

# Solar opportunities for Prosumer Applications

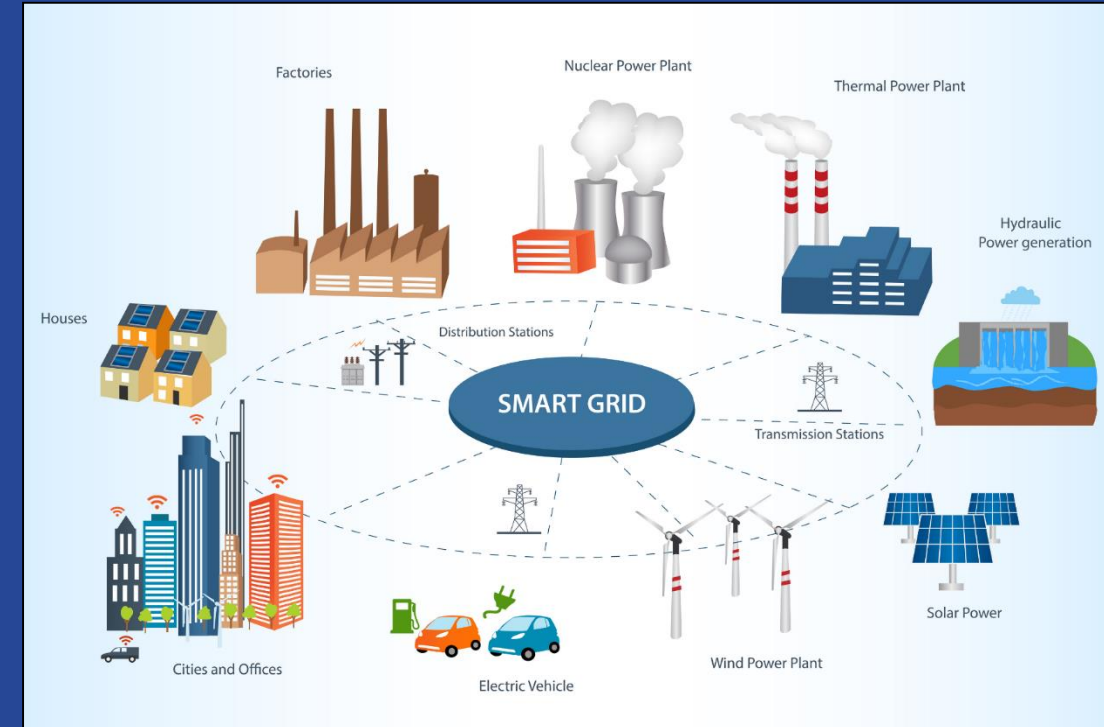
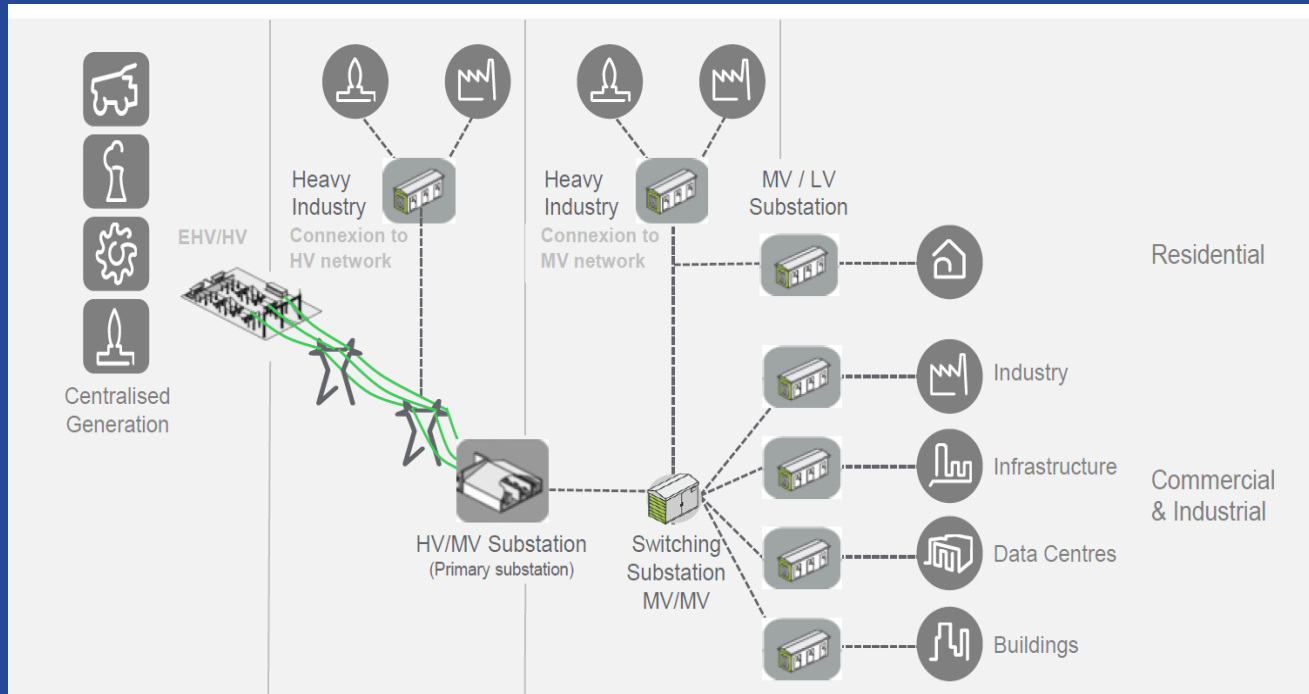
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Aug 25, 2022

## Traditional electrical grid... Centralized, One Way



## Future Grid... Distributed & Connected



Electricity eco system is undergoing an unprecedented transformation

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# Energy Landscape

- Energy use and demand doubled due to increase in population and income since year 2000.
- India's Per Capita energy use is still lower than world avg.
- India connected almost half a billion people to electricity grid in the last one decade.
- Grid availability
  - Urban – 22 hours
  - Rural – 20 hours

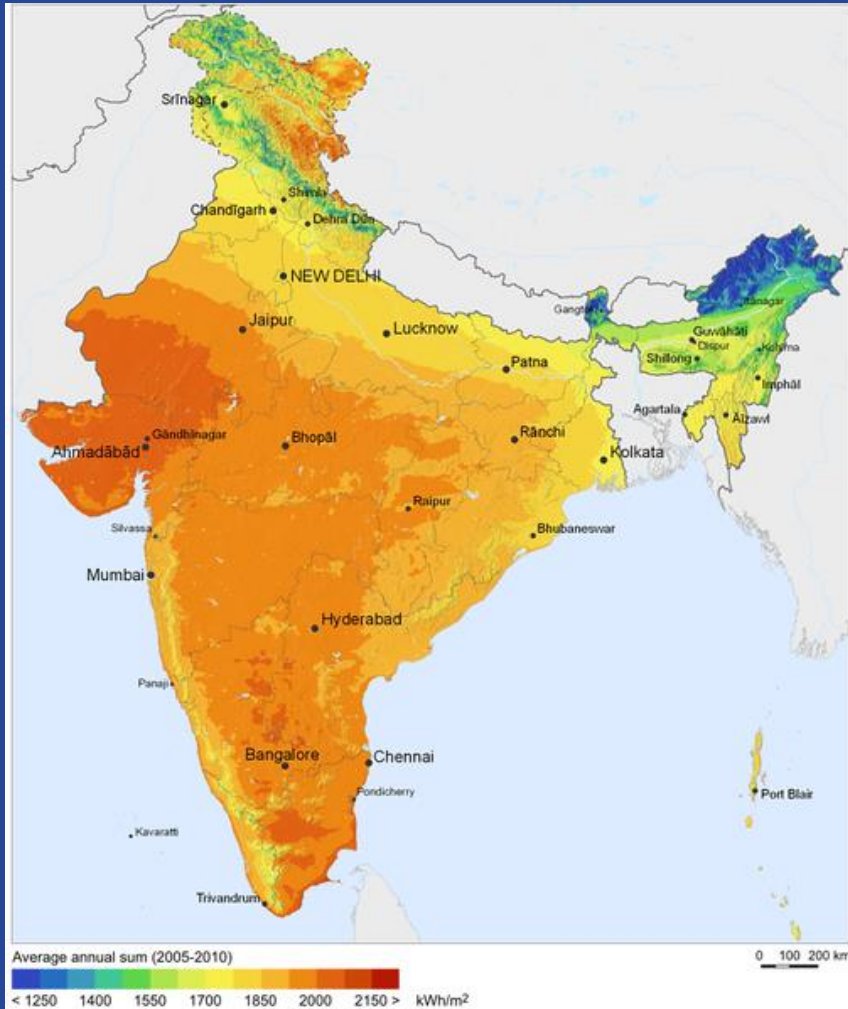
Source – India Energy Outlook

# Solar Opportunity

- Solar is the fastest growing among renewables
- Rooftop Solar is the potential source of captive power for residential and C&I sectors
- Self Reliant Consumer.
  - Geography
  - Govt Subsidies
- Rooftop installation back to pre covid levels
  - 53% growth YoY (1748 MW installed)
  - High share of Capex Vs Opex
  - Residential sector growing & promising @**28%** of Installed Capacity

Source: BTI Solar Rooftop Map 2021 June

# India Scenario



India's current Solar Capacity : ~58 GW

Target 2030: ~300 GW from Solar

Rooftop Solar cumulative: ~ 8 GW

87% have access to grid-based electricity

The hours of supply is nearly 17 hours per day

Reduction in cost and Reliability of Electricity are the key requirements for consumers

# Key Drivers for Solar in a Prosumer World

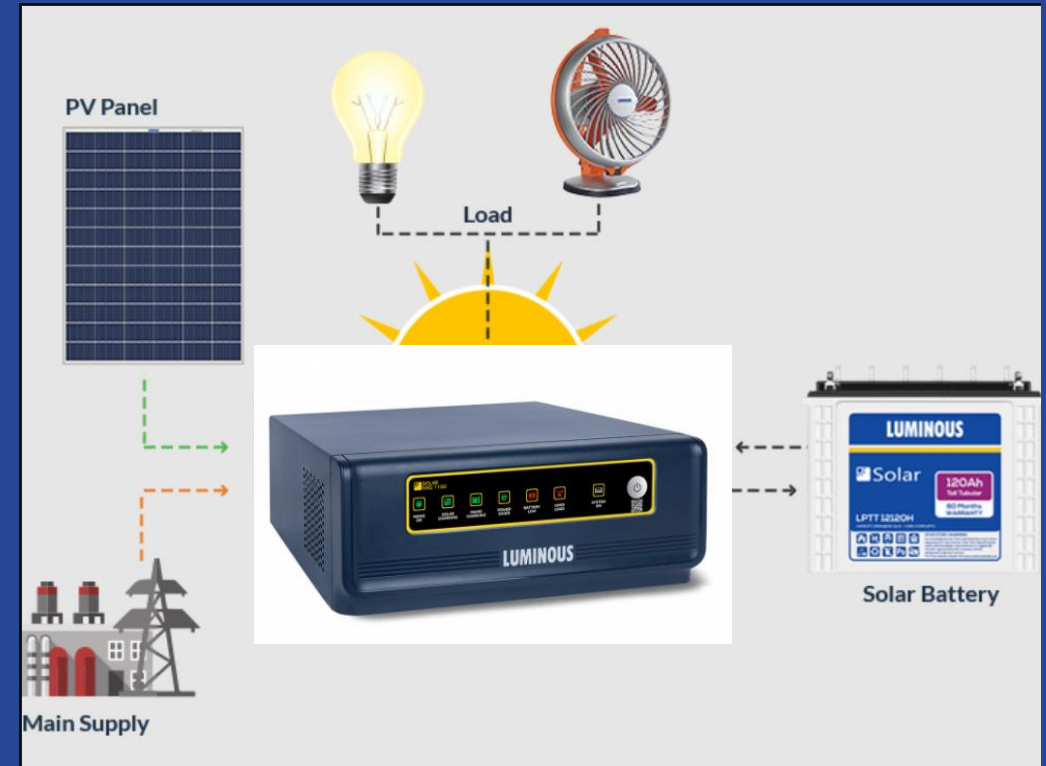
Consumer demands are increasing ... Continuous Power is a necessity now...Environmental awareness is growing

Grid has become complex... Weak Distribution Infrastructure... Consumers are facing significant power outages

Solar Panel and Battery Costs have come down significantly, Efficiencies have increased

Power Electronics & Controls, Energy Storage and Digital Technologies have evolved rapidly

Overall cost of electricity from distributed power is now competitive to grid power



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# Growth Enablers

- Faster payback period for consumer
- Low & Easy Finance options
- More flexible Net Metering Policy
- Drone policy for quick site survey



# Applications

## Rural



## Power Deficient



## Semi Urban



## Urban



## Commercial/ Industrial



**Power cut  
per day**

**Very High**  
No Grid Power

**High**  
>10 hour Power Cut

**Medium**  
2-10 hour Power Cut

**Low**  
0-2 hour Power Cut

**DG Backup**

**Characteristics**

Remote locations/Rural  
Basic need of electricity

Outside urban areas  
Need of 24/7 electricity  
Inverter batteries fail

Urban areas  
Power backup &  
Savings over normal  
inverter/battery

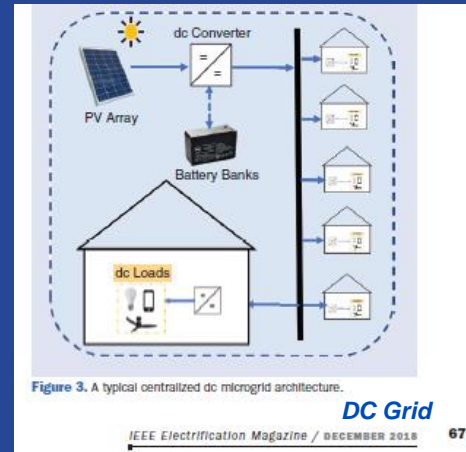
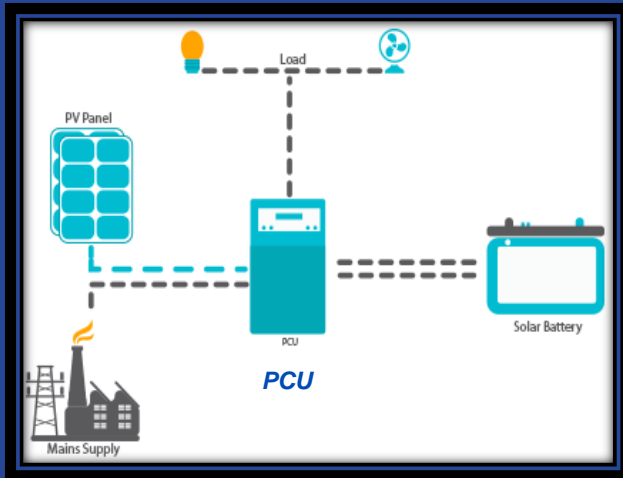
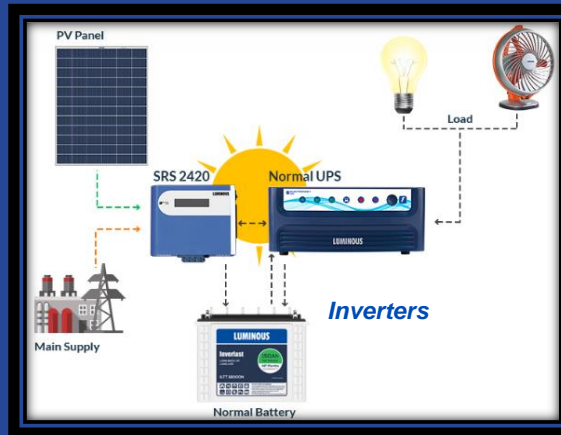
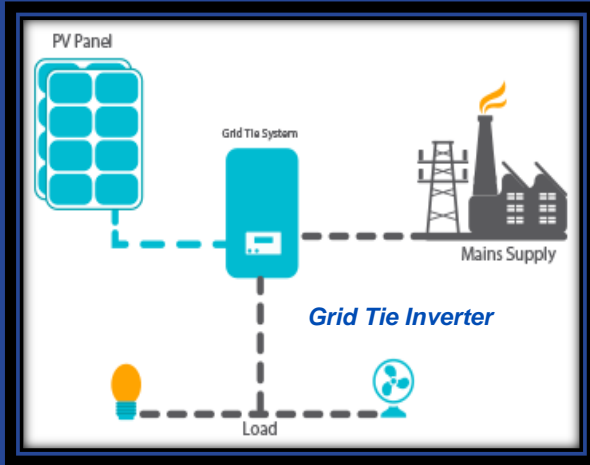
Urban/Posh areas  
Uninterrupted power  
supply  
Savings & Social image

24/7 Uninterrupted  
power for all equipments  
Reducing DG usage

**Now consumers have a choice to become prosumers**

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# Solar System Configurations



# Technical Considerations

Solar Panels... Poly, Mono, Bifacial, PERC, Thin Film (CIGS, CdTe), Perovskite etc..

Inverters... Hybrid, Micro, High Frequency, Grid Forming

Storage.. Li-ion technology becoming more relevant; BMS very critical

Protection.. DC cables, Junction Boxes, Earthing Requirements critical

Integrated Systems & Controls... PWM/MPPT, Grid resilient, smart load management

Data Analytics... IOT, Remote Monitoring

Need for BIS certification to ensure quality of products/solutions

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# Need to accelerate progress

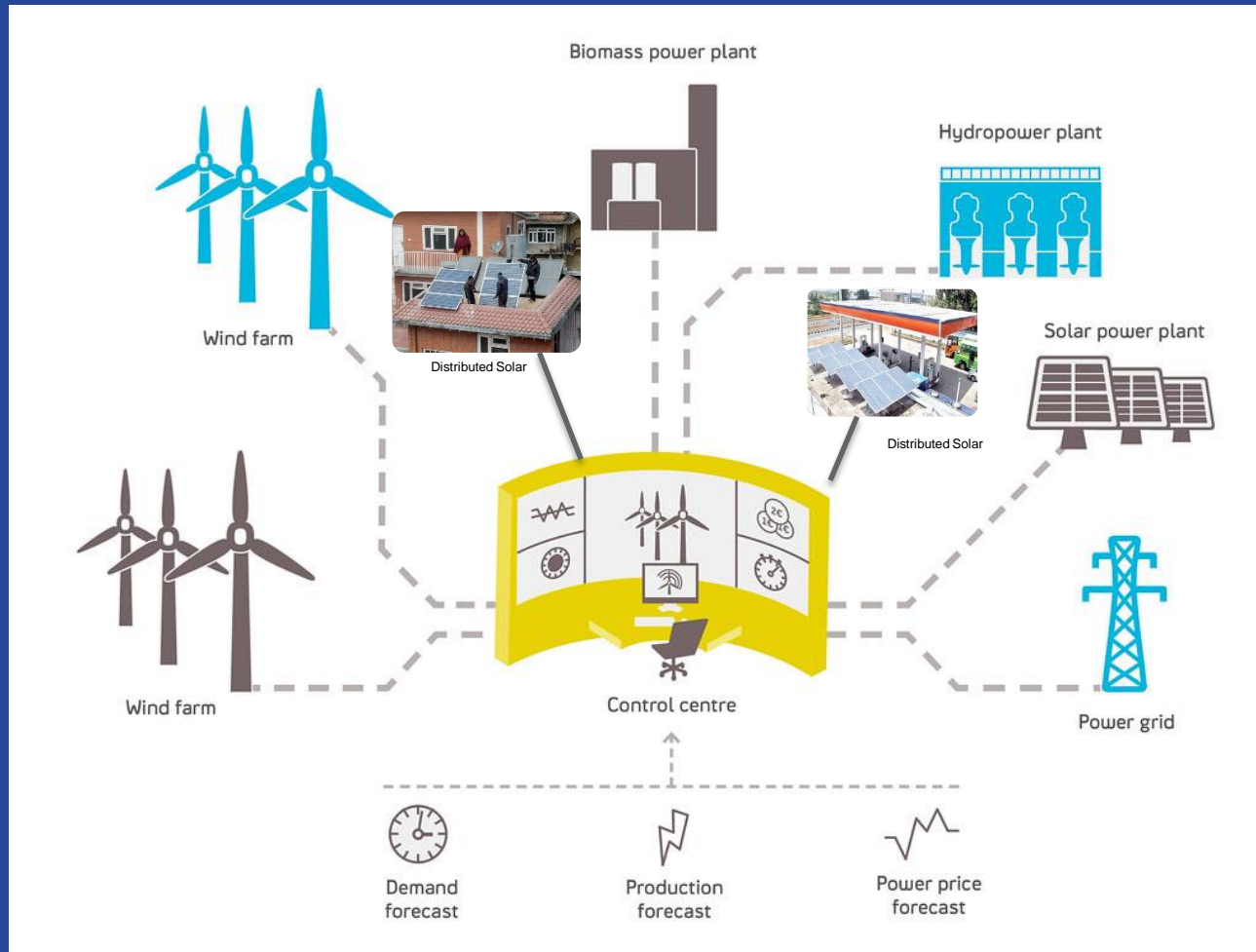
- Distribution Utilities need to repurpose their business
- Govt, Utilities, Tech providers and Consumers should work hand-in-hand to accelerate
- Consistent Consumer Centric Policies should continue to evolve
- Appropriate Financing models would help drive faster adoption
- Technology and Innovation will continue to play a key role



**India is a leader in clean energy transformation... Perfect opportunity to leapfrog with Distributed Solar Solutions.**

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# Looking into the Future..



Virtual Utility Concepts are emerging globally

Opportunity for Distributed Solar Solutions to participate

Transactive Energy Technologies evolving

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*Khushiyon ka ghar*