

# Urban Microgrids

## - Perspective from Singapore Institute of Technology

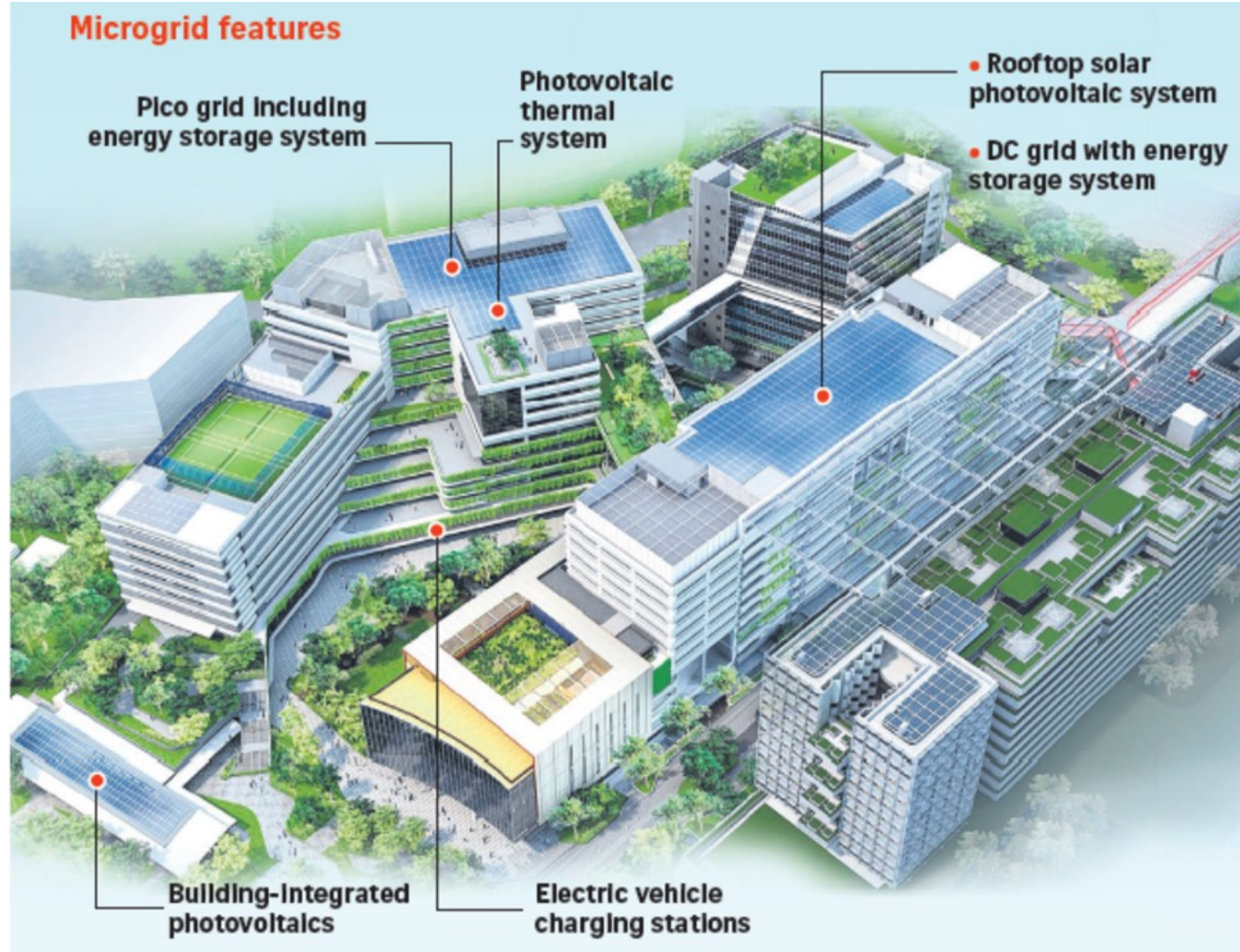


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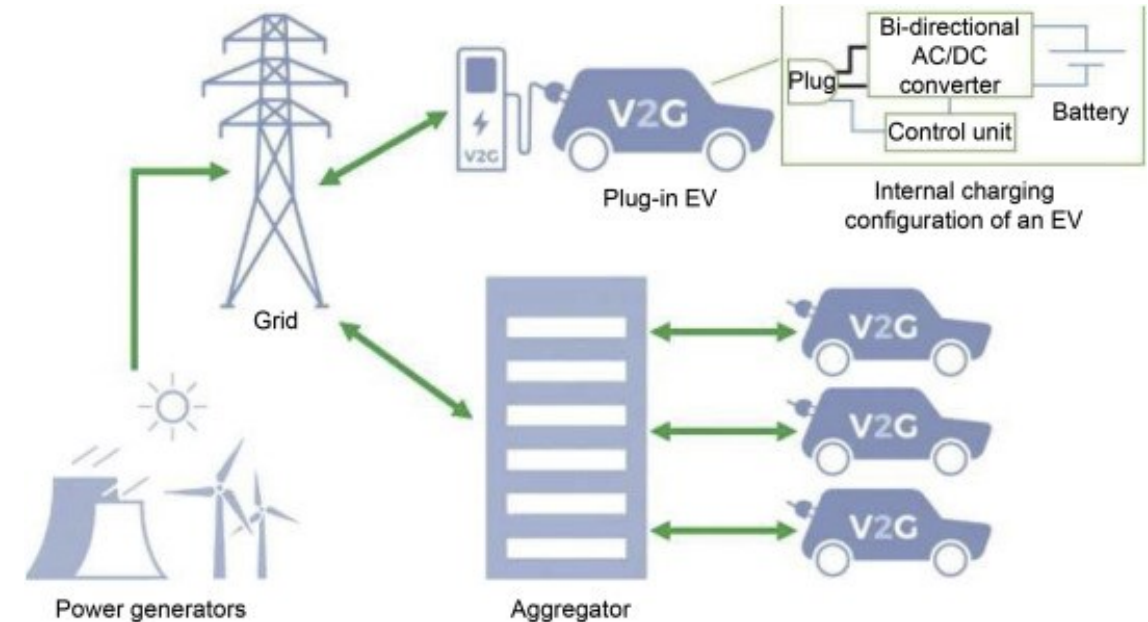
# SIT-SP Microgrid @ Punggol Campus



- SIT new campus, be ready in 2024
- Designed and constructed as a cluster of microgrids with various DERs – SP as operator
- EV and V2G Ready Campus
- Aimed to promote study of benefits of heterogeneous PQR type of electricity distribution
- Islandable buildings and load clusters within building
- As Energy Living Lab for our bachelor degree in Electrical Power Engineering
- Supported by SIT-EMA EDGE programme to promote innovation and demonstration

# Technologies in SIT-SP Microgrid

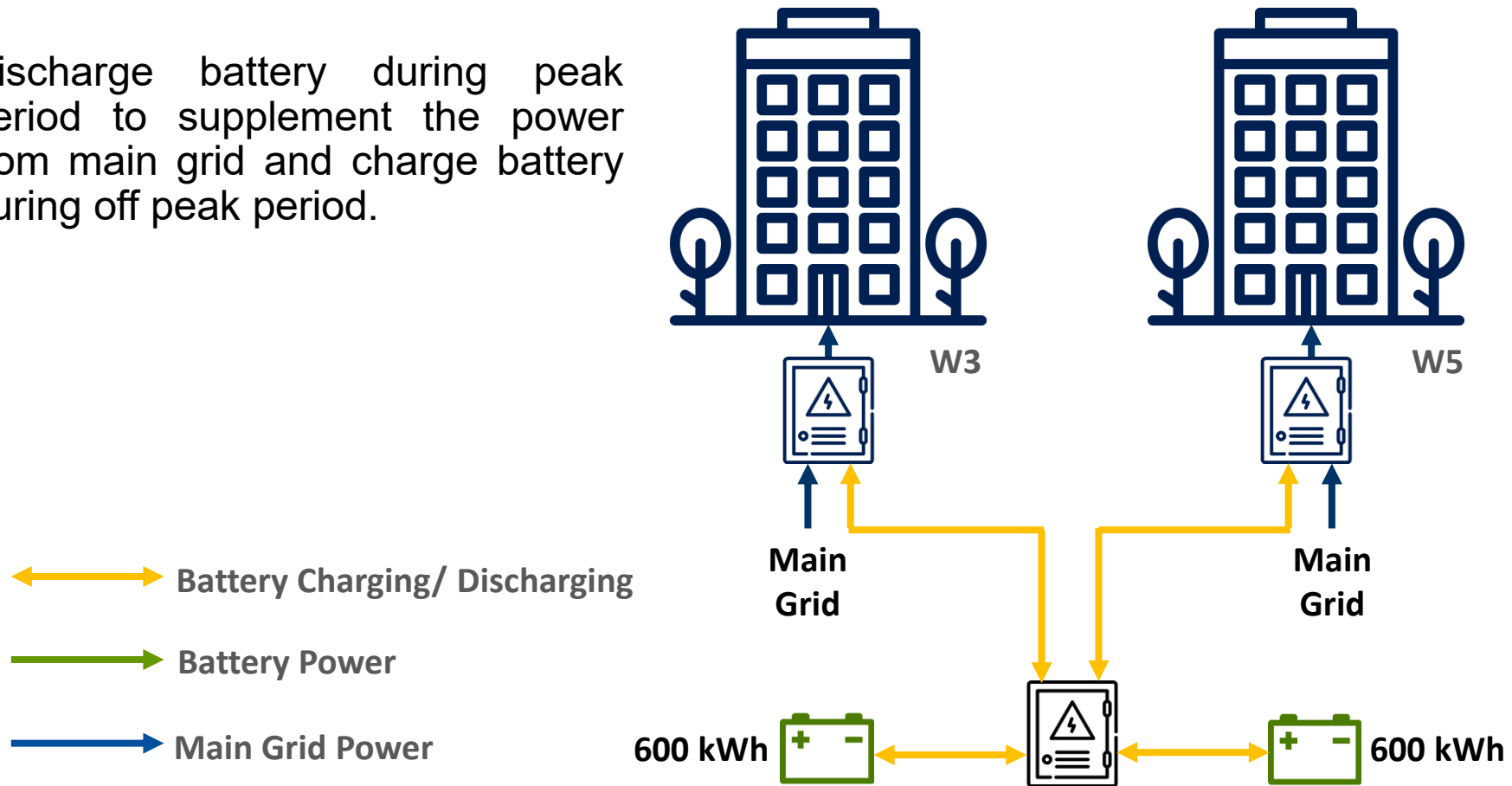
- Types of DER most applicable to Built Environment:
  - Solar Photovoltaic Systems
    - Important for Singapore
  - Battery Energy Storage Systems
    - The more the better
    - Re-Used Batteries possibility
  - EV Charging Infrastructure
    - As significant dispatchable loads
    - As mobile BESS
    - As Vehicle-to-Grid
  - Alternative Clean Fuels Ready
- Smart Grid Communication Infrastructure
- AI and Condition-Monitoring Based Asset Management, e.g. digital twins



# Research Focus 1: Energy Trading and Services

**Nanogrid** - Electrical network with the capability to **island the building** from the Main Grid

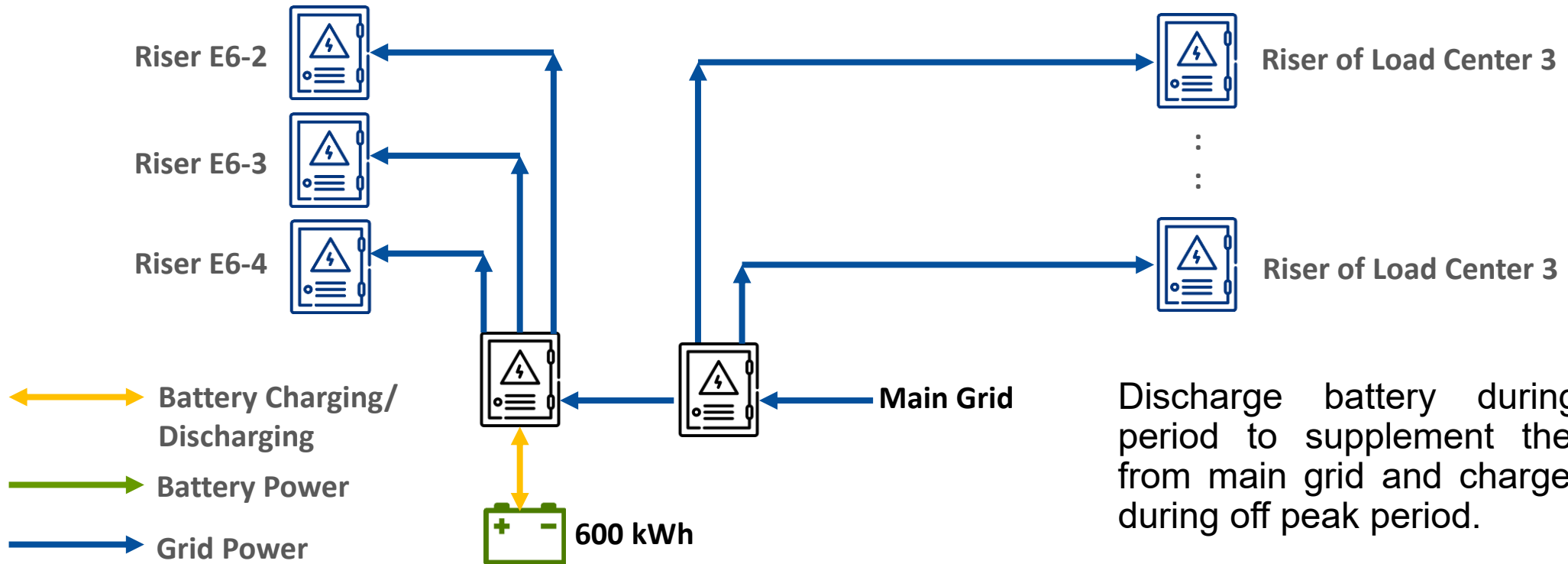
Discharge battery during peak period to supplement the power from main grid and charge battery during off peak period.



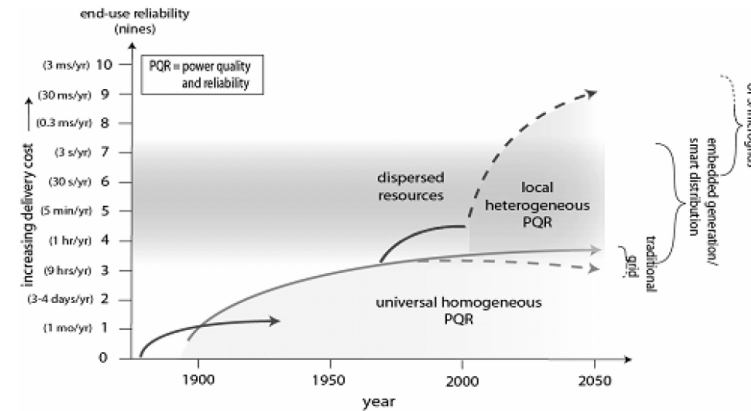
# Research Focus 2: Heterogeneous Power Quality and Reliability

Picogrid - Electrical network with the capability to **island certain parts of the building** from the Main Grid

Normal Operation



Discharge battery during peak period to supplement the power from main grid and charge battery during off peak period.



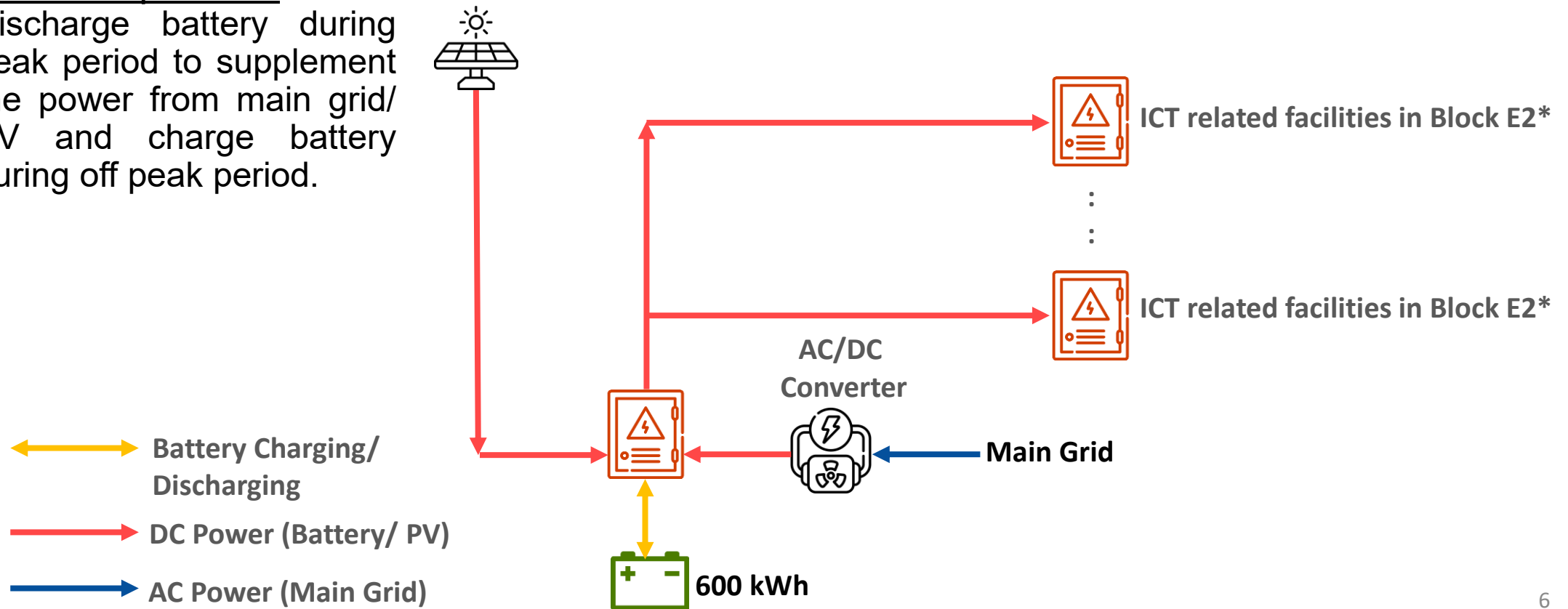
# Research Focus 3: DC Power Distribution

## - Power electronic-based controllers and protection

DC Grid - Electrical network with **Direct Current (DC)** power from the PV and capability to **island the facilities** from the Main Grid

### Normal Operation

Discharge battery during peak period to supplement the power from main grid/ PV and charge battery during off peak period.



**Thank You**

**Q & A**