



सत्यमेव जयते

Ministry of New and Renewable Energy
Government of India



Executive Summary

Udaipur Solar City Master Plan



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India is a developing country and it is in the phase of rapid industrialization. With this continuous development, there is a huge demand for energy. In India, largest source of energy is coal (conventional source), which is the cause of large scale emission of Greenhouse Gas (GHG) in various sectors. With the view to reduce dependence on conventional sources of energy to meet the increasing demand, Solar City program has been initiated by the Ministry of New and Renewable Energy (MNRE), Government of India (GoI).

The main focus of India's Eleventh and Twelfth Five Year Plan was to reduce the increasing energy demand and reducing dependence on fossil fuels across different sectors in the fast urbanizing cities in the country and increase the use of renewable energy. With an increase in population and economic activities, urban areas are facing tremendous energy crisis. In Udaipur City, the population is expected to rise to 5.83 lacs by the end of 2021 and 6.5 lacs by the end of 2023; whereas the gross energy demand excluding the transportation sector is expected to increase from 1164 GWh in 2015-16 (Base year) to 1604 GWh by 2021-23 and 2021 GWh in 2026-27.

As has been the case with the wide-scale introduction of renewable energy technologies and energy efficiency measures across the country, Udaipur Municipal Corporation (UMC) has taken the initiative to develop it as a Solar City. The solar City program strives to integrate efforts in Energy Efficiency (EE) across different energy consuming sectors in the city and utilization of available Renewable Energy (RE) resources such as solar energy, wind energy, biomass, and municipal wastes to meet the reduction targets as per the guidelines provided by MNRE.

The study "Udaipur Solar City Master Plan" has benefitted from the active participation of the Udaipur Municipal Corporation, Rajasthan Renewable Energy Corporation Limited, power and energy distribution companies, industry associations, builders associations, educational institutions, and energy supply agencies in the city. The project includes study of four different sectors, namely, municipal, commercial and institutional, residential and industrial. However, as an additional study as advised by the UMC, baseline energy consumption in the transportation sector has also been included in the report. The key components of the study comprised of:

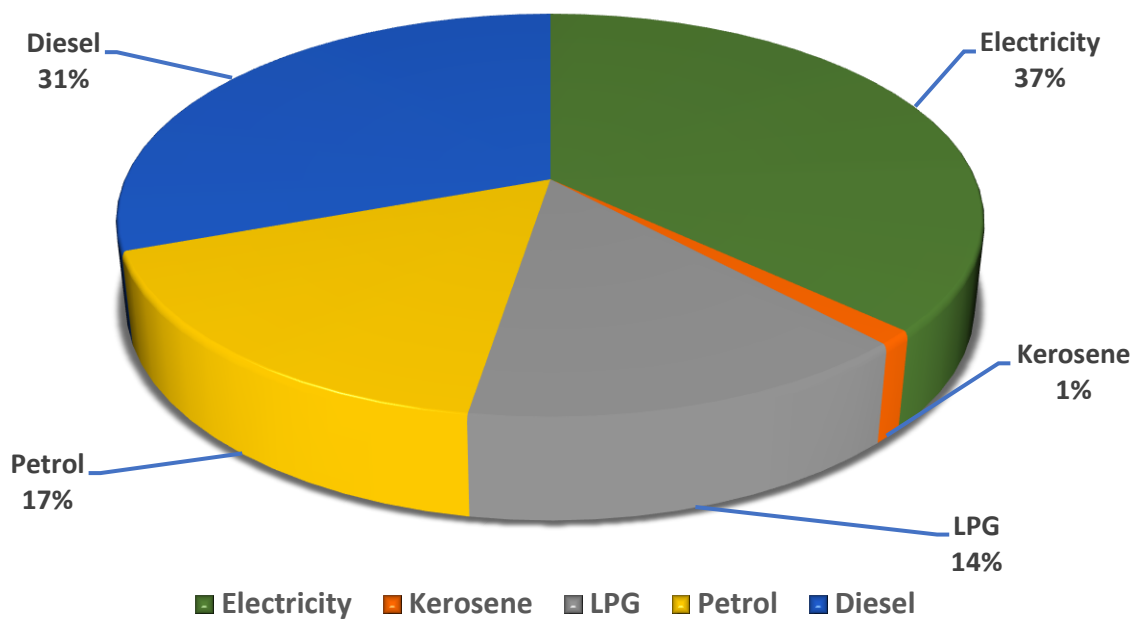
1. Baseline (2015-16) energy assessment and demand forecasting for the year 2021-22 and 2026-27.
2. Energy planning and sector-wise strategy for meeting the 10 % reduction target through RE and EE.
3. Budget estimation for achieving the reduction targets.
4. Implementation plan, awareness generation and capacity building.

During the baseline year for the city, the maximum energy consumption was in the form of electricity followed by petrol, diesel, LPG and kerosene in order. The consumption trend for all the fuels and sources of energy has been increasing during the past five years.

Baseline Energy Consumption 2015-16 and Projected Energy demand for the year 2021-22 & 2026-27

Type of Fuel	Energy Consumption in 2015-16 (Baseline Year) GWh	Projected Energy Demand in GWh	
		2021-22	2026-27
Electricity	817.6	1215.4	1596.5
Kerosene	25.3	16.4	6.0
LPG	321.3	372.2	418.5
Petrol	373.4	489.7	599.9
Diesel	677.3	711.3	740.0

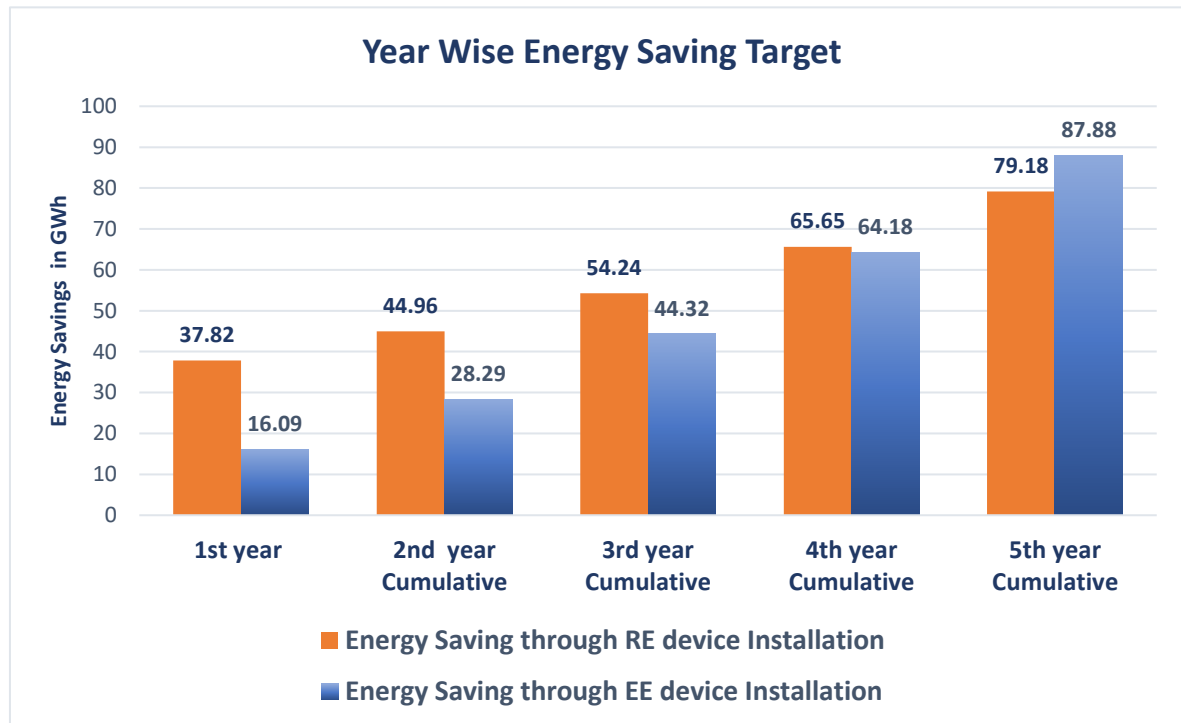
Energy Consumption(GWh) % Share Baseline Year 2015-16



Electricity has the largest proportion in the energy consumption, accounting for 37% of the energy supply, with diesel at 31% petrol, at 17%, LPG at 14 %, and kerosene at 1%.

As mandated in the solar city programme, the target is 10% reduction of energy demand at the end of five years. Projected energy demand at the end of next five year (2021-22) for Udaipur City is estimated to be 1640 GWh. As per guidelines of “Development of Solar City Master Plan”, minimum of 10% reduction is projected in energy demand of conventional energy at the end of five years through a combination of enhancing supply from renewable energy sources in the city and energy efficiency measures. Energy demand reduction target is to be achieved through installation of renewable energy system and energy efficient system in the four sectors as per the guidelines of Solar city master plan. Total energy demand reduction target is 160.4 GWh, which will be achieved

through installation of RE System and EE System. Installation of RE System and EE System has been distributed year wise across the forthcoming five years from 2017-18 to 2021-22, in the proportion of 10 % in first year, 15 % in second year, 20% in third year, 25 % in fourth year and 30 % in fifth year of demand respectively. Based on the analysis of potential for supply side augmentation through RE and demand side measures through EE, following targets are proposed for different sectors in order to develop Udaipur as a “Solar City”.



Various options of generating power from renewable energy resources has been assessed and suggested in the Master Plan. The renewable energy options are assessed in solar energy technologies and waste to energy, as biomass potential in Udaipur district is apparently Zero. Some generic EE measures have been suggested common to all the sectors and some specific to certain sectors depending upon its suitability.

Based on the sector wise proposed project activity to improve the present consumption and projected energy demand scenario of the city, quantum of investment required for various sectors is estimated for Solar City Development Plan over a specified time frame to achieve the mission goals. Gross investment required will be approximately Rs. 240 crores for the next five years. The costing provided for the projects is a rough estimation based on similar kind of projects and interaction with suitable escalation factors in each sector during the implementing period.

The total indicative budget for the development of Udaipur as a Solar City is estimated to be Rs. 240 crores through renewable energy as well as energy efficient system installation and renewable energy pilot projects, which will be invested over the next 5 years of implementation period for solar city development programme.

The budget for implementation of RE strategy and EE strategy is estimated to be 193 crores and 46.7 crore respectively. While budget for RE strategy will be shared amongst MNRE, state/city and private users whereas for energy efficiency estimated budget will be invested by user.