
MUNICIPALITIES



VADODARA MUNICIPAL CORPORATION
Vadodara (Gujarat)

Municipality Profile

Vadodara Municipal Corporation was formed in 1966. Vadodara Municipal Corporation was formed in 1966. Vadodara Municipal Corporation has implemented Energy Conservation measures in Street Light Service since 1992-93 as per details summarised hereunder. The measures have been implemented as a part of day to day activities of the streetlight department. Total area of coverage of Vadodara Municipal Corporation is 160 Sq. Kilometers and total population of the municipal is 16 Lakh (2007-2008). 1691 kilometers of street lighting is covered in vadodara (2007-2008). Vadodara Municipal Corporation is the first in the country to implement international level lighting, lowest lifecycle cost of the entire project & GSM based intelligent street light controller.

Energy Consumption

Energy Consumption per component (Specific Energy Consumption with respect to different Components).

| Parameter | 2005 - 2006 | 2006 – 2007 | 2007 – 2008 |
|--|-------------|-------------|-------------|
| Electricity consumption for street lighting (Lakh kWh) | 189 | 197 | 205 |

| Year of commissioning of project | Project description | Achievement of energy saving |
|----------------------------------|--|------------------------------|
| 2007-2008 | Conservation of T12 FTL into T8 FTL | 6.99 |
| 2007-2008 | Procuring of low watt loss ballast | 7.98 |
| 2007-2008 | Conversion of HPMV into HPSV (lamp selection based on lumen efficacy) | 13.26 |
| 2007-2008 | Street lighting installation policy based on IS 1944 (part i & ii)1970. Sanction by general board (5)design lighting (6)time management. | 16.2 |
| | Sub Total | 44.43 |

Energy Conversion Commitment, Policy and Set up

Benefits of Energy Conservation initiatives

- Energy & Financial savings without compromising servicing delivery.
- Reduction in maintenance cost.
- Improvement in services delivery.
- Low lifecycle cost.
- Environmental Protection.

- Accident Reduction and Improvement in Safety & Security of Citizens.
- Received Best Practice Award.

VMC started with procurement of 36w FTL instead of 40wFTL resulting in 10% saving i.e. 4 watts per FTL with higher burning life of 8000 hours. As this measure is part of routine maintenance this is no cost saving. Year wise savings is mentioned in the following table for the last five years. VMC has implemented this initiative since **1992**. It helped not only in reduction in electrical consumption but also reduced maintenance expenditure.

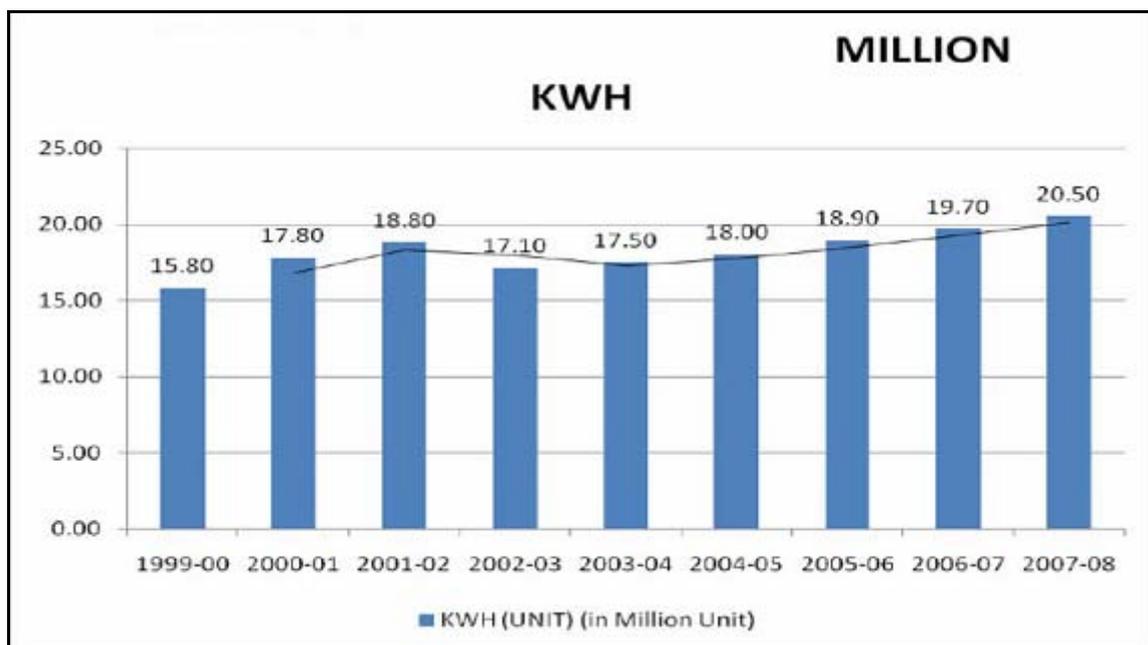
| TABLE 1.1A SAVING ACHIEVED BY CONVERTING T12 INTO T8 FTL (4w per lamp) | | | | |
|---|-----------------------------|------------------------------|----------------------------------|-------------------------------|
| Year | No. of 36 W FTL (T8) | Annual Savings In KWH | Annual Savings Rs in Lacs | Investment Rs. In Lacs |
| 2003-04 | 39255 | 630435 | 21.00 | NIL |
| 2004-05 | 40212 | 645805 | 21.31 | NIL |
| 2005-06 | 41333 | 663808 | 22.70 | NIL |
| 2006-07 | 42212 | 677924 | 23.19 | NIL |
| 2007-08 | 43503 | 698658 | 28.30 | NIL |

Energy Savings by staggering during off peak hours

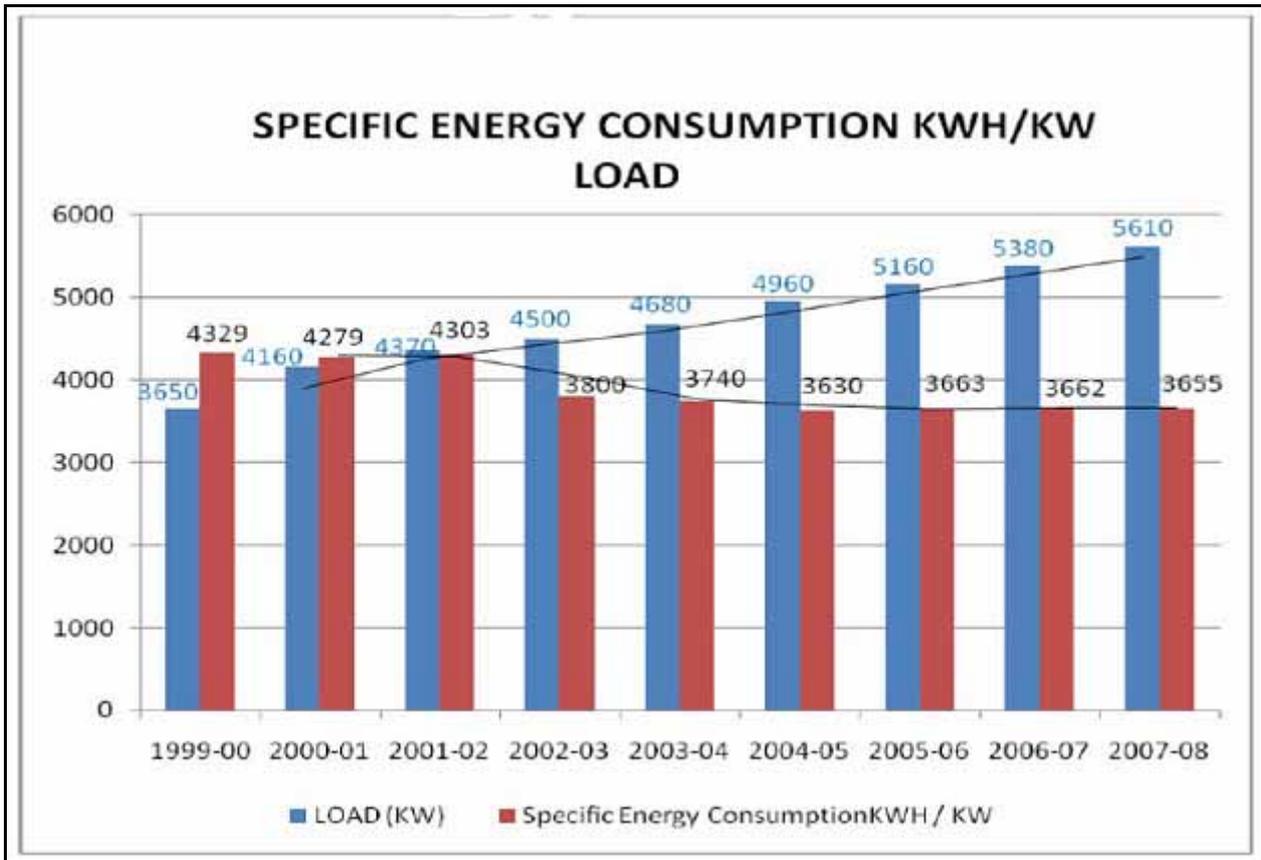
After 11 p.m., traffic density on the roads is thin and hence full illumination level is not required during this off peak hours. During late night hours MGCVL (electrical supply company) operates on low electrical load which increased supply voltage from 220V up to 260V, which increases electricity consumption and increases illumination level. The corporation can compromise with lower level of illumination during off peak hours. As traffic density is low after 11 p.m., VMC has introduced staggering of street lighting with the help of microprocessor based annual programmable time switch, which resulted in further saving of more than 20%.

VMC Started replacing HPMV Lamps in to one size lower HPSV Lamps without compromising lumen output. Light output of 250/150/70 W HPSV lamps is same/higher than 400/250/125 W HPMV Lamps. HPMV lamps attract more maintenance as it is highly sensitive to voltage fluctuation and has lower burning life as compared to HPSV lamps. On main roads, which are carrying high traffic density, VMC replaced 250 w HPMV lamps by 250 w HPSV lamps.

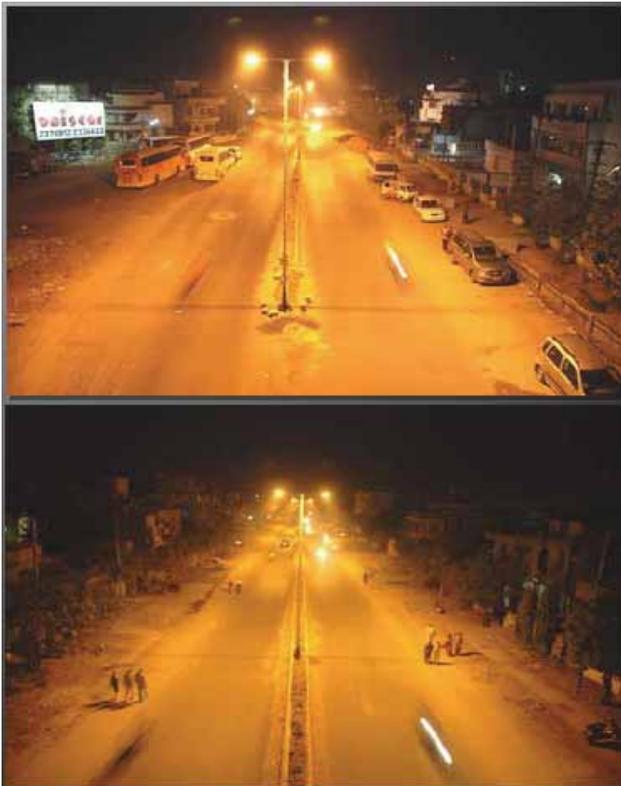
| ENERGY SAVING BY CONVERTING HPMV INTO ONE SIZE LOWER HPSV LAMPS | | | | | | |
|--|---------------------|------------------------------|--------------------------------|---------------------|------------------------------|-----------------|
| Existing HPMV | | | Replaced with HPSV Lamp | | | % Saving |
| Watt of Lamp | Lumen Output | Burning Life in hours | Watt of lamp | Lumen output | Burning Life in Hours | |
| 250w HPMV | 12500 | 5000 | 150w SON E | 12500 | 15000 | 40% |
| 125w HPMV | 5500 | 5000 | 70w SON E | 5500 | 15000 | 40% |



| REDUCTION ACHIEVED IN SPECIFIC ENERGY CONSUMPTION KWH/KW LOAD | | | |
|---|----------------|------------|---|
| YEAR | KWH IN Million | LOAD IN KW | SPECIFIC ENERGY CONSUMPTION KWH (unit) / KW(load) |
| <i>1999-00</i> | 15.80 | 3650 | 4328.77 |
| <i>2000-01</i> | 17.80 | 4160 | 4278.85 |
| <i>2001-02</i> | 18.80 | 4370 | 4302.06 |
| <i>2002-03</i> | 17.10 | 4500 | 3800.00 |
| <i>2003-04</i> | 17.50 | 4680 | 3739.32 |
| <i>2004-05</i> | 18.00 | 4960 | 3629.04 |
| <i>2005-06</i> | 18.90 | 5160 | 3662.80 |
| <i>2006-07</i> | 19.70 | 5380 | 3661.72 |
| <i>2007-08</i> | 20.50 | 5610 | 3654.19 |



Energy Conservation Achievements





Microprocessor Based Intelligent Street Light Controller

(Implemented in the year 2008 Low Cost Saving)

VMC has implemented energy efficiency approach in new street light projects in the year 2008 with lighting design approach. Most important feature of this project is Installation of Microprocessor Based Intelligent Street Light Controller with GSM technology for data transfer, remote operation & monitoring of streetlight (SCADA).

- Function of Microprocessor Based Intelligent Street Light Controller is:
- Optimizing switch ON & switch OFF timings at pre programmed time, which will take care of seasonal variations.
- Voltage reduction after 11.00 P.M. which gives savings of approximately 40%. Remote operation & monitoring from central computer.
- All electrical parameters transferred to central computer after switching ON.
- Non working luminaries can be monitored from current at central computer. Control room operator can pass on the instructions to the maintenance team without doing physical patrolling.
- In case of fault, energy saver unit generate & send SMS to the concerned person looking after maintenance of that area.

In case of emergency, streetlights connected with GSM technology can be switched ON/OFF. Day to day monitoring of energy consumption.

New Project Planning Based On Low Life Cycle Cost

(Implemented In the Year 2008)

VMC has implemented design based streetlights in the year 2000, based on the experience VMC has decided to strengthen technical specifications. Based on the available technical data, VMC decided to upgrade the technical specifications and introduced Microprocessor Based Intelligent Street Light Controller for remote monitoring and controlling of street lighting from the central Computer. Main features of this project are HPSV Luminaries with IP 66 protections prevents entry of moisture, dust & Insects resulting. Into consistent light output throughout its life. Lumen maintenance for 250 W HPSV SON T PIA lamp is also better than any other lamp. (90% lumen output after 10000 burning hours and 85% lumen output till the end of life) It has a higher lumen package of 33000 lumens with long burning life of 32000

hours. ISI marked Mild Steel step pole result into good esthetically look and longer life. Energy Saver unit with GSM technology for monitoring, controlling & data transfer. Programming of street light operation timings for the entire year which will take care of seasonal variations, which can give approximately 7% savings compared to manual operations. During off peak hours when traffic density is very low, full level of illumination is not required.

This unit will operate in energy saving mode at pre-programmed time. This can save approximate 40% electricity. Important feature of this controller is data transfer to the central computer by using wireless GSM technology from which we can control & monitor street lighting connected with these units.

Vadodara Municipal Corporation is the first in the country to implement international level lighting, lowest life cycle cost of the entire project & GSM based intelligent street light controller. Because of improved illumination level, safety & security of citizens has been improved to the great extent, which resulted into reduced number of accidents. Other benefit of design based street light with GSM technology are reduction in operating & maintenance cost, Reduction achieved in green house gas emission.

Energy Conservation Plans and Target

New Projects Development On The Basis Of Life Cycle Cost

Street lights installed by using conventional methods without considering Photometric & Installation terms warranted higher number of luminaries resulting into higher Capital and Operational cost. In spite of spending higher costs, service delivery is poor. Under the conventional methods, street light installation on one-kilometer length of fast moving traffic road used to be 33 Nos. of poles (span between poles less than 30mtrs.) totalling 66 nos. of 250 watts HPMV/HPSV luminaries, which consumes an electrical load of 18.5 kW. Also the conventional practice of selecting High Pressure Mercury Vapour Lamps (HPMV) was technically improper. To overcome poor service delivery, higher operational and maintenance cost VMC planned to implement "code of practice for lighting of public thoroughfares IS 1944n in the year 2000. VMC has implemented IS 1944 for the first time in the country in municipal services without appointing any external consultant VMC invited lighting design based tender to install streetlights on newly dev eloped public roads of A1 category.

Description of the energy conservation measure is given for Conversion of T12 FTL into T8 FTL, Procurement of low watt loss Ballast, Conversion of HPMV into HPSV. Streetlight Installation policy is based on IS 1944 sanctioned by General Board of the Corporation, Design based Lighting, Time management, A Staggering/Dimming of street lighting during off peak hours, Installation of Microprocessor Based Intelligent Street Light Controller with GSM technology for monitoring, controlling & data transfer.

Environment and Safety

VMC in association with City Managers Association Gujarat (CMAG) conducted two days training program on "Energy Efficiency in Municipal Utilities", in August 2003, at Vadodara. More than 35 ULBs of Gujarat have participated. International Council for Local Environmental Initiatives (ICLEI), South Asia is using VMC's initiatives for capacity building in other ULBs across the Country. International City Managers Association (ICMA) has transferred VMC's initiatives to Indonesian cities in the year 2004.