

SOLAR ROOF TOP SYSTEM AND GOVERNMENT INITIATIVES

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Abstract: *It very important for people to start thinking of other ways realizing their energy needs. Keeping this in mind Ministry of New and Renewable Energy (MNRE), Government of India and Government of Gujarat is promoting Roof top solar PV systems in the country. Many people in the country have started installing solar PV system for their home, apartment complex or office use, and with this article we would try to provide some information by considering consumer unit consumption and SPV system payback period with state government and central government subsidies which can be a good starting point for a roof-top Solar system size selection for installation[9].*

I. INTRODUCTION

Rooftop solar PV systems are of 3 types:

Grid-tied – These rooftop systems are primarily designed to supply the generated power to the grid and also power the load. These systems will NOT generate power during a power failure as the inverter shuts down the system to stop sending power into the grid and avoids the risk of electrocuting utility personnel who are working to repair the grid

Grid-interactive – This system works in conjunction with either a battery backup or diesel generator to support the load even during a power failure.

Off-grid – This system does not work with the grid and is designed to work only with a battery backup or diesel generator in off-grid applications

II. MAJOR SYSTEM COMPONENTS [4]

Solar PV system includes different components that should be selected according to your system type, site location and Applications. The major components for solar PV system are solar charge controller, inverter, battery bank, auxiliary energy sources and loads (appliances).

- PV module – converts sunlight into DC electricity.
- Solar charge controller – regulates the voltage and current coming from the PV panels going to battery and prevents battery overcharging and prolongs the battery life.
- Inverter – converts DC output of PV panels or wind turbine into a clean AC current for AC appliances for stand alone system or feed into grid line for grid tie system.
- Battery – stores energy for supplying to electrical appliances when there is a demand.
- Load – is electrical appliances that connected to solar PV system such as lights, radio, TV, computer, refrigerator, etc.
- Auxiliary energy sources - is diesel generator or other renewable energy sources.

III. GOVERNMENT INITIATIVES [1,2]

To create the awareness amongst the consumers / applicants of Residential Rooftop Solar PV Systems this to inform that GEDA has registered 41 Empaneled Agencie (EA) to implement the scheme. List of the 41 EAs is available on GEDA web site. It is a responsibility of EA to design the system with all accessories and equipment, supply, Install, Commission and maintain it for 5 years with free replacement of guaranteed parts against manufacturing defects. EA will obtain all necessary approvals from GEDA, concern DISCOM and Chief Electrical Inspector (CEI) for the Residential Rooftop Solar Systems (RRSS).

The discover cost of the RRSS is Rs. 69,000/-- per kilowatt (Sixty Nine thousand only) as per the specifications.

Following subsidy is available to applicant for the installation of RRSS ;

(1) State Subsidy of Rs.10,000/-- per kW subject to maximum of Rs.20,000/--

(2) MNRE subsidy of 30 % of the discovered cost i.e. 30 % of Rs.69,000/--, Rs. 20,700/-- per kW (Without any capacity limit)

Accordingly applicant/beneficiary requires to pay only Rs.38,300/-- per kW to EA, which is Rs.69,000/-- (Total cost of 1 kW RRSS) – (minus) Rs.10,000/-- (State subsidy per kW subject to maximum Rs.20,000/--) – (minus) Rs.20,700/- - (MNRE, New Delhi subsidy)

The total cost of the system includes supply of following[5]: Solar PV Panels, Inverter/s, Bi Directional (net) meter, solar meter, standard wiring, standard structure, Erection, Commissioning, 5 years CMC with replacement of part/s against defect liability, inclusive of all taxes.

IV. ESTIMATION OF COST ANALYSIS AND CALCULATION OF PAY-BACK PERIOD

The Project cost on turnkey basis for 1-2Kwp on grid solar system will be as per the scope of work defined in above section and is calculated as follows.

Carrying out all the calculations, we find that the initial investment for 1 kw Roof top grid tie system is 38300/- and for 2 kw system is 76600/-.

Pay-back period Calculation[6,7]:

Pay-back period = A / B

Where, A = Total cost of PV system with all auxiliary equipment's.

B = Total annual cost saving after installation of PV system.

Pay-back period = 4-6 Years depend on plant size selection and unit consumption by consumer

To get maximum returns from a SPV, net metering system, sizing is important. The pay-back period is calculated for a 1KW system which generates 4.5 units /day and 2 kw system 9 units/day

Profit after pay-back period till useful life of SPV[6,7]:

The efficient useful life of PV is 25 years and we calculated pay-back period of SPV is 4-6 years.

Profit = (Useful life – Pay-back period) x Difference amount in bill after connection of SPV.

Calculation and Discussion:

Avg. unit consumption per day by consumer	for 1 kw system payback in years	for2 kw system payback in years
1	6.1	6.6
2	5.3	6.17
3	4.7	5.73
4	4.2	5.3
5	4.08	5
6	4.09	4.7
7	4.11	4.44
8	4.12	4.21
9	4.13	4.07
10	4.15	4.08
11	4.16	4.09
12	4.18	4.09
13	4.19	4.1
14	4.2	4.11
15	4.22	4.11

to install its pay back is short compared to 2 kw system and if per day consumption is 9-15 units then 2kw system is good to install. Above all calculation is by considering the government of India and government of Gujarat subsidy scheme.

V. CONCLUSION AND OBSERVATION:

As per above calculation payback period is too long and to encourage consumer to accept more solar PV system at home till more incentive required from government to reduce pay back and to increase profit after payback till useful life of SPV.

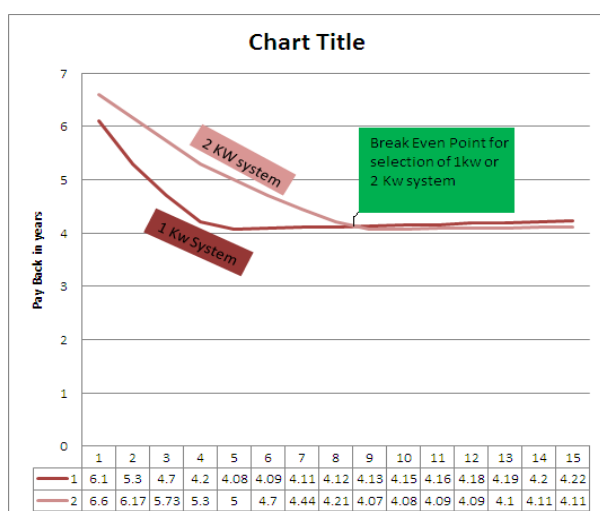
Feedback/ Comment by U.G.V.C.L consumer:

Comment: payback period is too long and profit after payback is less and it is equivalent to return on investment in Fixed Deposit with 8% interest rate. So why should I invest in solar?

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From above table and graph it is clear if your consumption is 1-3 units per day then payback period will be 5 to 6 years so if your consumption is 4-8 units/day then 1 kw system is best