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BITS Pilani
Pilani Campus

Smart Energy Management

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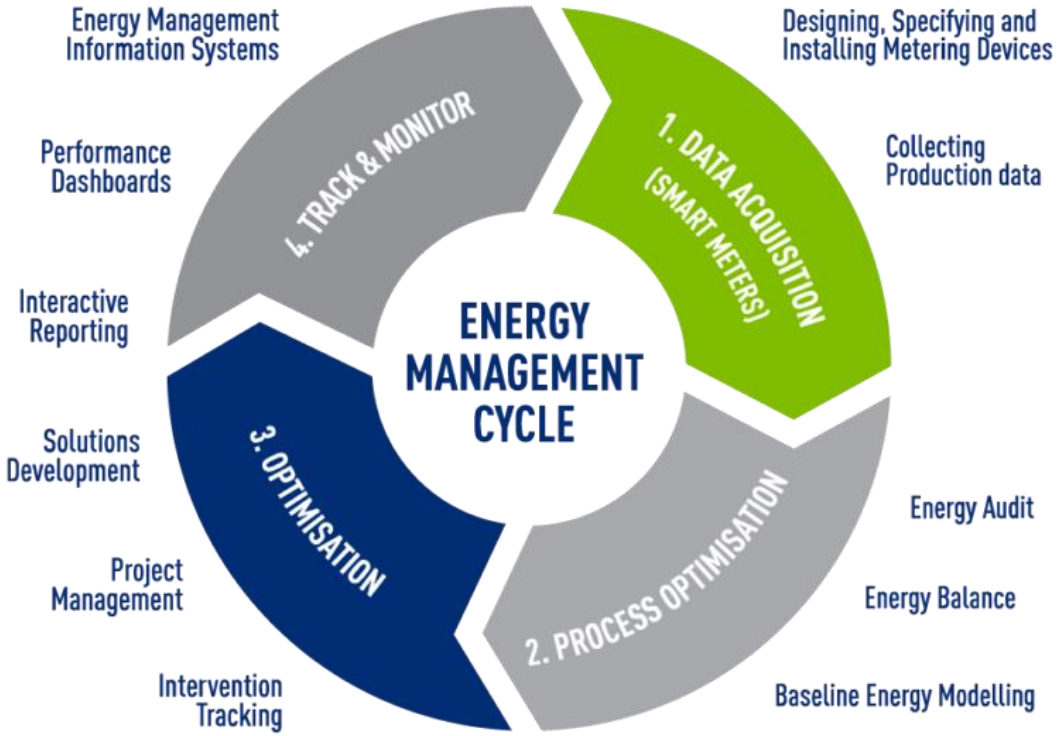
Smart Energy Management

A smart energy management system is a computer-based system designed to monitor, control, measure, and optimize energy consumption in a building, factory, or any facility.



Source: https://www.energyworxsa.com/smart-energy-management

Methods to promote/implement
Energy Management

Smart Energy Management Methods

Data Acquisition and Monitoring	
Electrical Signature Analysis	
Energy Efficiency equipment rebate	
Demand Side Management	
EV charging rebate	
Solar Net-Metering	
Digital Twin modelling of energy system	

Data Acquisition and Monitoring

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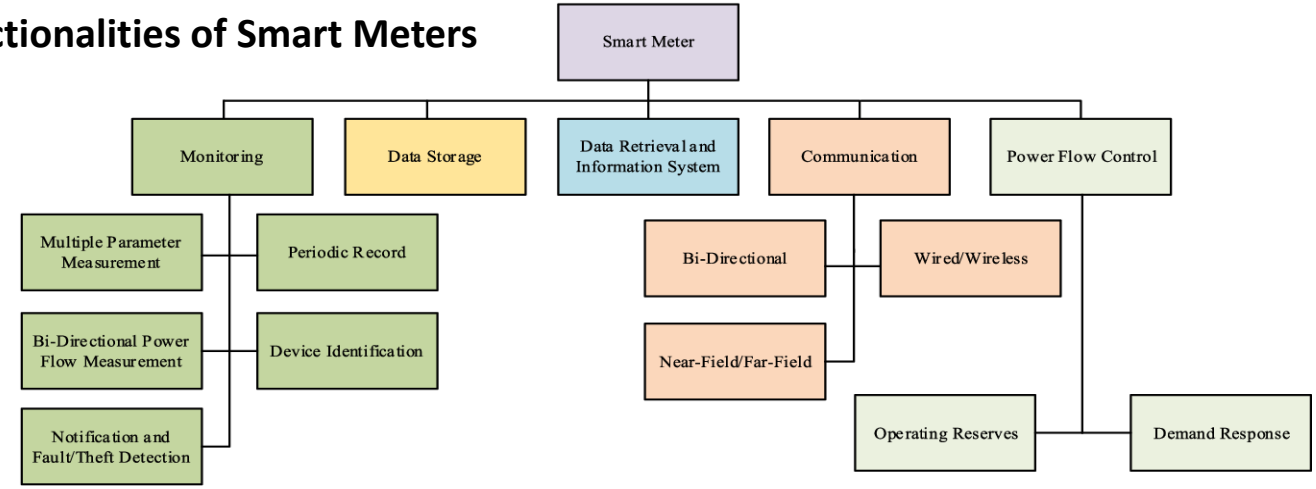
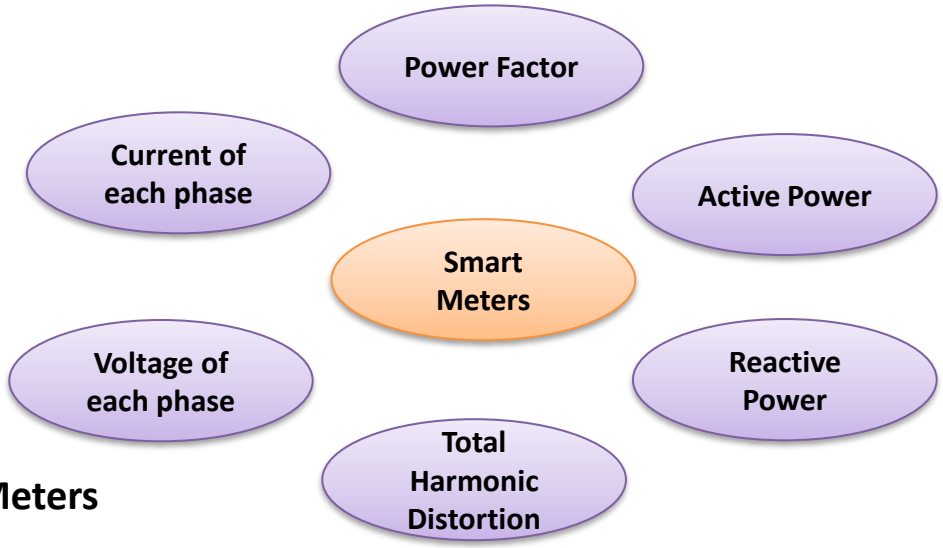
Functionalities of Smart Meters



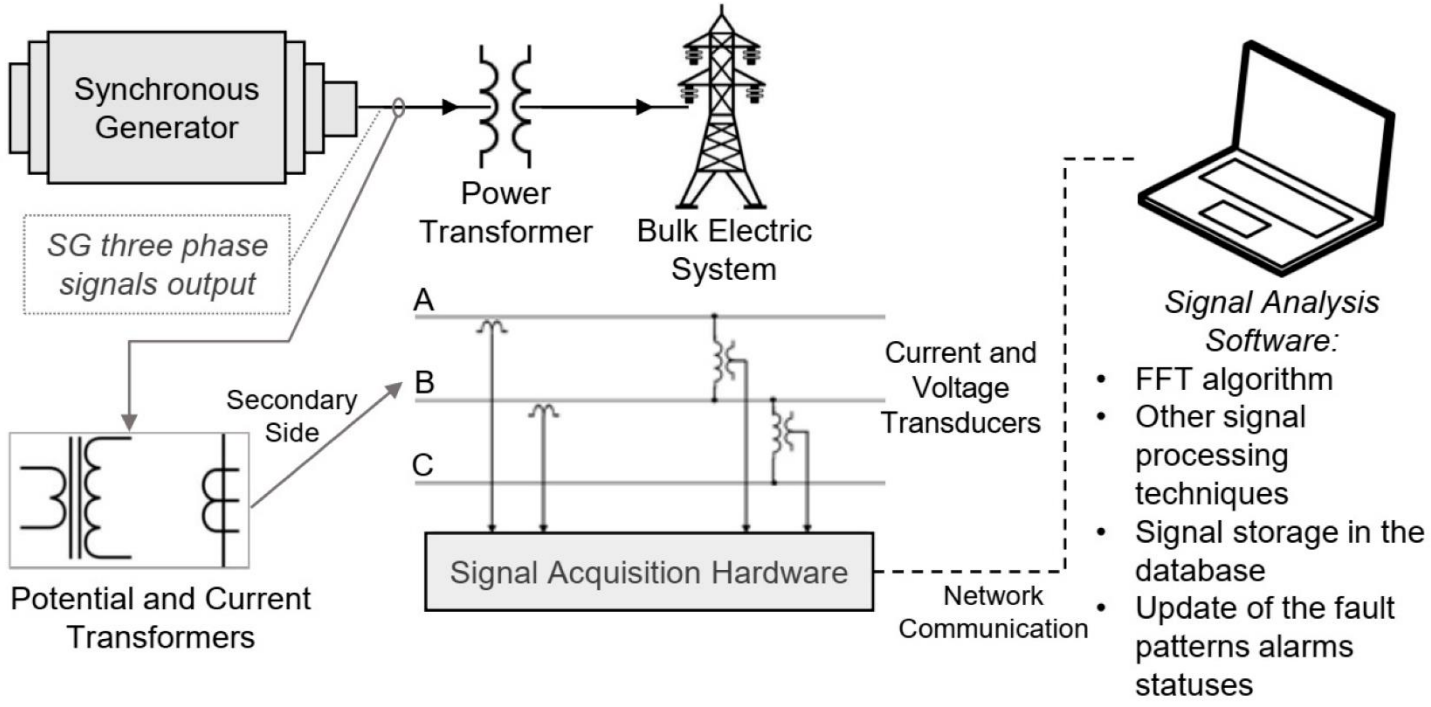
Source: IEEE Access



Parameters monitored by Smart Meters

Electrical Signature Analysis (ESA)

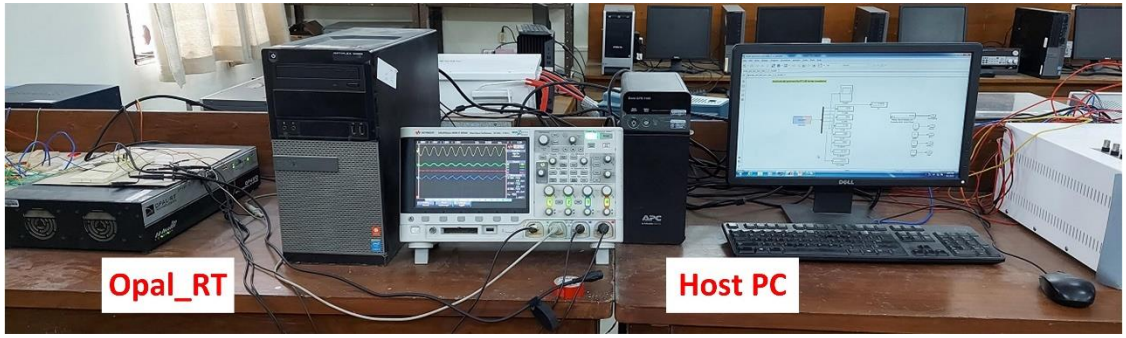
- ESA is a condition monitoring technique that can provide metrics to raise asset performance and energy efficiency in real time.
- The first step of performing ESA is installing sensors and smart meters.



Source: Salomon, C.P.; Ferreira, C.; Sant'Ana, W.C.; Lambert-Torres, G.; Borges da Silva, L.E.; Bonaldi, E.L.; de Oliveira, L.E.d.L.; Torres, B.S. A Study of Fault Diagnosis Based on Electrical Signature Analysis for Synchronous Generators Predictive Maintenance in Bulk Electric Systems. *Energies* **2019**, *12*, 1506.

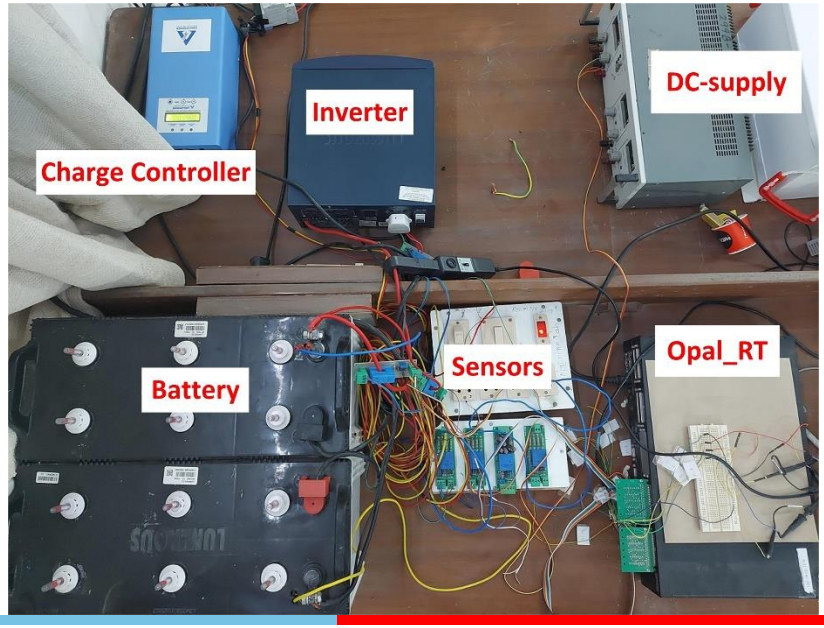
Electrical Signature Analysis (ESA) of Single-Phase Home Converter System

Single-Phase Home Converter System with Solar PV system

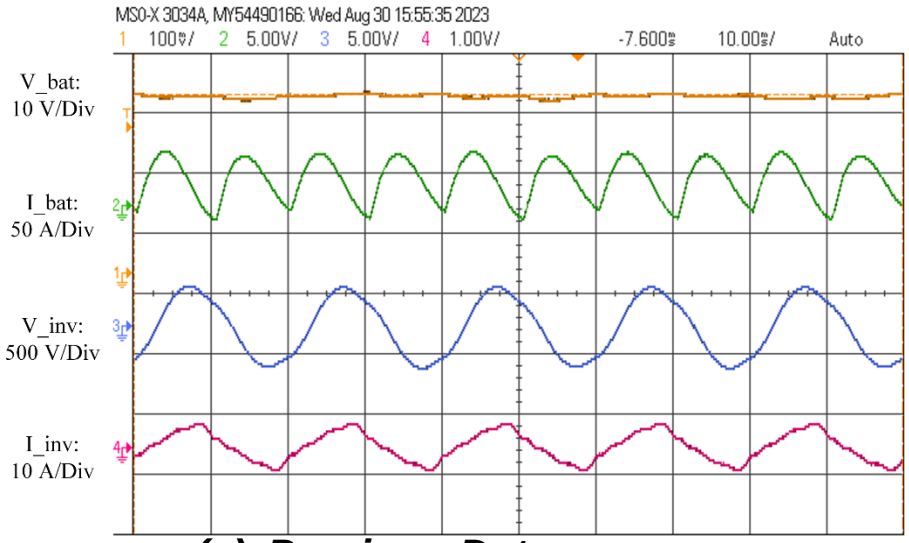


Hardware configuration of single-phase inverter

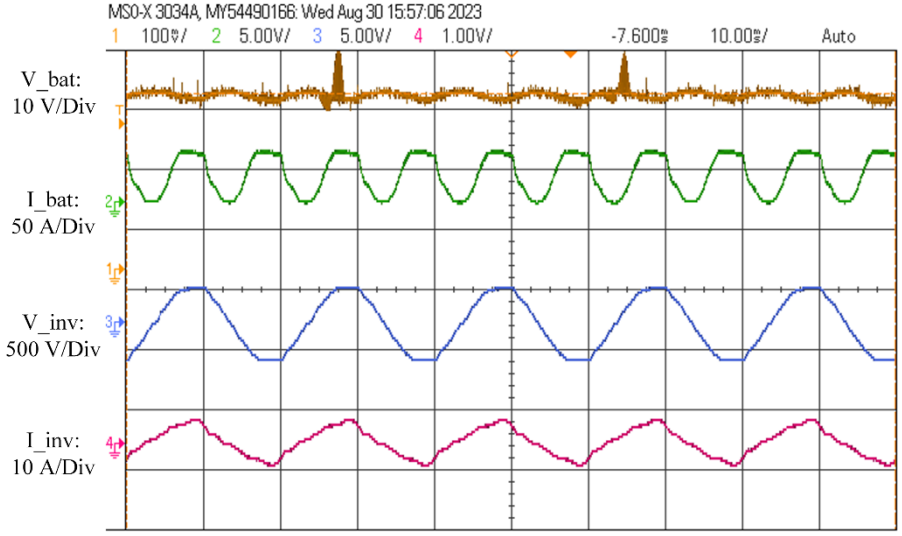
Solar Panel



Current and Voltage Signature Analysis



(a) Previous Data



(b) Real-Time Hardware Data

Comparison between of single-phase inverter in discharging mode (battery mode)

Smart Energy Management for a Prosumer Building

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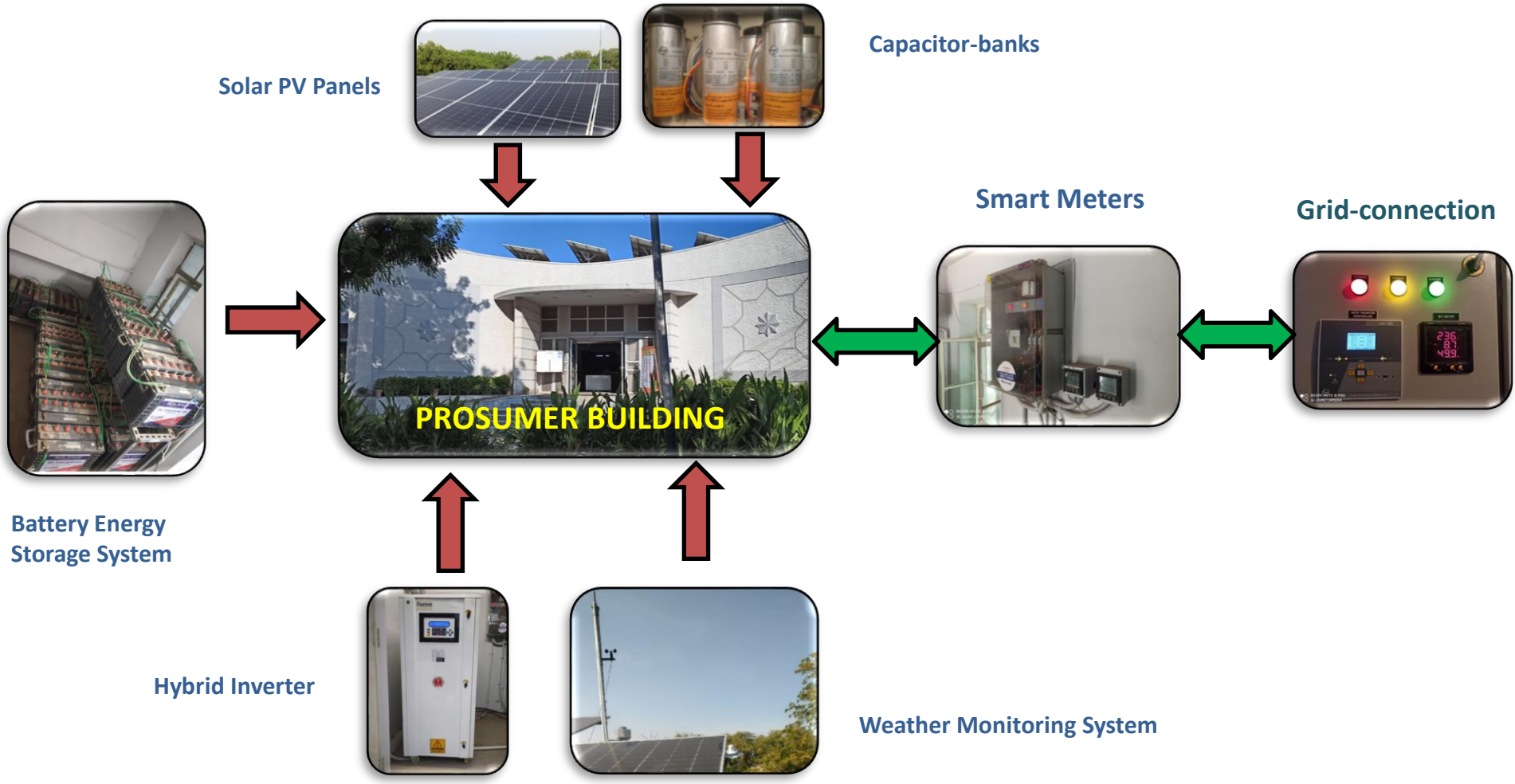
A solar rooftop with battery energy storage installed at a building, located at BITS, Pilani.



Smart meters and sensors placement

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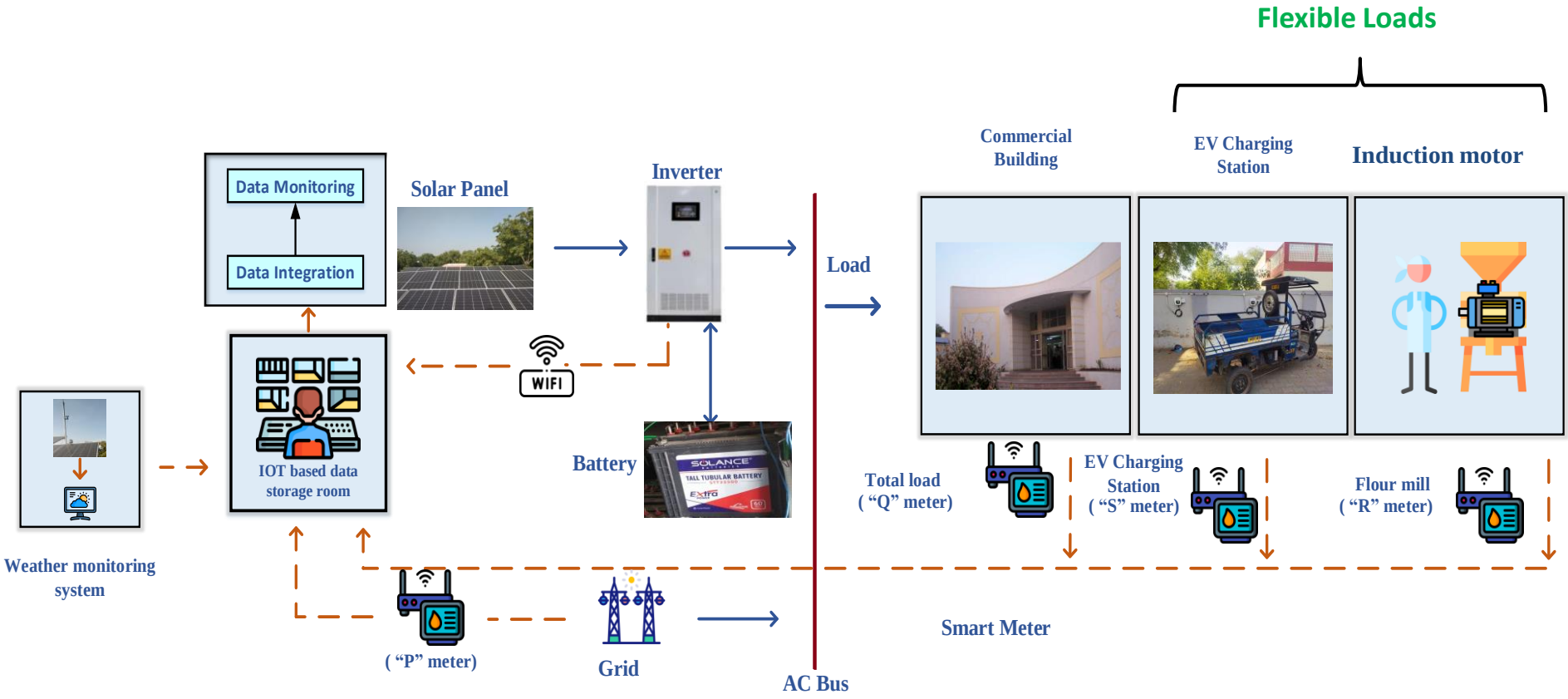
Optimal Placements of **Smart meters and Sensors** (solar irradiance, temperature, wind speed, humidity) for data acquisition.



Power Signature Analysis of a prosumer building

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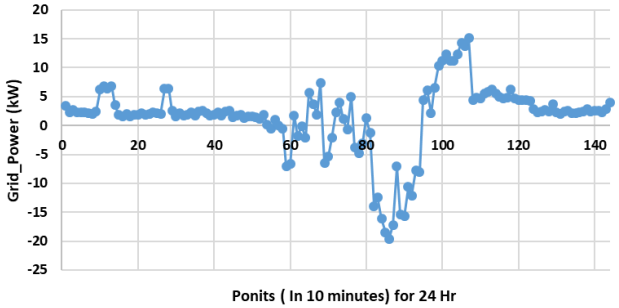
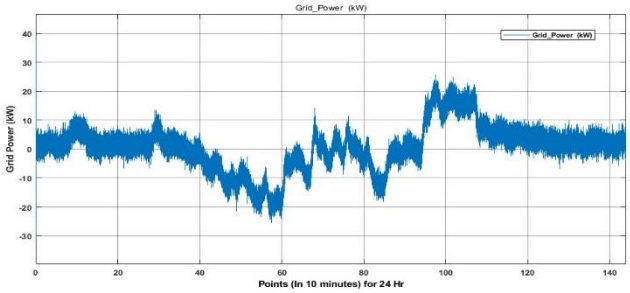
Previous Data

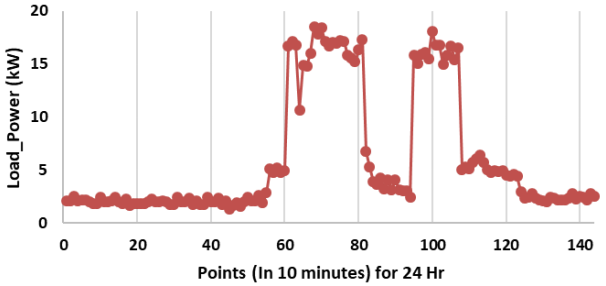
Real time Data

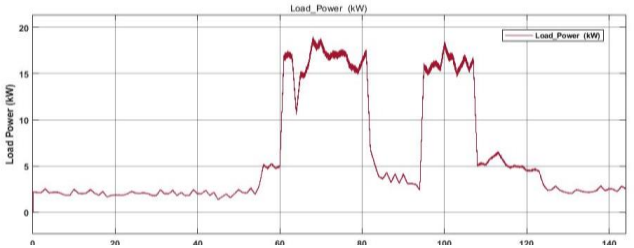
Grid_Power



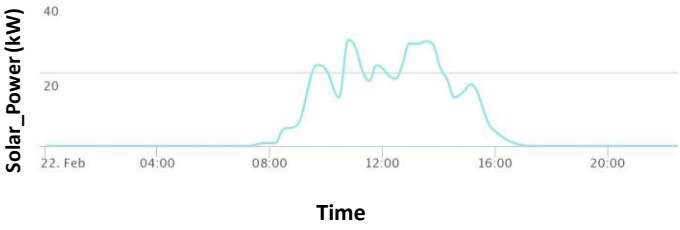


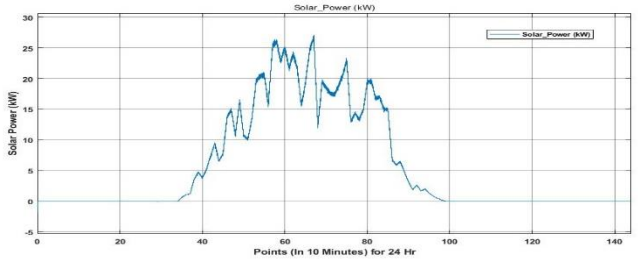
Load_Power





Solar_Power





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THANK YOU !