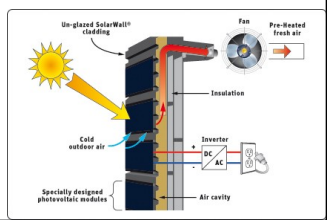
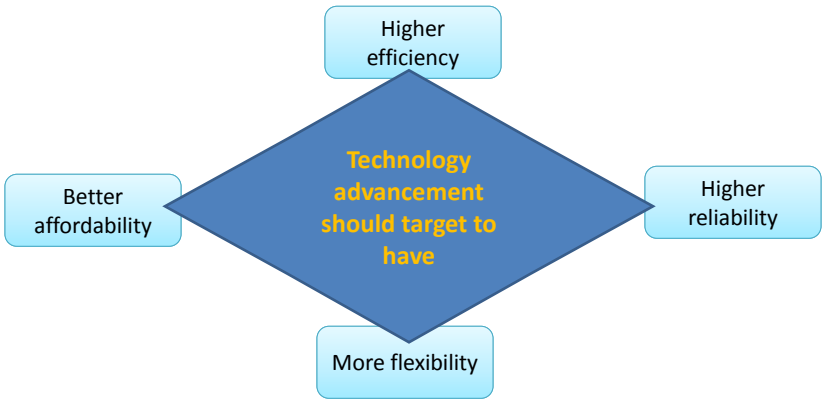
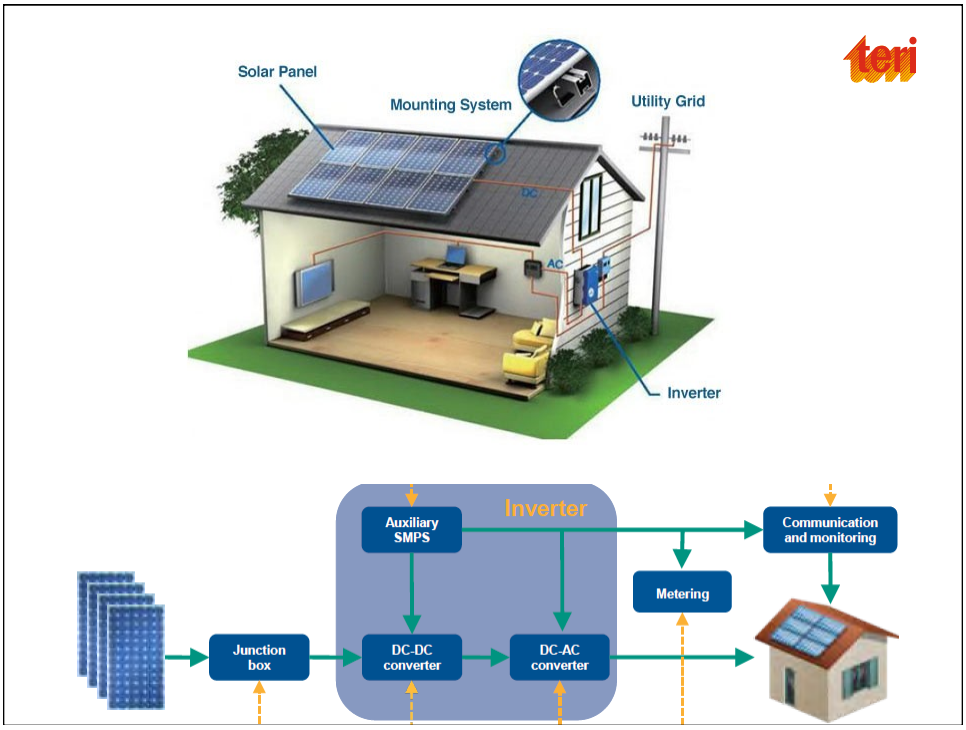
Technology advancement in Solar Photovoltaic System for Building sector

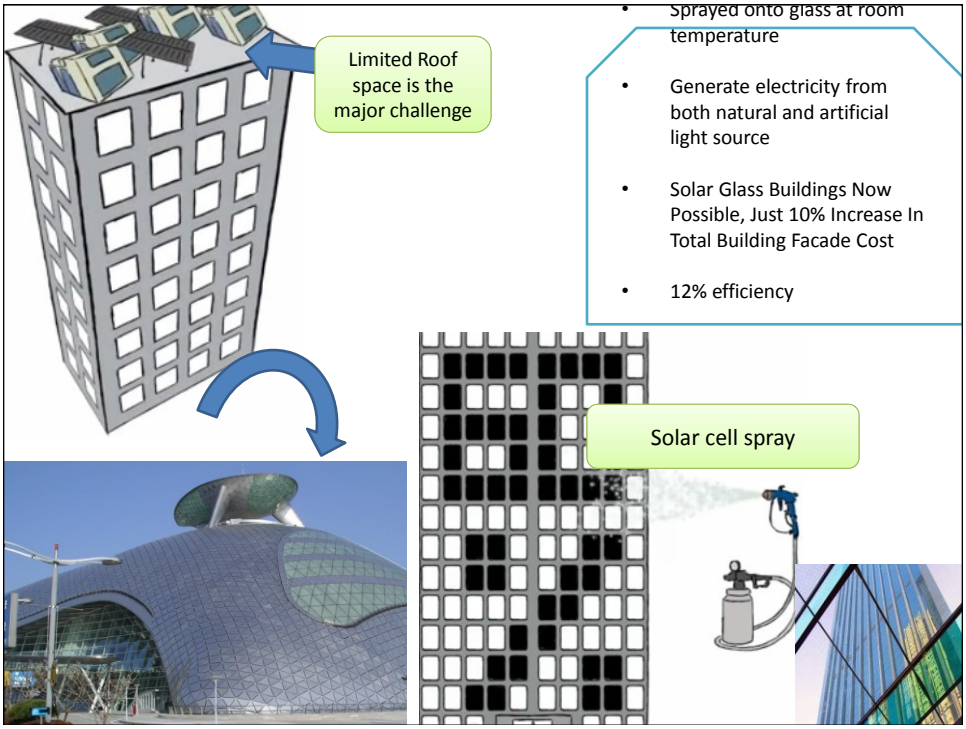
Parimita Mohanty

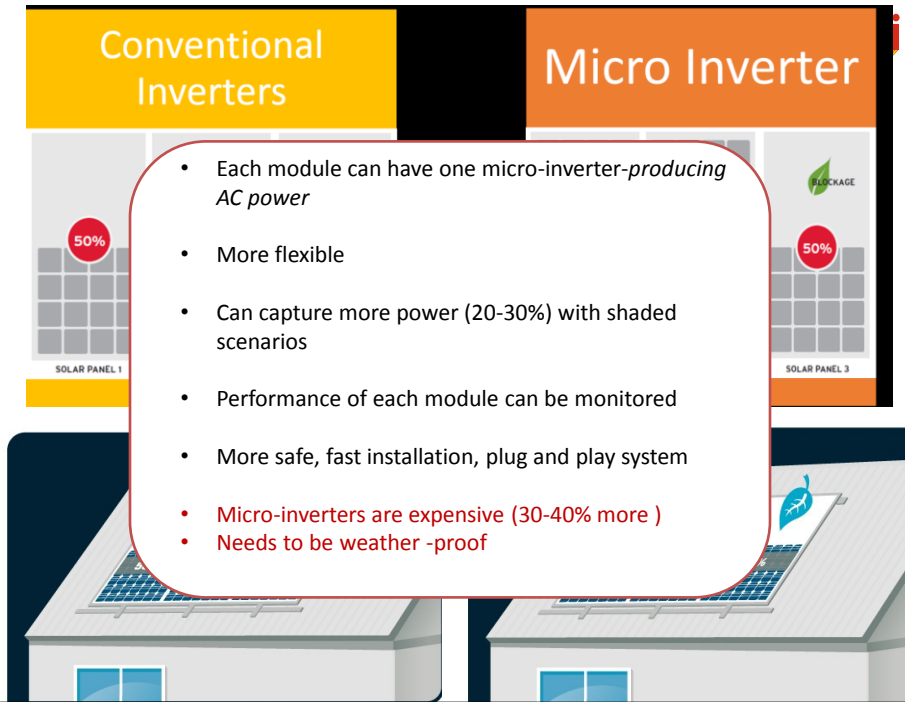
THE GRIHA SUMMIT 2014
January 16, 17 & 18, 2014





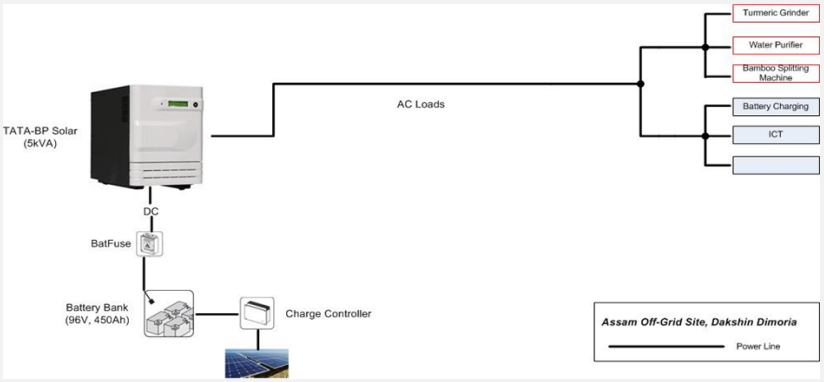

Solar Panel
Mounting System
Utility Grid
DC
AC
Inverter
Inverter
Auxiliary SMPS
Communication and monitoring
Metering
Junction box
DC-DC converter
DC-AC converter


Limited Roof space is the major challenge
Sprayed onto glass at room temperature
Generate electricity from both natural and artificial light source
Solar Glass Buildings Now Possible, Just 10% Increase In Total Building Facade Cost
12% efficiency
Solar cell spray



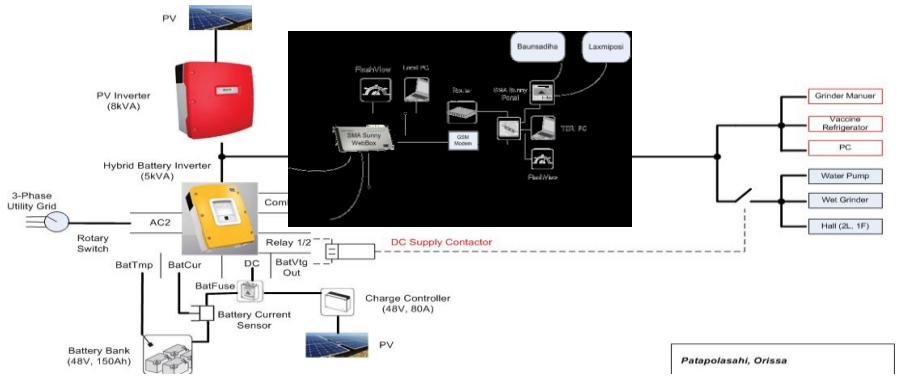
- Each module can have one micro-inverter-*producing AC power*
- More flexible
- Can capture more power (20-30%) with shaded scenarios
- Performance of each module can be monitored
- More safe, fast installation, plug and play system
- Micro-inverters are expensive (30-40% more)
- Needs to be weather -proof

Technology Trend



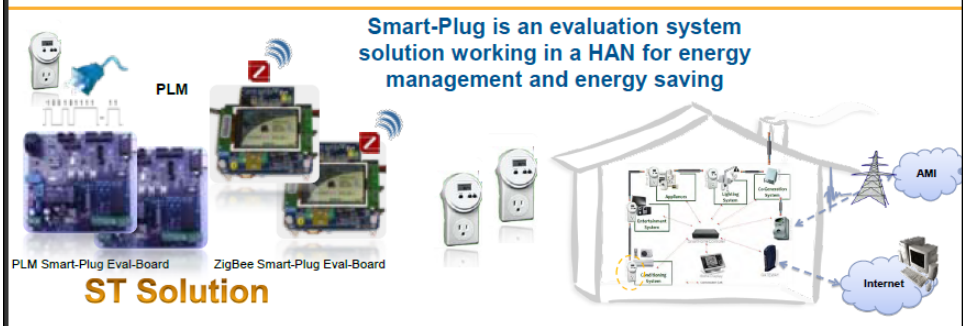
This figure depicts the standard design of solar PV systems.

- The batteries, which are the weakest link, are always in the system loop which negatively impacts the reliability and efficiency of the system
- There is little scope for system expansion or grid connectivity.



More efficient:	Able to directly feed power to the load thus avoiding losses through double conversion
More reliable:	Allow seamless operation of multiple energy resources
More flexible:	Same configuration compatible for taking power and feedback power to the grid; thus avoiding redundancy of infrastructure in future
Less O&M cost	Intelligent load and resource management requires less battery/replacement cost
Less post monitoring Cost	Support remote monitoring and remote control from the central location with minimal cost

7



Key Products

- Energy consumption and electrical parameters monitori
- Power network overload prevention and remote load management in a wireless HAN;

by functions

Basic → Medium → Advanced

POWER: *DC for electronics & battery*

METROLOGY: *Measures Current and Voltage and computes for active power*

Standard Functions: *Overall housekeep and tamper monitor. Processes, store, display data point. RTC needed for time usage records and multi tariffs*

COMMUNICATIONS *Communication protocols. Used in reading of meter for payment collection purposes, as well as in calibration and verification of meter. Smart card reader for pre-paid features.*

by features

Low End Meter

- kWh measures
- LCD Display
- Storage Calibration Data

+

Mediu End

- Anti Tamper
- Maximum demand with date and time
- Date&Time
- Cumulative Energy

+

High End Mete

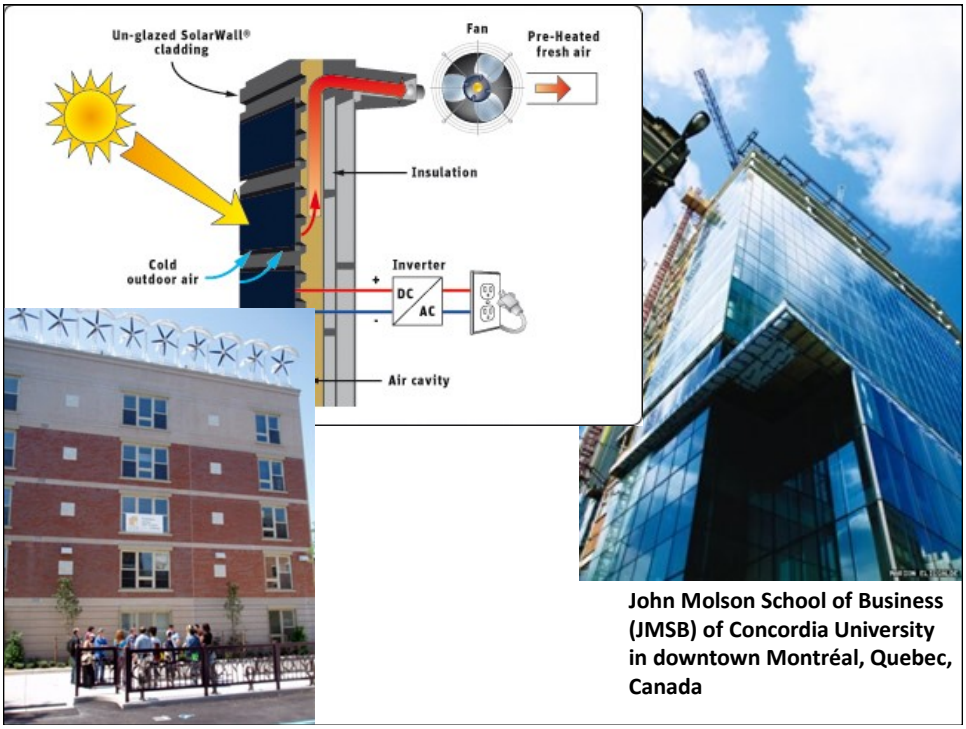
- Automatic Meter reading (IR, RF, IrDA, PLC, ZigBee)
- Multi –Tariff (Peak hours, normal hours, etc)
- Meter calibration trough s/w
- Pre-paid module (Card types used: EEPROM card, Security card, Smart card)

PLC

Smart card

meter

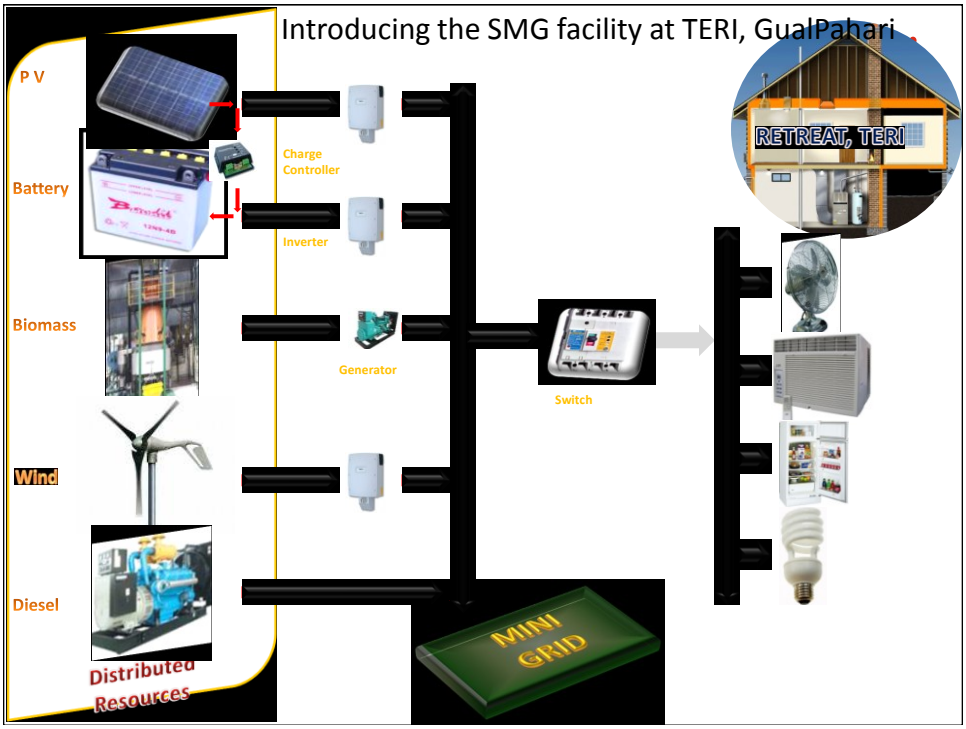
Key blocks are similar in each classification …

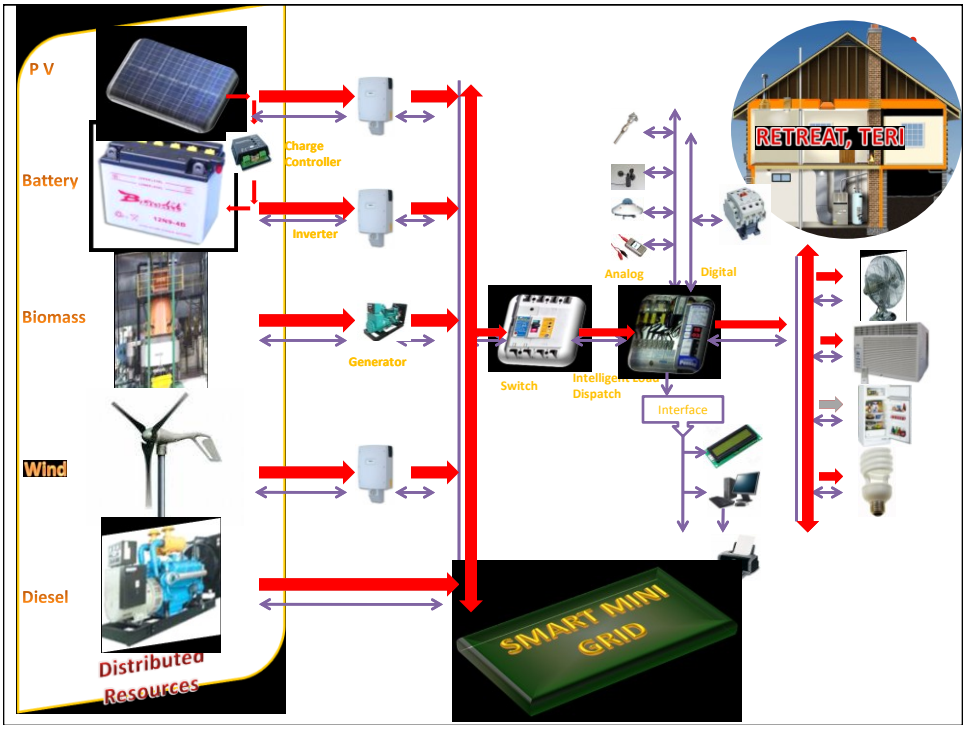


John Molson School of Business (JMSB) of Concordia University in downtown Montréal, Quebec, Canada

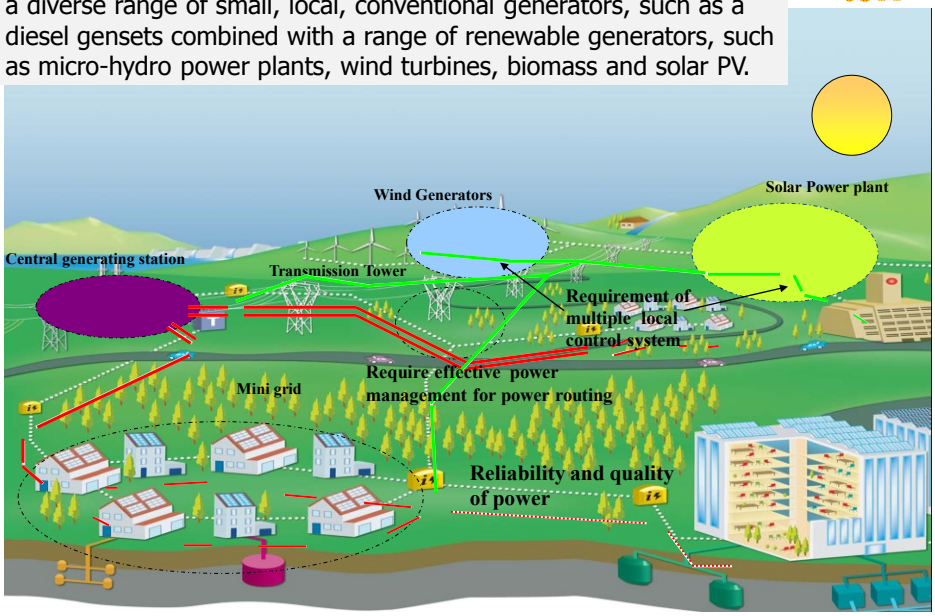
Distributed Generation based Smart Mini-Grid system at TERI, Gram, India

Introducing the SMG facility at TERI, GualPahari





Smart Mini-grid- An electricity distribution network operating below 11 KV, providing electricity to a community. It is supplied by a diverse range of small, local, conventional generators, such as a diesel gensets combined with a range of renewable generators, such as micro-hydro power plants, wind turbines, biomass and solar PV.



Courtesy: TERI

Thank You

parimita@teri.res.in