

Net Metering Using Solar

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Abstract— Net metering mechanism provides usages of a bidirectional meter which has facility to record both import and export energy values. In net metering, prime focus is on utilizing self produced electricity by renewable energy sources and excess or surplus is sold to utilities or grid. It results into reduction of electricity bills. Solar photovoltaic system is used significantly in net metering. The study on analyzes the annual savings of electricity and economic feasibility in solar rooftop photovoltaic system. The study shows that lower payback period is achieved with solar rooftop photovoltaic system.

1. INTRODUCTION

Net metering mechanism gives usages of a bidirectional meter which has amenity to record both import and export energy values. In net metering, prime focus is on utilizing self produced electricity by solar energy and excess or surplus is sold to utilities. It results into reduction of electricity bills. Solar photovoltaic system is used significantly in net metering. This study involves the feasibility examination of net metering implementation in commercial buildings of Reliance Energy consumers in Mumbai. Commercial consumers are targeting purposefully. The study also on analyses the annual savings of electricity and economic feasibility in solar rooftop photovoltaic system. The study shows that lower payback period is achieved with solar rooftop photovoltaic system.

There are two types of metering arrangements that can be used for development of solar PV projects: gross and net metering. Worldwide, both net-metering and gross metering concepts have been implemented.

In a gross metering arrangement, the entire energy generated by solar PV system is given directly to the electrical grid and the system owner is profited by feed-in-tariff based on sale of power to the utility.

2. LITRETURE SURVEY

This project is about application oriented power generation through renewable energy sources. In this project we took our main reference from Internet and “NET METERING WITH SOLAR” by Kourosh

Sedghisigarchi. Initially we search the papers on IEEE website and we collected some information related with implementation of our project. Till today’s date this project was not implemented in residential area of India. Thus it should have to perform on our own responsibility.

Referencing the information on Internet, we precede the work step by step. Power Generation through solar panels .we design circuit for net metering which is useful & efficient for use net metering for residual area.

To design inverter, we refer various related to design of inverter and its individual component. The component to be decided according to requirement we brought on ratings for filters, converters.

3. BLOCK DIAGRAM

This is the block diagram of net meter. In this solar panels works to collect solar energy. SBG work as converter to generate, filter and inverting the collected energy. Net meter work as bidirectional meter takes data of import & export energy. Battery use to save energy and use energy as our requirement.

The generated energy is first fed to load this will be home appliances & other devices. The excessive generated energy will be fed to line. We get savings on electricity and economic.

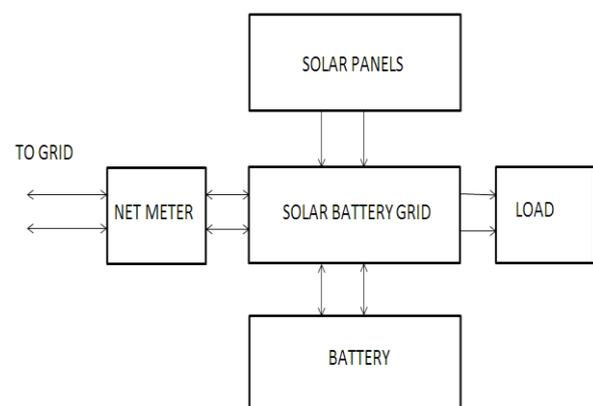


Figure 1: Block Diagram of Net Metering Using Solar

4. ELECTRICITY GENERATING SYSTEMS BY SOLAR

This systems absorb sunlight and convert it into electricity that we can use. Every second, the sun emits approximately 42 trillion kilocalories of energy to the Earth. If we convert 100% of this energy into electricity, then we could create one year's power for our precious planet in a single hour. Solar energy is the most powerful of all renewable energy resources.

The Earth's reserves of fossil fuels, such as petroleum and coal, may eventually be depleted. Moreover, burning these fossil fuels creates carbon dioxide emissions, which are suspected contributors to climate change.

As long as the sun exists, we can use its energy here on Earth. And because solar power does not emit carbon dioxide, it is an effective solution to natural resource reduction and climate change — problems that are becoming more serious every year.

5. NET METERING COMPONENTS

1) BI-DIRECTIONAL METER



Figure 2: BI-DIRECTIONAL METER

It means a consumer meter for measuring, indicating and recording quanta of electricity flowing in opposite directions (export to the licensee's distribution system and import by the consumer from distribution system) in Kwh including any other quantity as per the requirement. The net quantity of electricity either fed to the distribution system or imported by the consumer in Kwh is derived by arithmetical means. In case the meter is fixed with HT consumers the power factor will be based on the import of energy only.

TECHNICAL FEATUES OF BIDIRECTIONAL METERS

- Separate registers for import and export of power along with MRI downloading feature in these registers

- KVA, KWh, KVA measuring registers for plants above 1KW
- AMI facility with RS 232 cable
- Class 1 accuracy meters for PV systems up to 10 kW, 0.5 accuracy class meters for PV systems above 10 kW and 0.2 class accuracy meters for HT systems
- BSI and ISI certification required
- CT feature to be added above 50kw.

2) SOLAR PANEL



Figure 3: Solar Panel

These solar panel refers to a panel designed to absorb the rays from sun as a source of energy for generation of electricity.

A photovoltaic (PV) module is a packaged; connect assembly of typically 6x10 solar cells. The solar Photovoltaic panels consist of the solar array of a photovoltaic system that generates and supplies solar electricity in commercial and residential applications. Each module is rated by its DC output power under standard test conditions, and typically ranges from 100 to 365 watts. A photovoltaic system have a panel or an array of solar modules, a solar inverter, and sometimes a battery and interconnection wiring. The module efficiency gives the area of a module given the same rated output – an 9% efficient 230 watt module will have twice the area of a 18% efficient 230 watt module. There are a few easily available solar panels that exceed 24% efficiency and reportedly also exceeding 26%. Single solar module can produce limited amount of power; most installations includes multiple modules

3) GRID-TIE INVERTER



Figure 4: GRID-TIE INVERTER

This is a power inverter which is used to convert DC electricity into AC electricity with an ability to synchronize to interface with a utility line. It is used in the converting DC sources such as solar panels or small wind turbines into AC for tying with the grid.

Electricity delivered to the grid can be compensated in several ways. The entity that owns the renewable energy power source receives compensation from the utility for its net outflow of power is Net metering. So for example, if during a given month a power system feeds 450 kilowatt-hours into the grid and uses 150 kilowatt-hours from the grid, it would receive compensation for 300 kilowatt-hours. In the US, net metering policies vary by jurisdiction. The owner of this system is paid for every kilowatt hour delivered to the grid by a special tariff based on a contract with Distribution Company or other power authority this policy is known as feed-in tariff.

4) CABLES:

- All cables shall be supplied conforming to IEC 60227/ IS 694 & IEC 60502/IS 1554. Voltage rating: 1,100V AC, 1,500V DC
- For the AC cabling, PVC or XLPE insulated and PVC sheathed single formulate-core flexible copper cables shall be used. Outdoor AC cables shall have a UV-stabilized outer sheath.
- The total voltage drop on the cable segments shall not exceed 2.0%.
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- The DC cables from the SPV module array shall run through a UV stabilized PVC pipe of adequate diameter with a minimum wall thickness of 1.5mm.
- Cables and wires used for the interconnection shall be provided with solar PV connectors (MC4) and couplers.
- All cables and PVC pipes shall be clamped to the rooftop, walls and ceilings with thermo-plastic clamps at intervals not exceeding 50 cm. The minimum DC cable size shall be 4.0

mm² copper. The minimum AC cable size shall be 4.0 mm² copper.

6. ADVANTAGES

- Financial Credit for Extra Solar Power Produced
- No Battery Storage System Needed
- No Backup Generator for when Solar Power is Not Available
- Seasonal Storage – Solar Power Produced in Summer Saves on Winter Costs
- Most important advantage is that we can inject excess power from the panels to the grid.
- It also provide information on energy savage by the system
- It calculates 'power credits' on power injected into the grid
- It encourages us to save power using 'Time of Use ' and other unique features present in modern net-meters
- It reduces the pressure on the grid.
- Power can be also provided to neighboring homes
- It reduces transmission losses.
- It makes the user more conscious of energy usage.

7. DISADVANTAGES

- Voltage fluctuation and imbalance
- Transmission of unwanted current into the grid
- Unintentional islanding
- Reverse power flow and voltage fluctuations.

8. APPLICATIONS

- The generated power can be used to supply the power to the house loads like bulb, fan, and tube light & other small equipment.
- The generated power can be stored and can be supplied to station for the electrification of lamp around industry.
- The generated power can be used to light many powerless homes.

9. CONCLUSION

Best way to recover waste energy by the generating power which is primary need of metro cities. By using of this technology, we can generate more power. The technology is expected to reduce carbon emissions and also help to country to improve its economic power. Generated Power can easily transfer to local areas. It can be easily maintained by using sensors. Free accessible energy can be

created with the help of this work, which can cater to the growing demands of energy all around the world. Thus an alternate means of renewable energy is provided by this project, which will not only help solve the energy problems, but will also to an extent reduce the load on major sources of energy production like thermal power plants and nuclear power plants, which generally consume much of the treasured depleting resources. Therefore positive ramifications of this entire research are manifold and will tend to alleviate the major energy crisis problem faced all over the world.

10. FUTURE SCOPE

- As the hunger for alternative forms of energy continues, these type odd projects are generating hope.
- Indian govt. has decided to equip all the govt. office, hospital, collage, with roof top pv system & Involve them in net metering.

11. REFERENCES

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