SHAKTI
SUSTAINABLE ENERGY
FOUNDATION

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Creating Innovative Solutions
for a Sustainable Future

Panel Discussion on

Accelerating Large Scale Deployment of Rooftop SPV in India

February 20, 2014

Context Setting

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- Rooftop SPV can be a good solution for reducing demand-supply gap and distribution losses.
- Huge potential for Rooftop SPV
- Various central and state government initiatives for promoting Rooftop SPV

Still Rooftop SPV market has not developed in India??

One of the possible solutions could be commoditization

About the Project

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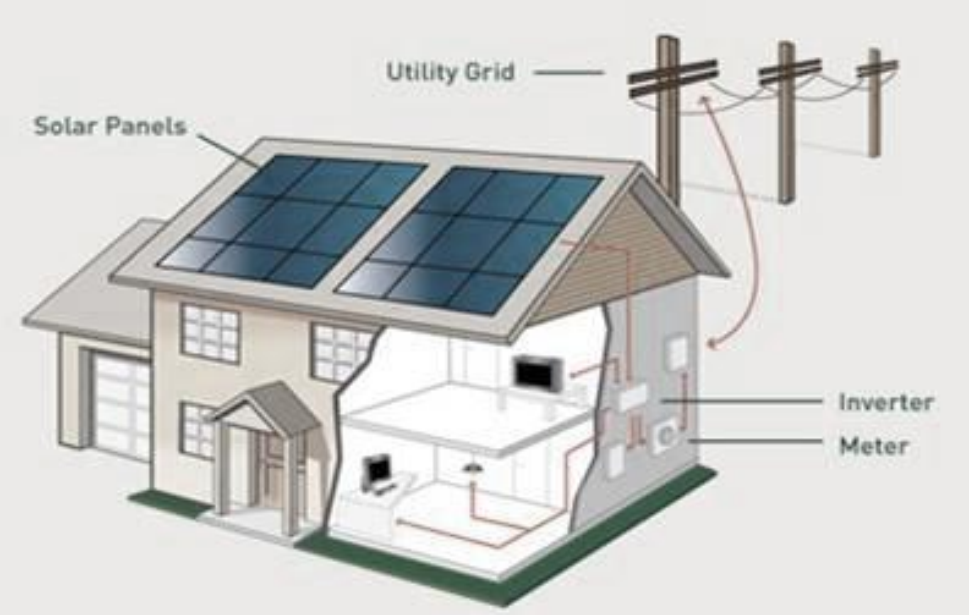
Evaluate market preparedness and policy status in India, for commoditizing Rooftop SPV for different consumer categories

Work methodology:

- Primary survey and market research
- Design and development of business models



Primary Survey and Market Research

- Except Gandhinagar there is power outage in other 5 cities ranges between 1 to 2.5 hours per day
- Commercial and industrial segments adopt generator set as a power backup option
- Residential sector prefers battery-inverter set as a power backup option due to less availability of small capacity generator sets in the market

Barriers for Large Scale Deployment of Rooftop SPV

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- High upfront cost
- Lack of financing schemes by banks
- Lack of awareness
- Unavailability of standardized Rooftop SPV systems
- Inadequate supply chain for Rooftop SPV system
- State policies and guidelines for Rooftop SPV are still evolving

Need for Commoditization

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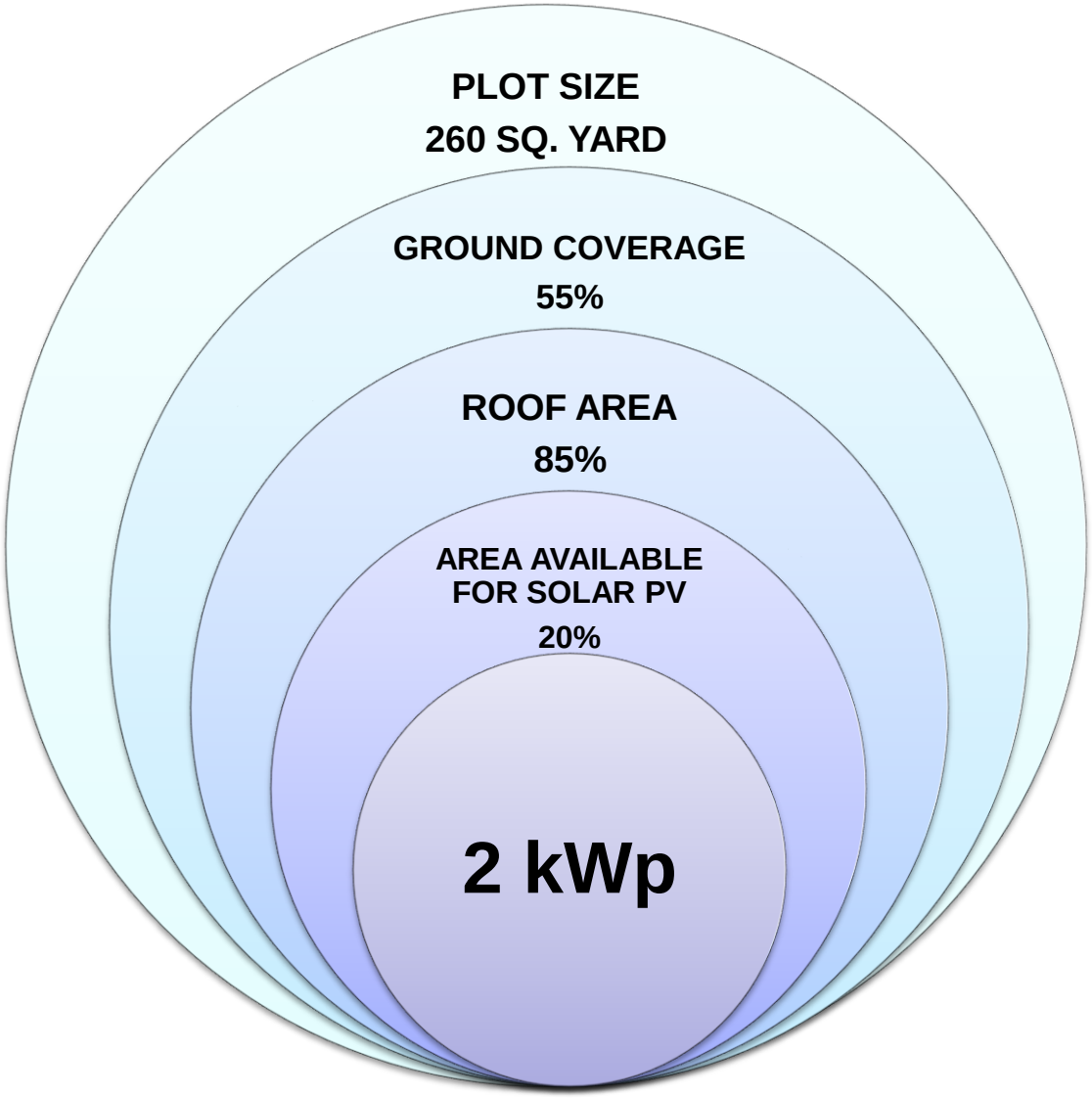
- Availability
  - **Range of standardized products**
- Accessibility
  - **Wider network of suppliers and service providers**
- Affordability
  - **Easy financing**

Standardization of Rooftop SPV System



End-use loads considered for system sizing

Equipment	Nos.
Tube light	5
CFL	5
Fan	4
Cooler	1
Refrigerator	1
TV	1
Washing machine	1
CD Player	1
Computer	1
Laptop charging	1

SPV system capacity 1.8 kWp

SPV System Configurations & Metering Arrangements

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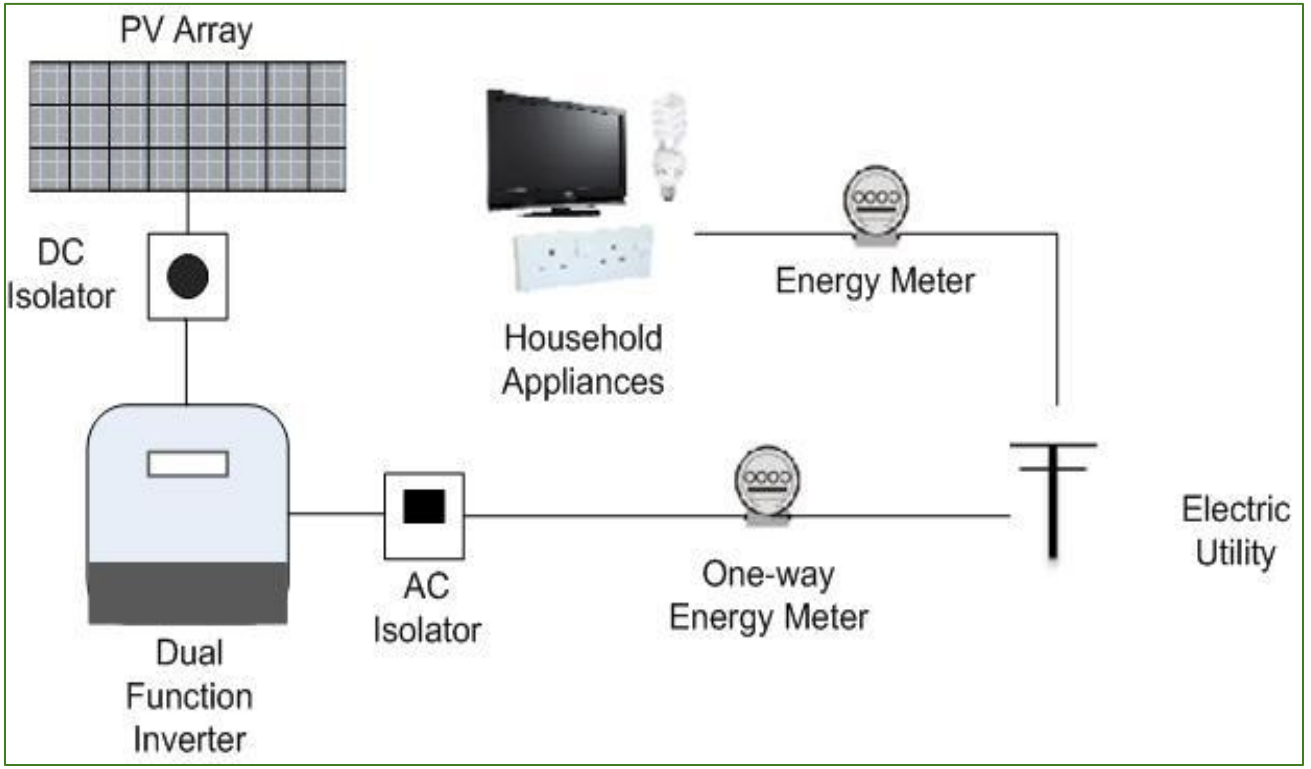
Gross Metering



It is a simple and cost effective Rooftop Solar PV system which doesn't affect household grid connection and wiring.

SPV System Configurations & Metering Arrangements

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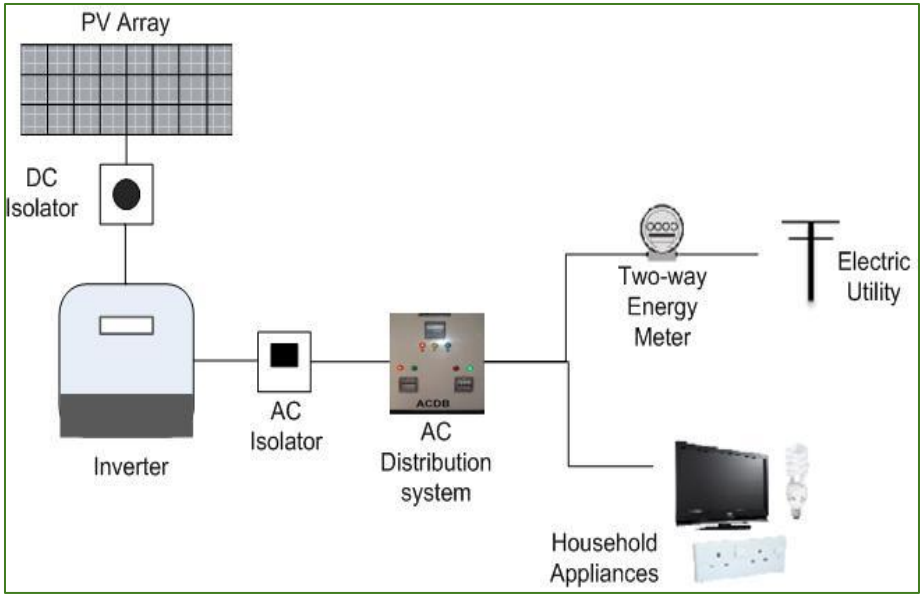
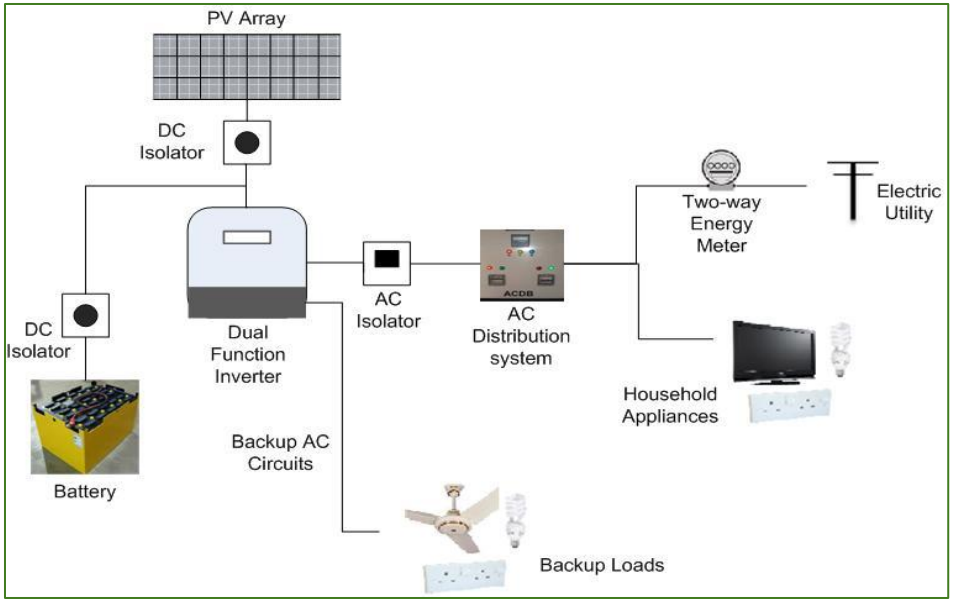
Net Metering



- **Suitable for sites with reliable grid power**
- **It doesn't provide backup power during power outage**

Net Metering with Backup



It provides backup power during power outage

System Configuration & Metering Arrangements

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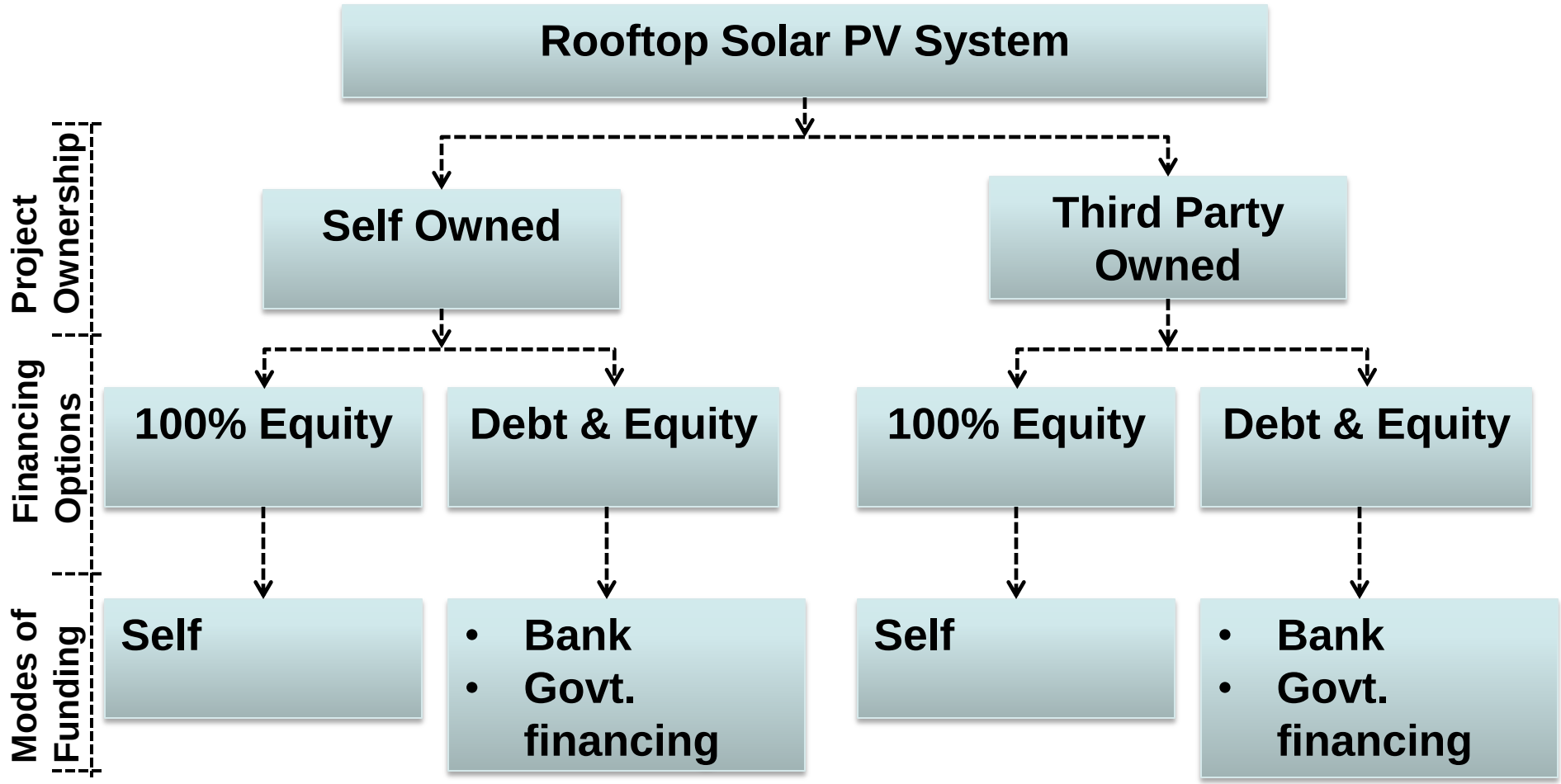
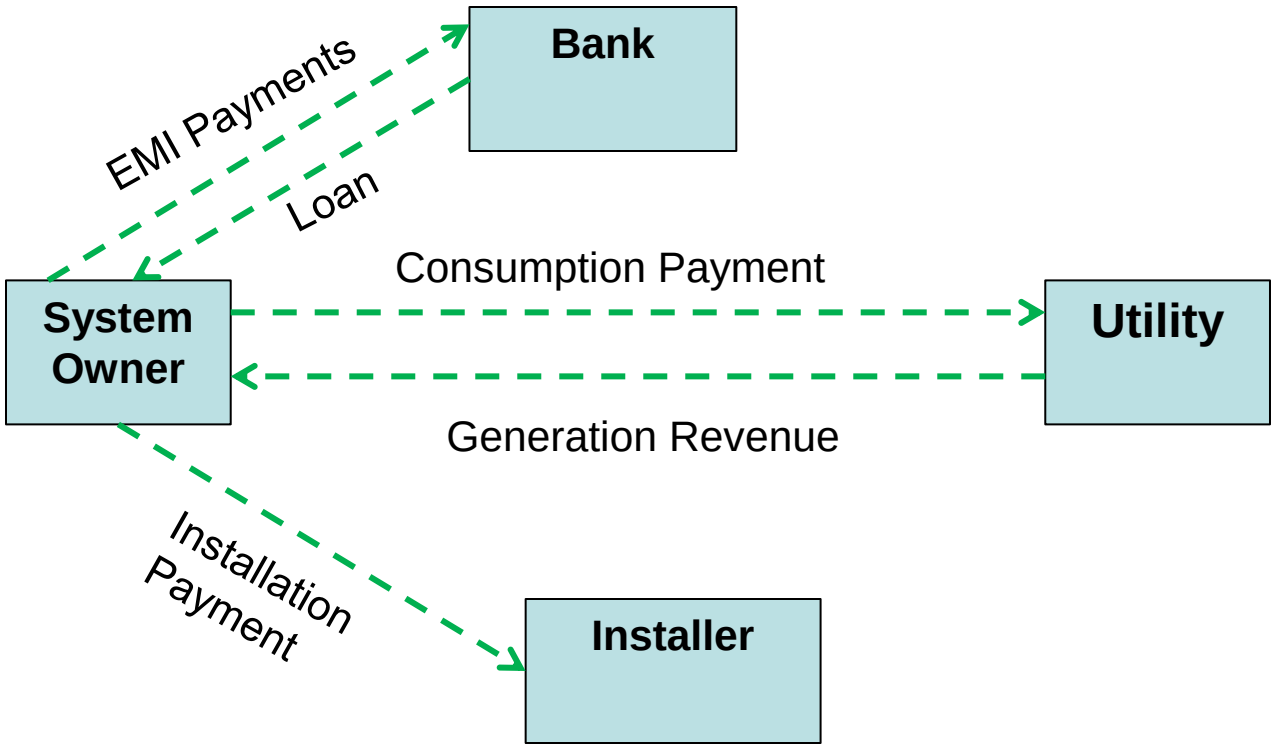
Parameters	Gross Metering	Net Metering	Net Metering with Storage
Purpose	Sale of electricity to utility	Consumption at the consumer's end	Consumption at the consumer's end and also a backup source during power outage
Preferred consumer category	Commercial & Industrial	Residential, Commercial & Industrial	Residential
Tariff plan	PPA, FiT	Energy settlement, FiT	Energy settlement, FiT
Energy accounting	Two separate meters	A bidirectional meter	A bidirectional meter
End-user advantages	Return on investment	Hedging for grid electricity cost increases	Reliable power and hedging for grid electricity cost increases
Utility's perspective	Reduced distribution loss	• Reduced distribution loss • Uncertain revenue scenario in long term	• Reduced distribution loss • Uncertain revenue scenario in long term
Operating cost	Low	Low	High

Financing Options



Business Models

Gross Metering – Self Owned

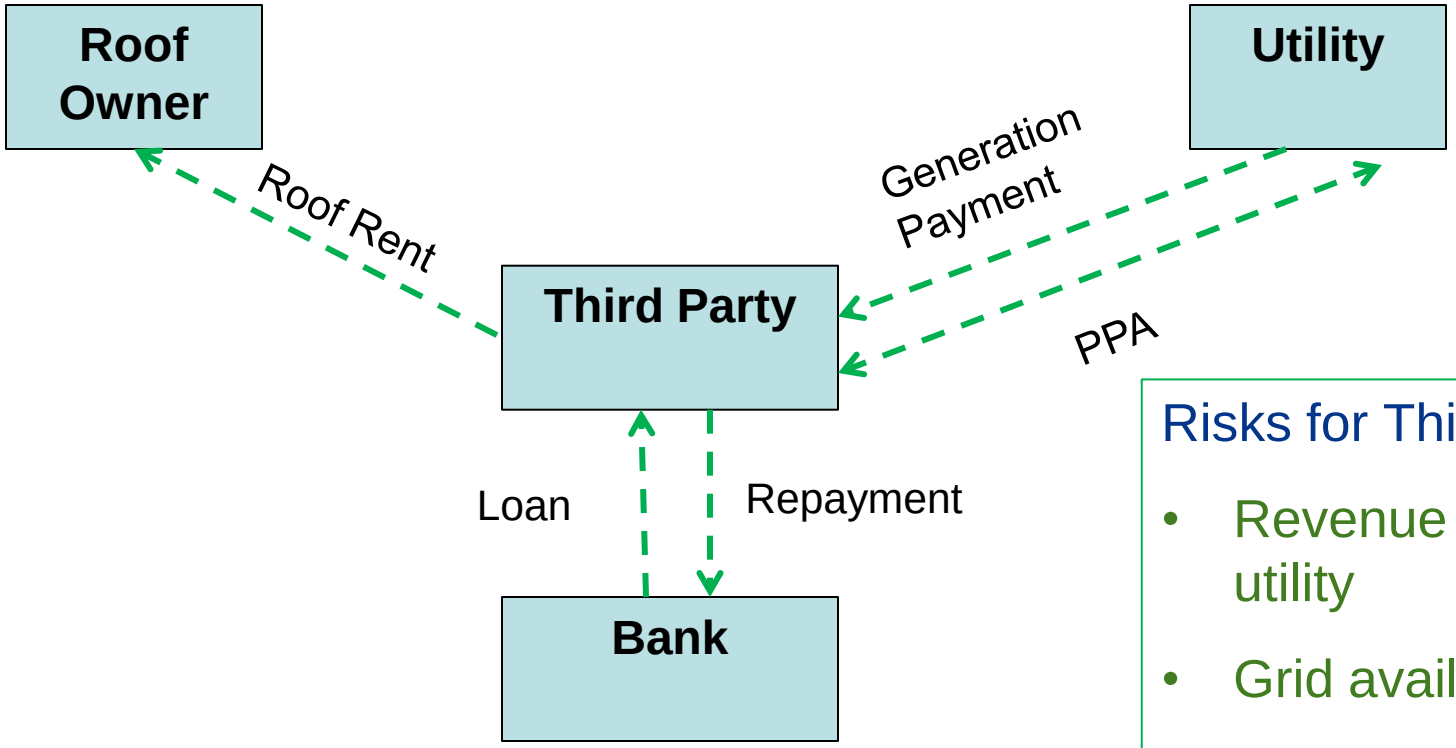


Risk for System Owner

- Revenue recovery from utility
- Grid availability
- System warrantee/ Insurance
- O&M

Business Models

Gross Metering – Third Party Owned

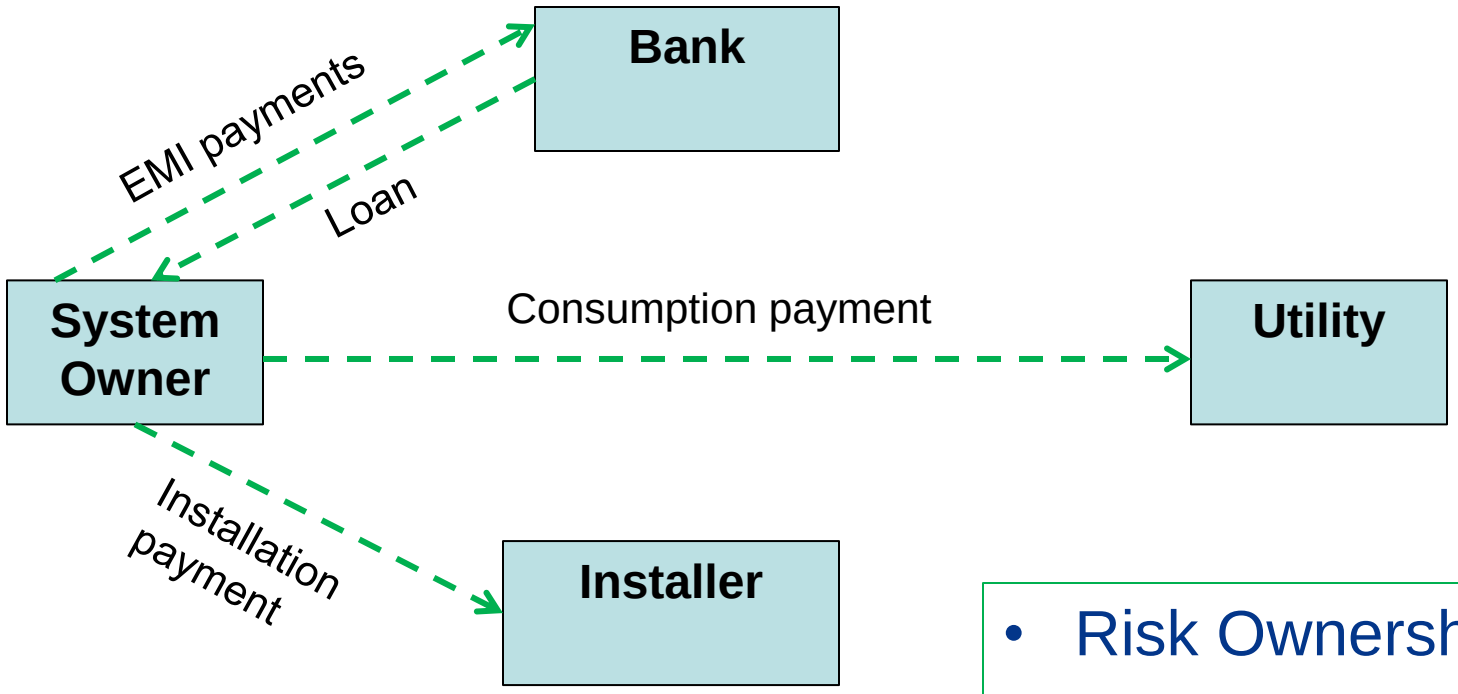


Risks for Third Party

- Revenue recovery from utility
- Grid availability
- System performance and O&M
- Long term access to roof

Business Models

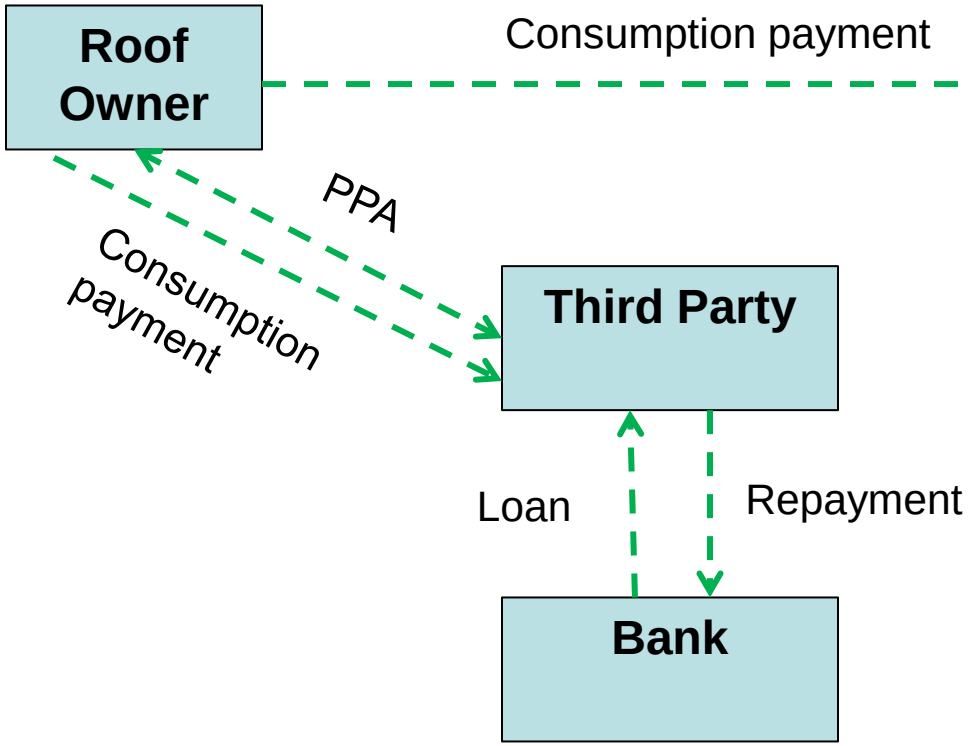
Net Metering – Self Owned



- Risk Ownership
  - System Owner
  - Long Term Risk for Utility

Business Models

Net Metering – Third Party Owned



- Risk Ownership
  - Third Party
  - Long Term Risk for Utility

Discussion Points

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- Should there be an upper cap on system size?
- Is there any need for certification of Rooftop SPV systems
  - **Who will certify**
- What should be financial mode for Rooftop SPV
  - **Interest subsidy or capital subsidy or FiT**
  - **Should existing inverter owners be incentivized for choosing solar PV systems.**

Thank You