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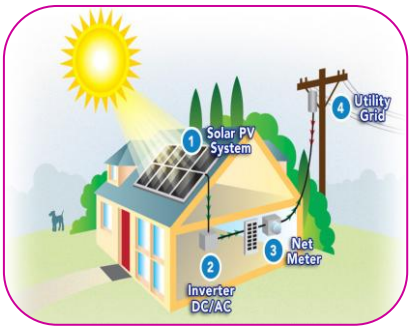
ROOFTOP SOLAR NET METERING SYSTEM: THE FUTURE OF HOUSEHOLD ELECTRICITY



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ABSTRACT:-

Electricity is basic need of any household. Electricity is normally generated by nuclear power project, Hydro power project. However in these methods there is huge investment required. Such investment is possible to government or large corporate.

Even after 70 years of independence electricity has not reached in around 1,75,000 villages across India. There are lot of difficulties for generation, transmission and distribution of electricity.

Solar energy can be used to generate electricity in economic way. In addition it is pollution free as well as low budget project. Even a Family can be self sufficient in electricity generation as per their needs. So in future it is definitely possible that solar power will replace traditional form of electricity to much extent at least at household level.

Government has promoted the use of solar energy by providing 30% to 50% subsidy on cost of solar unit.

INTRODUCTION:-

A. Solar energy:-

Solar energy is simple energy provided by the sun. This energy is in the form of solar radiation, which makes the production of solar electricity possible.

➢ **Benefits of solar energy:-**

- Diverse Applications
- Low maintenance.
- Solar is a Secure Investment
- Guaranteed Performance
- Environment friendly (Pollution free)
- Create Energy Independence
- Solar power is universally available
- Government subsidy

➢ **Limitations of solar energy:-**

- Weather Dependent
- Solar Energy Storage Is Expensive
- Uses a Lot of Space
- Problem of efficiency

- Complications when moving

OBJECTIVES:-

1. To study Net metering scheme of MSEDCL.
2. To study economic viability of NET METERING scheme for household use
3. To Calculate Return on Investment for Net metering project

RESEARCH METHODOLOGY

This research paper is based on data collected from MSEDCL regarding Net metering project. This data is analysed to find out the effective savings in electricity bill by installation of net metering unit by household. In addition the return on investment due to saving in electricity bill is also calculated. For calculation purpose, household electricity rates as on 1st September 2018 are considered at different levels of electricity consumption by a household.

➢ What is NET METERING?

Net metering is a system where an electricity user who has installed solar energy unit generates the electricity by solar panels. Generated electricity is used for his household and surplus units of electricity are sold to electricityGeneration Company.

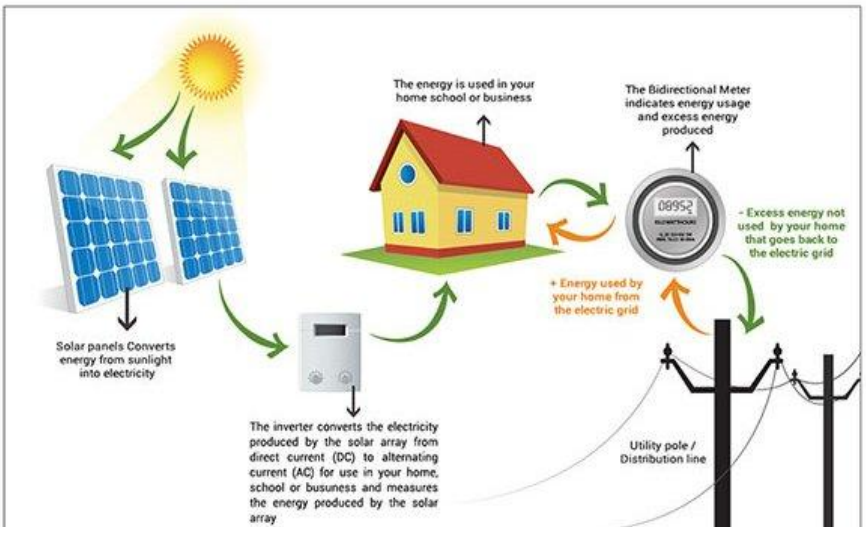
Electricity bill is payable on the NET ELECTRICITY USED by the user from electricity company.

NET electricity used= TOTAL electricity used- SOLAR power used

➢ Featuresof net metering:-

- Consumers can generate own energy at any time of the day.
- Solar energy can be used at night.
- Energy not used in a month, can be rolled over to be used in the next month.
- Solar power can be used during winter months when there is little or no sunlight.

➢ How net metering works:-



On-Grid Solar

On-Grid Systems are solar PV systems that only generate power when the utility power grid is available. They must connect to the grid to function. They can send excess power generated back to the grid when you are overproducing so you credit it for later use.

Benefits: These are simplest systems and the most cost effective to install. These systems will pay for themselves by offsetting utility bills in 3-8 yrs.

Off-Grid/Hybrid Solar

These systems allow you to store your solar power in batteries for use when the power grid goes down or if you are not on the grid. Hybrid systems provide power to offset the grid power whenever the sun is shining and will even send excess power to the grid for credit for later use.

Benefits: Provides power for your critical loads when the power grid is down.

- **Parts / Equipments of roof top solar system:-**
- Solar panel
- Inverter
- Switching meter

Details of net metering unit

- For a 2kw unit minimum investment should be Rs.1,00,000 approx.
- 30% subsidy is provided by government on this project.
- 120 units electricity is generated per month.
- 4 units electricity generation per day.
- 25 years guarantee by authorized company for solar panel and 5 years guarantee by government for this unit.
- Minimum requirement is ONLY to clean the panels per week for effective generation.
- 100sqft area is required.

Benefits of Net metering

Freedom from Load shedding.

No need to modify existing electrical fittings and installations.

Saving electricity =generating electricity.

Wide use of solar appliances will reduce the cost of electricity

Electricity can be used at remote areas of the country

Economic viability of net metering unit for household use

Assumptions

a. Basic 2kw netmetering product is used by the household

b. Electricity generation during10am to 4pm only throughout the year.(6 hrs/day)

c. Constant electricity consumption throughout the year.

d. There is no change in electricity rate/unit.

e. Government subsidy is available for netmetering unit.

Electricity bill Slab(Units per month)	0-100	101-300		301-500	501- more
Units used per month	100	200	300	500	600
Electricity Rate/unit	3.07	6.81	6.81	9.76	11.25
Connectivity charges/unit	1.18	1.18	1.18	1.18	1.18
Total Charges/Unit	4.25	7.99	7.99	10.94	12.43
Electricity usage charges(a)	425	1598	2397	5470	7458

Fixed Charges(b)	65	65	65	65	65
Electricity Charges@16%(c)	78.4	266.08	393.92	885.6	1203.68
Approx Bill (a+b+c)	503.4	1929.08	2855.92	6420.6	8726.68
Actual Charges/unit	5.034	9.6454	9.519733	12.8412	14.54447
Units generated by solar energy @ 4 units/day	120	120	120	120	120
Net Units Used	-20	80	180	380	480
Effective per Unit rate after saving	NA	5.034	9.64	12.84	14.54
Bill Payable after saving	Nil	402.72	1735.2	4879.2	6979.2
Net electricity bill Saved	503.40	1526.36	1120.72	1541.4	1747.48
Annual Saving	**6040.80**	**18316.32**	**13448.64**	**18496.8**	**20969.76**

Pay Back Period (recovery of investment)

Cost of Netmetering unit(Net)	70000	70000	70000	70000	70000
Pay back Period in Years	**11.58**	**3.82**	**5.20**	**3.78**	**3.33**

Calculation of Returns on Investment of Net metering

Electricity bill Slab	**0-100**	**101-300**		**301-500**	**501- more**
Units used	**100**	**200**	**300**	**500**	**600**
Annual Saving(Rs)	6040.80	18316.32	13448.64	18496.8	20969.76
Effective life of unit (Years)	25	25	25	25	25
Total saving(Rs)	151020	457908	336216	462420	524244
Cost of investment(Rs)	70000	70000	70000	70000	70000
Net Returns(Rs)	81020	387908	266216	392420	454244
Returns on investment(%)	**115.74%**	**554.15%**	**380.31%**	**560.60%**	**648.92%**

FINDINGS

Cost per unit of electricity goes on increasing as per use of electricity.

Netmetering saves substantial amount of electricity bill.

Basic netmetering product is available at very reasonable price with zero maintenance charges.

Government has launched various schemes to promote use of solar energy.

CONCLUSIONS.

Netmetering is economically useful for household using 100+ units of electricity per month.

Investment in netmetering is recovered in 3 to 5 years on the basis of electricity usage.

Earlier solar units were profitable for commercial use only, but netmetering is profitable even for household use

Netmetering unit can be considered as essential like other household appliances.

- Return on investment on net metering is surprisingly high ranging from 115% to 650%

SUGGESTIONS

Netmetering unit can be made mandatory for new houses / bunglows/ row houses etc.
Apartments, schools, colleges, manufacturing units and offices should be compelled to install netmetering unit for electricity connections with free initial cost.(recovery on EMI basis from savings.)
Compulsory use of LED lights to save electricity

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