jul-2010.

3 MW WPP had been commissioned in **Nov-2010**.

The details of important aspects are as under: -

∇ Total Investment: - **₹ 18.44 Crores**

∇ Location: - **Adodar** (Gosa, Dist: Porbandar)

∇ Energy is being used at : - **Sarthana Water Works (DGVCL) - 55%**
Varachha Water Works (DGVCL) - 45%

∇ Energy Generation Commenced from: - **02-Nov-2010**

∇ Manufacturer & Model of WEG offered: **Suzlon Energy Ltd. Model: S 82: 1,500 kW**

∇ Energy Generation till Aug-2014:- **31.01 GWH**

∇ Equivalent Gross Savings/ Benefits till Aug-2014:- **Rs. 15.07 Crores**

∇ Expected Levelized Cost of Energy Generation:- **Rs. 2.42 per KWH**

SMC has planned to cover all major water supply services with wind power plants. Accordingly, primary estimate of 30 MW capacity wind power plants has been envisaged.



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Based on the above, another 8.4 MW capacity wind power plant has been commissioned in Jun-Jul' 2013.

The details of important aspects are as under: -

- ▽ Total Investment: - **₹ 52.18 Crores**
- ▽ Location: - **Bhanvad** (Moti Khokhari, Dist: Jamnagar)
- ▽ Energy is being used at : - **Katargam Water Works (TPL) - 50%**
5 Water Distribution Stations (TPL) - 50%
- ▽ Energy Generation Commenced from: - **01-Jun-2013**
- ▽ Manufacturer & Model of WEG offered: **Suzlon Energy Ltd. Model: S 95: 2,100 kW**
- ▽ Energy Generation till Aug-2014:- **22.33 GWH**
- ▽ Equivalent Gross Savings/ Benefits till Aug-2014:- **Rs. 11.09 Crores**
- ▽ Expected Levelized Cost of Energy Generation:- **Rs. 3.13 per KWH**

Another 6.3 MW capacity wind power plant has been commissioned recently. Details of important and expected generation aspects are as under: -

- ▽ Total Investment: - **₹ 41.52 Crores**
- ▽ Location: - **Ratdi** (Dist: Porbandar)
- ▽ Energy is being used at : - **3 Water Works (DGVCL) - 64%**
6 Water Distribution Stations (DGVCL) - 36%
- ▽ Energy Generation Commenced from: - **29-Sep-2014**
- ▽ Manufacturer & Model of WEG offered: **Suzlon Energy Ltd. Model: S 97: 2,100 kW**
- ▽ Expected Energy Generation per annum:- **15.19 GWH**
- ▽ Equivalent Gross Savings/ Benefits per annum:- **Rs. 6.63 Crores**



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Surat as a "SOLAR CITY": -

- ☞ In principle approval has been given by MNRE to develop Surat as a "Solar City" vide their letter no. 40/2/2008/UICA (SE), Dated: 11/08/2010.
- ☞ "Solar City Stake Holder Committee" and "Solar City Cell" have been created vide General Board's resolution no. 441/ 2010, Dated: 21/08/2010.
- ☞ Consultant (Deloitte TTI Pvt. Ltd.) had been appointed vide Light & Fire (Ext.) Committee's resolution no. 08/ 2011, Dated: 04/02/2011.
- ☞ Surat city has been declared as a "Solar City" vide MNRE's approval letter no. 5/47/2010-11/ST, Dated: 13/04/2011.
- ☞ Solar City Master Plan has been sent for approval to GEDA & MNRE vide letter no. EEC/Out/NoP344, Dated: 07/02/2013.
- ☞ General Board's post approval has been sought vide their resolution no. 249/ 2013, Dated: 26/03/2013 for submission of Solar City Master Plan to MNRE.
- ☞ Revised Solar City Master Plan has been sent for approval to MNRE based on the correction given vide letter no. EEC/Out/No.219, Dated: 30/08/2013.
- ☞ Solar City Master Plan has been approved by MNRE vide their letter no. 05/47/2010-11/ST, Dated: 11/10/2013.
- ☞ Total Grant sanctioned by MNRE for Solar City Master Plan: **Rs. 43.46 Lacs.**
- ☞ SMC has envisaged various EE & RE targets under "Solar City Master Plan". Most important ones are installation of 21 MW wind power plants (out of which 8.4 & 6.3 MW capacity i.e. 14.7 MW capacity power plants are already commissioned), 5 MW capacity SPV based Solar Power Plants, 2.3 MWe capacity biogas based power plants (out of which total 1.85 MWe capacity power plants are already erected) and 16.25 MW capacity MSW based power plants.



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☞ The details of SPV based Solar Power Plants commissioned till date are as follows:-

☞ **100 kWp SPV based Grid connected Power Plant at Science Centre**

- ▽ Energy Generation commenced from: **18-Jan-2013**
- ▽ Expected Energy Generation (First Year): **1,41,134 KWH/ annum**
- ▽ Total Capital Cost: **Rs. 80.91 Lacs**
- ▽ Expected saving in energy bill: **Rs. 17.03 Lacs/ annum**
- ▽ Total Energy Generated till Aug-2014: **2,10,786 KWH**
- ▽ Total Savings till Aug-2014: **Rs. 22.66 Lacs**

☞ **Aggregate 750 kWp SPV based Grid connected Power Plants at Main Office Building, Katargam Water Works and other 12 sites**

- ▽ Energy Generation commenced from: **26-Mar-2014**
- ▽ Expected Energy Generation (First Year): **10,48,761 KWH/ annum**
- ▽ Total Capital Cost: **Rs. 7.00 Crores**
- ▽ Expected saving in energy bill: **Rs. 1.15 Crores/ annum**
- ▽ Total Energy Generated till Aug-2014: **4,19,426 KWH**
- ▽ Total Savings till Aug-2014: **Rs. 48.53 Lacs**

Increased efficiency of services provided can be verified from the following table:-

Year	Total Electricity Bill Amount (Lacs Rs.)	Average Energy Rate (Rs./ KWH)	Water Supply		Sewage Disposal		Streetlight	
			Electricity Bill Amount (Lacs Rs.)	Average Water Supplied (MLD)	Electricity Bill Amount (Lacs Rs.)	Average Sewage Water Disposed (MLD)	Electricity Bill Amount (Lacs Rs.)	Nos. of Luminaires
2000-01	3953.64	4.02	2272.53	354.10	887.23	244.30	507.38	36,419
2013-14	9811.56	5.92	5524.10	891.58	2066.80	641.94	1451.85	1,00,840
% Rise	148.17%	<u>47.12%</u>	143.08%	<u>151.79%</u>	132.95%	<u>162.77%</u>	186.15%	<u>176.89%</u>



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☞ **Summary of all EE & RE activities are as tabulated below: -**

Recurring Saving/ Benefits {Aug-2014}			
Department/ Activity	Energy Saving/ Benefits		Reduction in Greenhouse Gases Emission
	KWH/ annum	Rs./ annum	(Tonnes/ annum)
Water Supply, Street Lighting & Others	1,85,87,668	7,86,71,736.00	15,614
Bio-Gas Based Power Generation (3.5 MW _e)	65,47,463	3,13,95,282.00	37,451
Net Wind Power Generation (3 MW)	72,05,699	3,87,80,622.00	6,053
Net Wind Power Generation (8.4 MW)	1,55,36,526	8,54,50,893.00	13,051
Net Solar Power Generation (100 kWp)	1,31,106	14,86,558.00	110
Net Solar Power Generation (750 kWp)	9,75,348	1,10,59,081.00	819
Total	4,89,83,810	24,68,44,172.00	72,701
Cumulative Saving/ Benefits {Aug-2014}			
Department/ Activity	Energy Saving/ Benefits		Reduction in Greenhouse Gases Emission
	KWH	Rs.	(Tonnes)
Water Supply, Street Lighting & Others	16,52,22,363	69,22,58,758.00	1,38,787
Bio-Gas Based Power Generation (3.5 MWe)	4,24,17,092	20,06,46,226.00	2,42,625
Net Wind Power Generation (3 MW)	2,79,09,684	15,07,61,700.00	23,444
Net Wind Power Generation (8.4 MW)	2,01,00,315	11,09,10,809.00	16,884
Net Solar Power Generation (100 kWp)	2,10,786	22,66,466.00	177
Net Solar Power Generation (750 kWp)	4,19,426	48,52,759.00	352
Total	25,62,79,666	1,16,16,96,718.00	4,02,310



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REPLICABILITY OF THE INITIATIVE: -

- ◇ Energy conservation activities through Energy Efficiency Cell are shared with all Municipal Corporations of Gujarat and GEDA. Considering the magnitude of benefits received, such kind of "Cell" can be created in other government/ semi government organisations.
- ◇ Energy Conservation activities shared during seminars, tableau and programmes related to energy conservation activities significantly contributed towards increasing in awareness among common citizens.

SUSTAINABILITY OF THE INITIATIVE: -

To sustain the energy efficiency activities successfully,

- ◇ Energy Consumption pattern & Bill data of all HT & LT Services is continuously monitored. 74 HT services are accounting for >77% of electricity bill, which more closely monitored.
- ◇ Further, database of specific energy consumption e.g. KWH/ ML of potable water distributed is prepared and it is also being monitored.
- ◇ Measurement of efficiency of most important machineries like pumps, motors, transformers, air conditioners are periodically checked through in-house/ external energy auditing. Accordingly, improvement of efficiency of machineries/ equipments is planned/ executed.
- ◇ In the context of Energy Conservation Act 2001, although it is not compulsory for SMC, SMC is going to create the post of Energy Manager at the middle level management. SMC is also going to appoint additional junior level staff for improving the work efficiency of EEC.

AWARDS AND RECOGNITIONS: -

- ◇ Activity named "Re-engineering of Water Supply Routes for Effective Energy Savings" was **among total 16 Finalists** in **NATIONAL WATER URBAN AWARDS 2008**, details published on webpage http://124.30.164.71/asciweb/water_awards/waterawards1/shortlis16.html.
- ◇ The activity of water supply management & energy generation from bio-gas is awarded **second price** under is awarded under category of Technical Innovation for **NATIONAL URBAN WATER AWARDS 2009**, details published on webpage <http://www.waterawards.in/2009-winner-profile-smc.php>.
- ◇ Surat Municipal Corporation had been awarded with **"Certificate of Merit"** for year 2011 in the Municipality Sector by **Bureau of Energy Efficiency** for Use of Wind Power for Water Treatment Plants.



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Photographs:-



Pic. 1: Replaced pump sets @ Katargam Water Works



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Pic. 2: LED based Traffic Signal panel



Pic. 3: 1.5 MW Suzlon make Wind Turbine Generator installed at Adodor, Dist: Porbandar



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Pic. 4: First Thyristor based APFC panel installed at Dumbhal WDS



Pic. 5: Replaced pump set at Old Booster House at Sarthana WW



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Pic. 6: Design based streetlights with most energy efficient HPSV lamps on "Gauravpath"



Pic. 7: Replaced pump sets at French Well 1 at Sarthana WW



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Pic. 8: Thyristor based APFC panel installed at Katargam WW



Pic. 9: Gauravpath streetlights at Night



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Pic. 10: 100 kWp Solar Photovoltaic Power Plant at Science Centre