ON-GRID VS OFF-GRID SOLAR

On-Grid Solar is solar generation that is connected to the utility grid

All solar generation enters the grid

“co-generation” with solar

The grid provides backup power for a normally stand-alone solar installation

All generation enters the grid

Solar ‘farm’ owned by the utility to supplement diesel

Utility has full control of solar input to the grid

Solar ‘farm’ owned by an IPP

Utility has specific limited control of solar input to the grid

Advantages:

Maximum reduction of utility diesel use

Lower cost of generation than diesel

Utility has real-time control of access to solar generation

Control over quality and system compatibility of the solar installation

Disadvantages

Installations tend to be concentrated geographically and therefore have maximum impact on stability

Tends to increase the complexity of operational processes

The installation of a variety of different inverter types by donors greatly increases the problems of control of the solar

Possible actions to reduce the effects of the disadvantages

Set standards for equipment and type of installations and require donors and IPPs to meet those standards

Require the inclusion of batteries or fast response diesel units to offset large variations in output

Avoid geographical concentration of installations

“co-generation” with solar

solar generation is first delivered to a load with any surplus solar generation entering the grid for utility use

Advantages

Utility investment not required

Maintenance by utility not required

Typically a reduction of daytime peak demand results

Disadvantages

Loss of revenue from customer

Limited ability of the utility to control solar inputs

Less control over technical quality and compatibility of the installation

Possible actions to reduce the effects of the disadvantages

Utility ownership of installations

Require installation of battery storage to offset fluctuations

Establish and enforce standards for equipment that is connected to the grid

Off-Grid Solar

Solar generation that is totally independent of the utility grid.

Except for water pumping with tank storage, includes batteries for electricity storage

Solar home systems (SHS)

Usually delivers DC power

Capacity typically no greater than 200 Wp

Focused on lighting and entertainment for residences

Advantages

Greatly improves lighting quality

Allows the use of small appliances that require electricity to operate

Lower cost than alternatives for similar services

Easy to install

Maintenance is not complicated

Cheaper than the alternatives for providing comparable services

Disadvantages

Lack of funds when battery replacements are needed

Access for maintenance is usually costly

Often abused by end users leading to low reliability

Requires specialised DC lights and appliances

Usually systems are donor supplied and component quality or specifications often inappropriate

Possible actions to reduce the effects of the disadvantages

Rent the SHS with rental payments covering battery replacement and general maintenance

Do not allow customer access to batteries or controllers

Make DC lights and appliances available through local shops

Establish standards for the supply of SHS and enforce them

Off-grid AC supply

Full grid services made available for facilities that are not connected to the grid

Health centres, schools, island government facilities, visitor facilities, small rural industries

Small scale electrification not operated and maintained by a public utility.

Advantages

Can operate devices that require grid AC type electricity to function

Much lower in cost per kWh relative to small diesel or petrol generators

Easy to provide 24H power

Higher reliability of power than small generators

Low maintenance relative to small generators

Disadvantages

High front-end cost

May have substantial land requirements

Poor control over equipment that is to be installed

Possible actions to reduce the effects of the disadvantages

Use donor funding where practical

Establish financing programmes to make systems financially acceptable

Establish standards for equipment and system designs and enforce them

DISCUSSION