ReVision Energy

E2 Tech – Energy Storage: Saving for a (Renewable) Rainy Day

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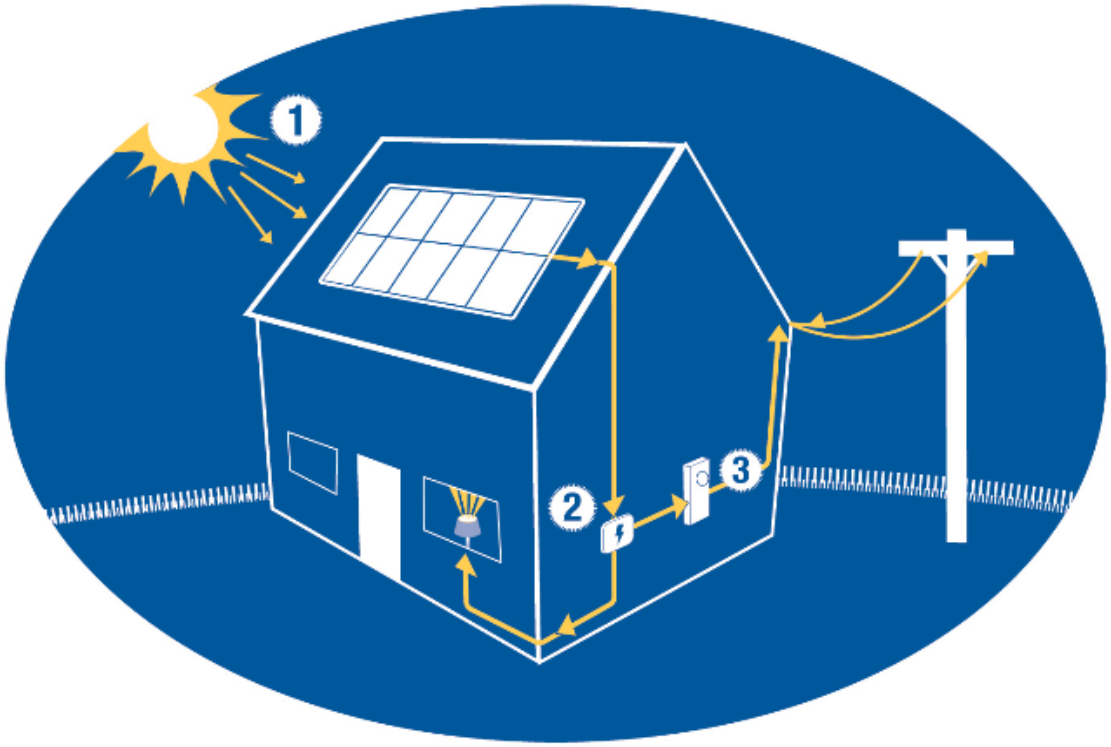
Agenda

- Net Metering – Current industry standard
- Grid Tied Solar
- Off Grid Solar
- Battery Hybrid Systems
- Battery Technology – Past, Present, & Future
- Self Consumption of Renewable Energy
- Commercial – Demand management
- Non storage alternatives

Standard ‘Net Metering’ with Renewables



1. Sun hits panels, creating DC electricity
2. Solar inverter converts DC power into AC power for household needs such as lights, television, computers, etc.
3. Excess power is sent to the grid, crediting your monthly bill

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Net Metered System Highlights

- Baseload demand of grid acts ‘storage’ – all renewable energy production is instantaneously consumed by others.
- Excess energy generation feeds into the grid. Grid supplements as needed to supply loads
- Works well when renewables have a low penetration into the grid
- PV production coincides (mostly) with peak demand of grid
  - Some utilities now promoting West facing solar arrays to better align PV production with peak demand on grid
- Lowest cost renewable option
- No maintenance requirements
- 30 Year life span

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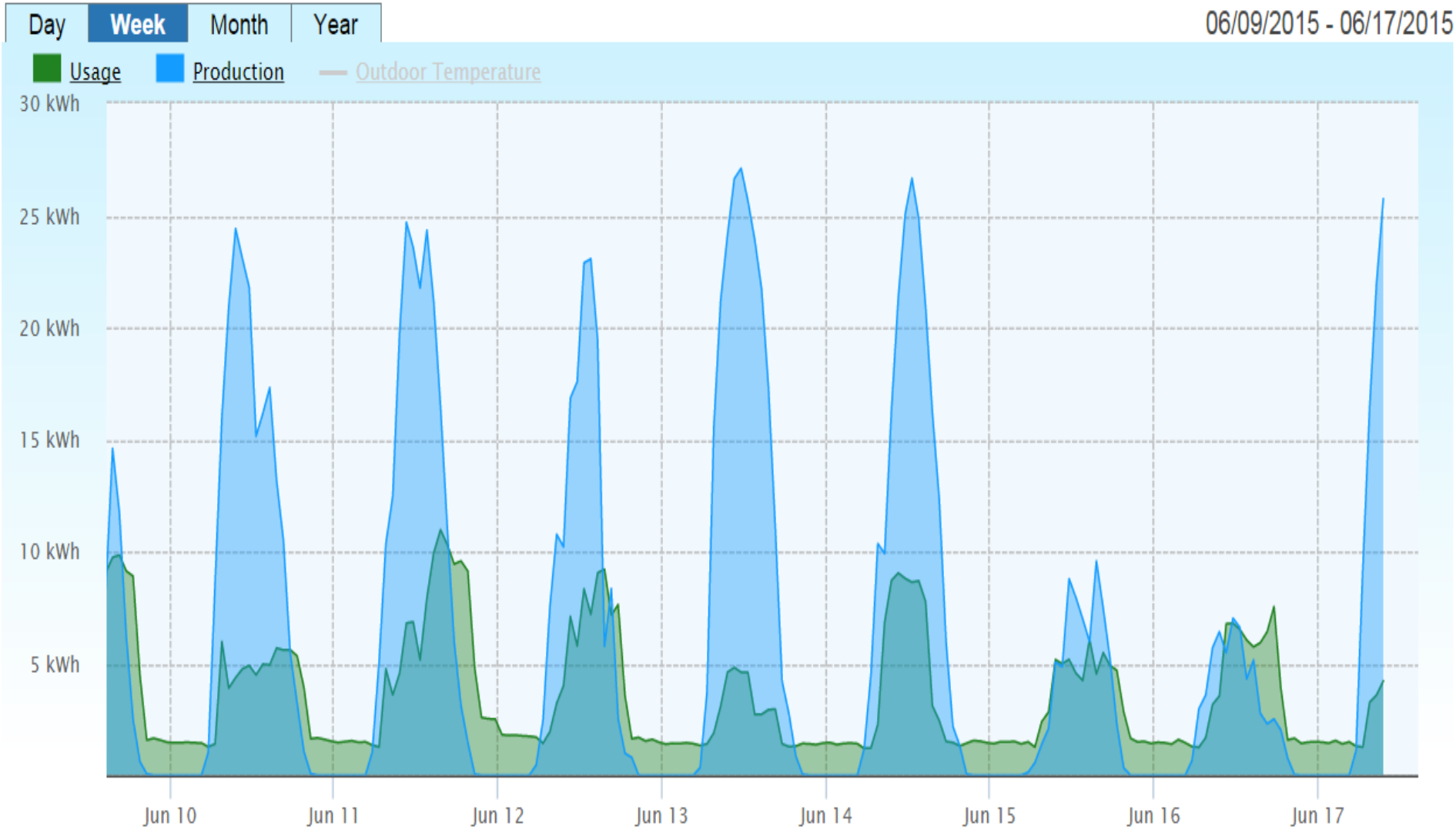
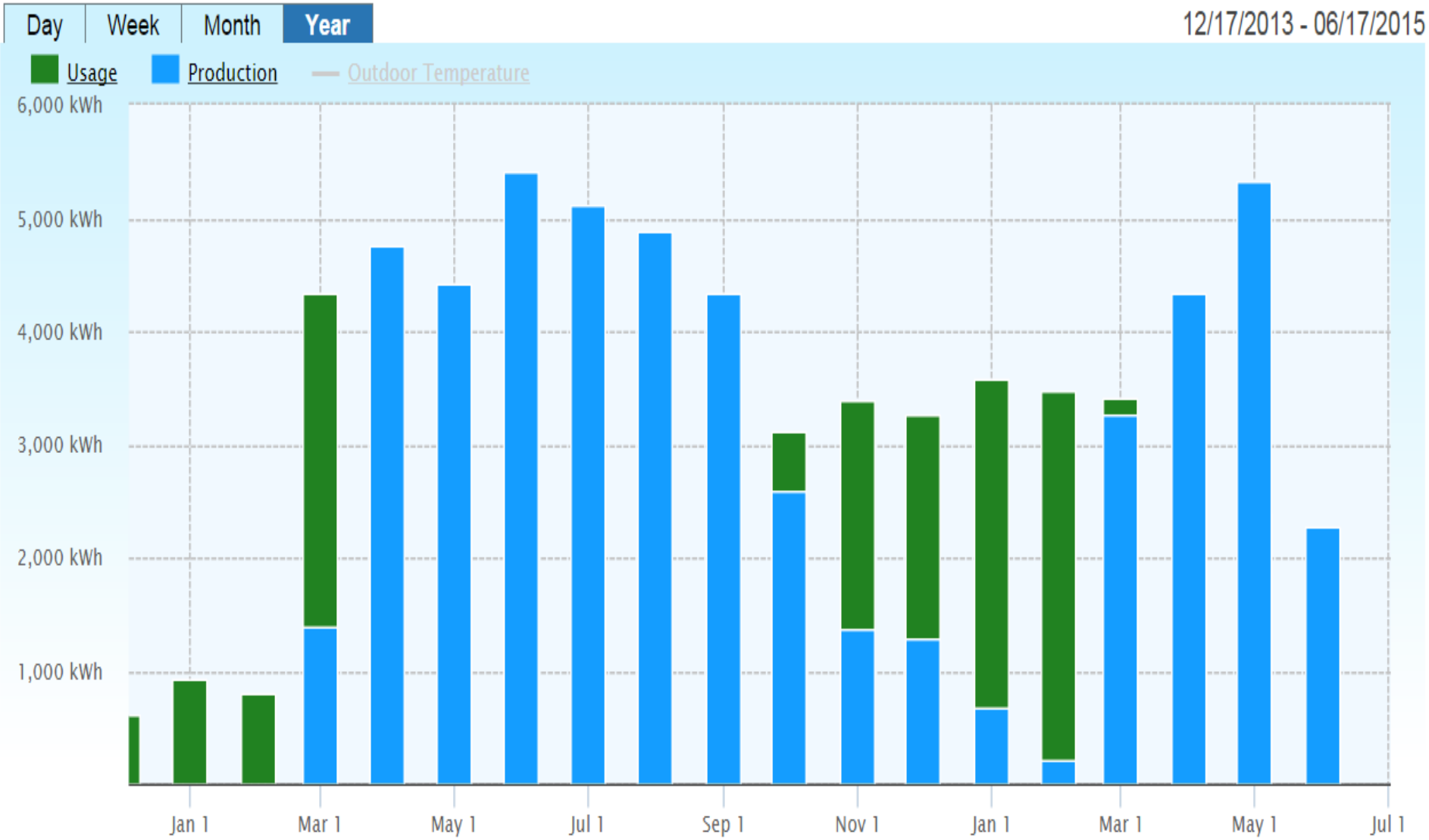
Typical Daily Solar Production and Load Profile – no storage



Typical Annual Solar Production and Load Profile – no storage



Standard Grid Tied Inverter

SMA

SolarEdge

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Off-Grid Solar Systems

- No connection to the utility grid
- Very strict design guidelines and engineering
- Will always be dependent on backup power (generator) during certain times of year
- No benefit to the grid

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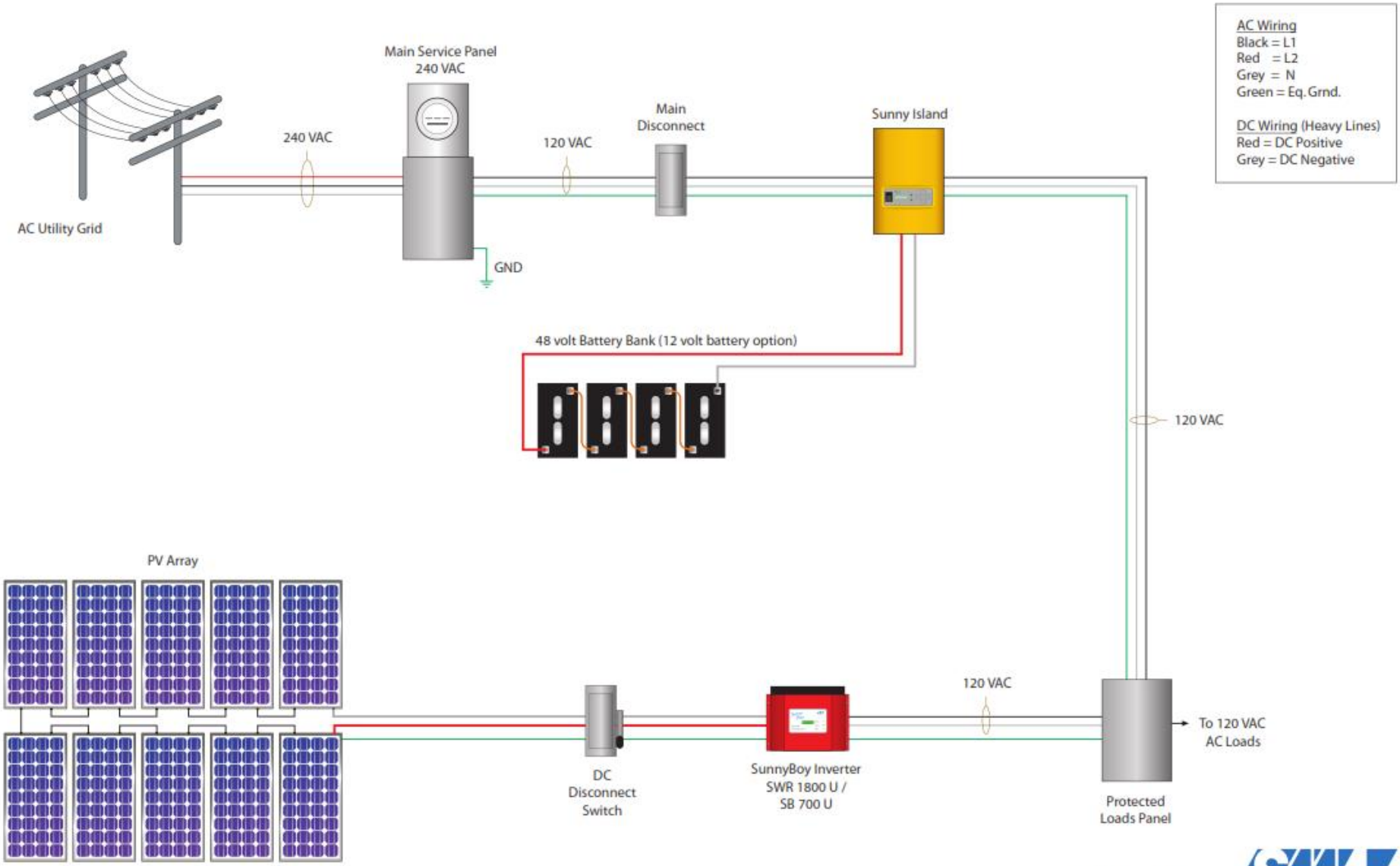
Hybrid Systems

- Export energy to grid for net metering
- Emergency power supply when the grid goes offline
- Programmed for ‘Self Consumption’ where poor net metering policy exists
- Programmed for ‘Demand Response’ for commercial applications
- AC Coupled
  - Charged from grid tied inverter
- DC Coupled
  - Charged from DC charge controller

Grid-tied Battery Hybrid Systems



Sunny Island Wiring
Single Phase 3

Battery Considerations

- Temperature range of storage area
- Stand by discharge rate
- Round trip efficiency
- Cycle lifetime
- Shelf life
- Energy capacity vs. Power capacity

TYPES – FLA, AGM, LiON, AHI, Flow Batteries

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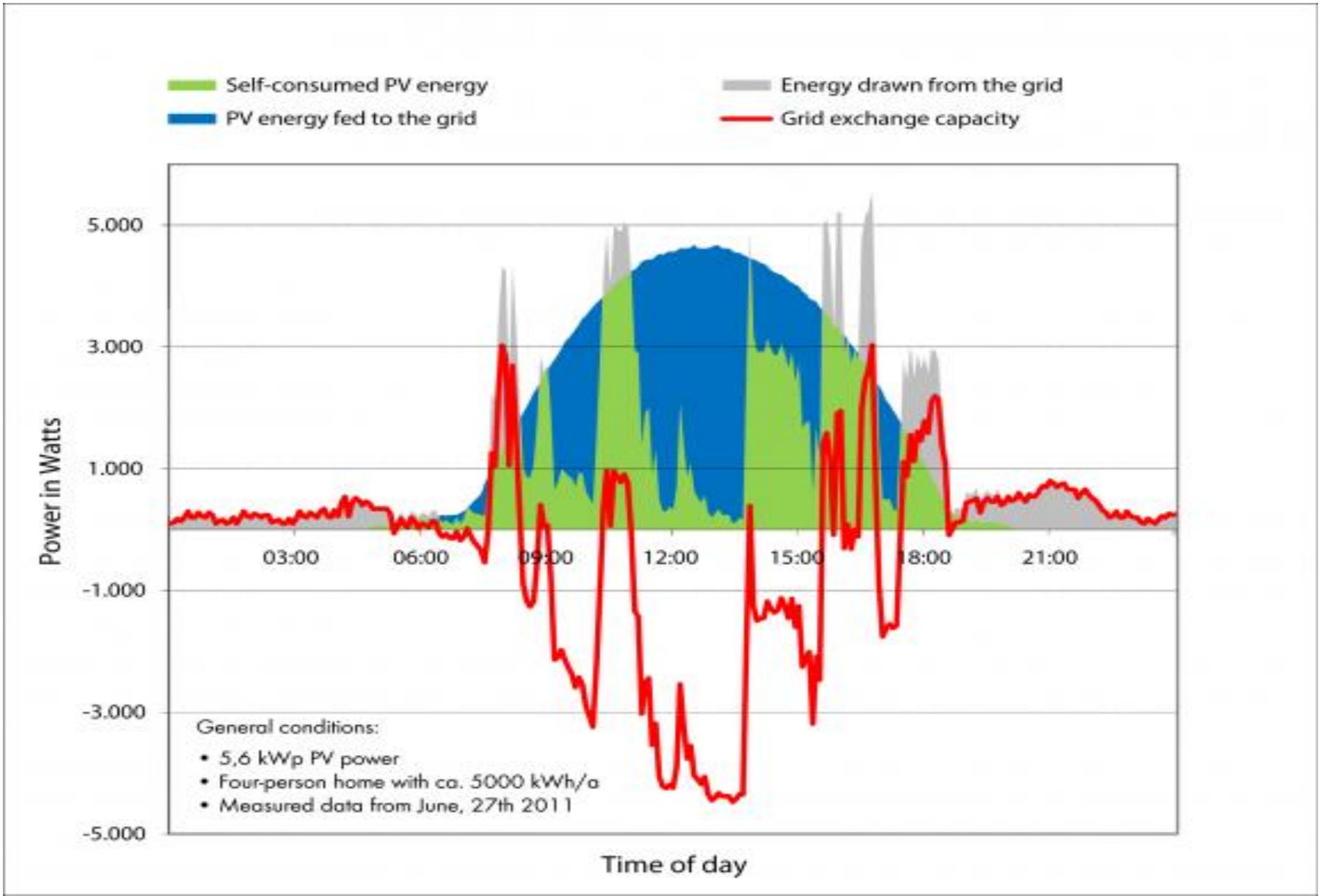
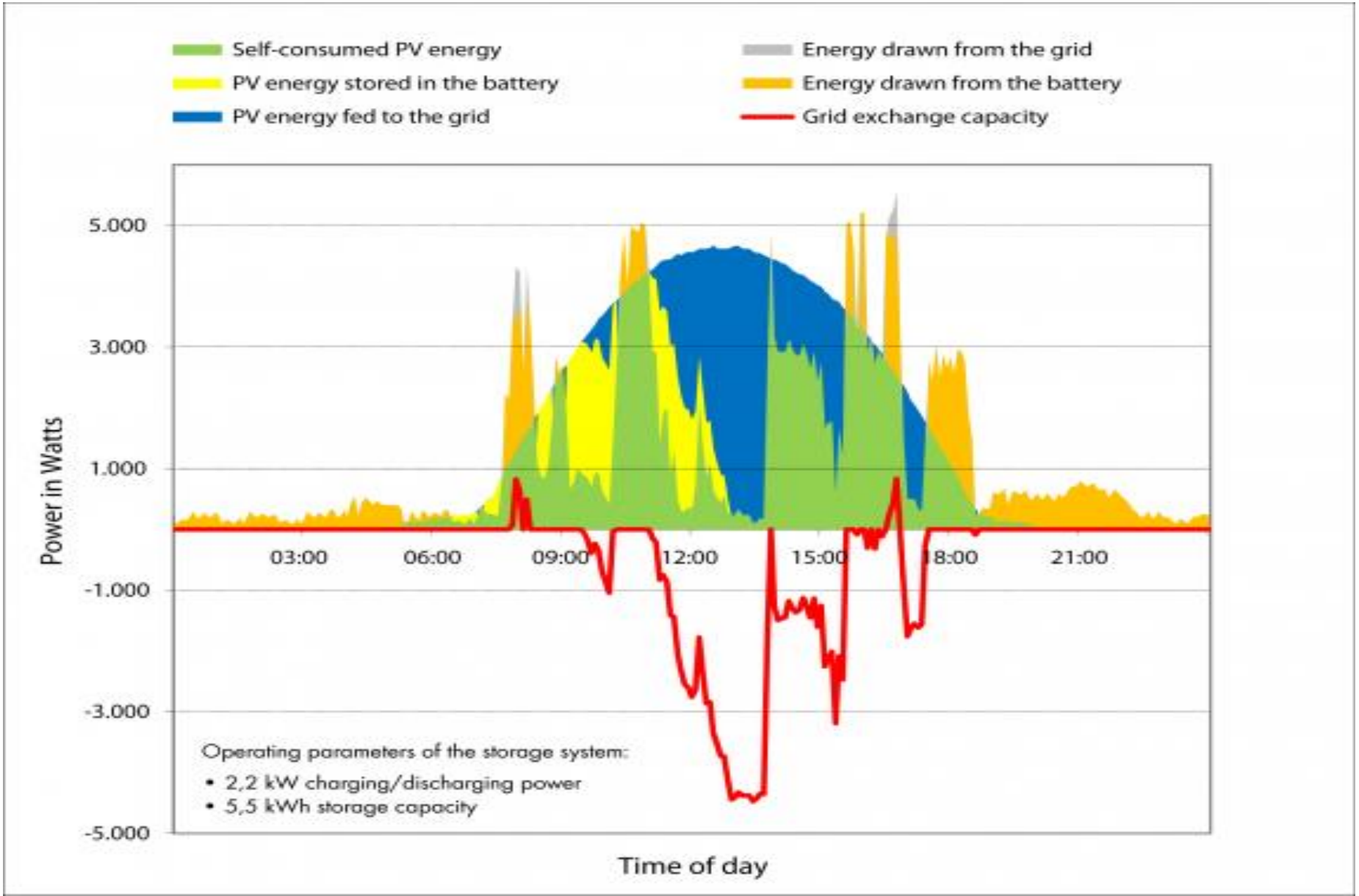
Self Consumption

- Store excess on site generation for later use
  - Minimizes energy net metered to the grid
  - Can reduce peak demand from the grid

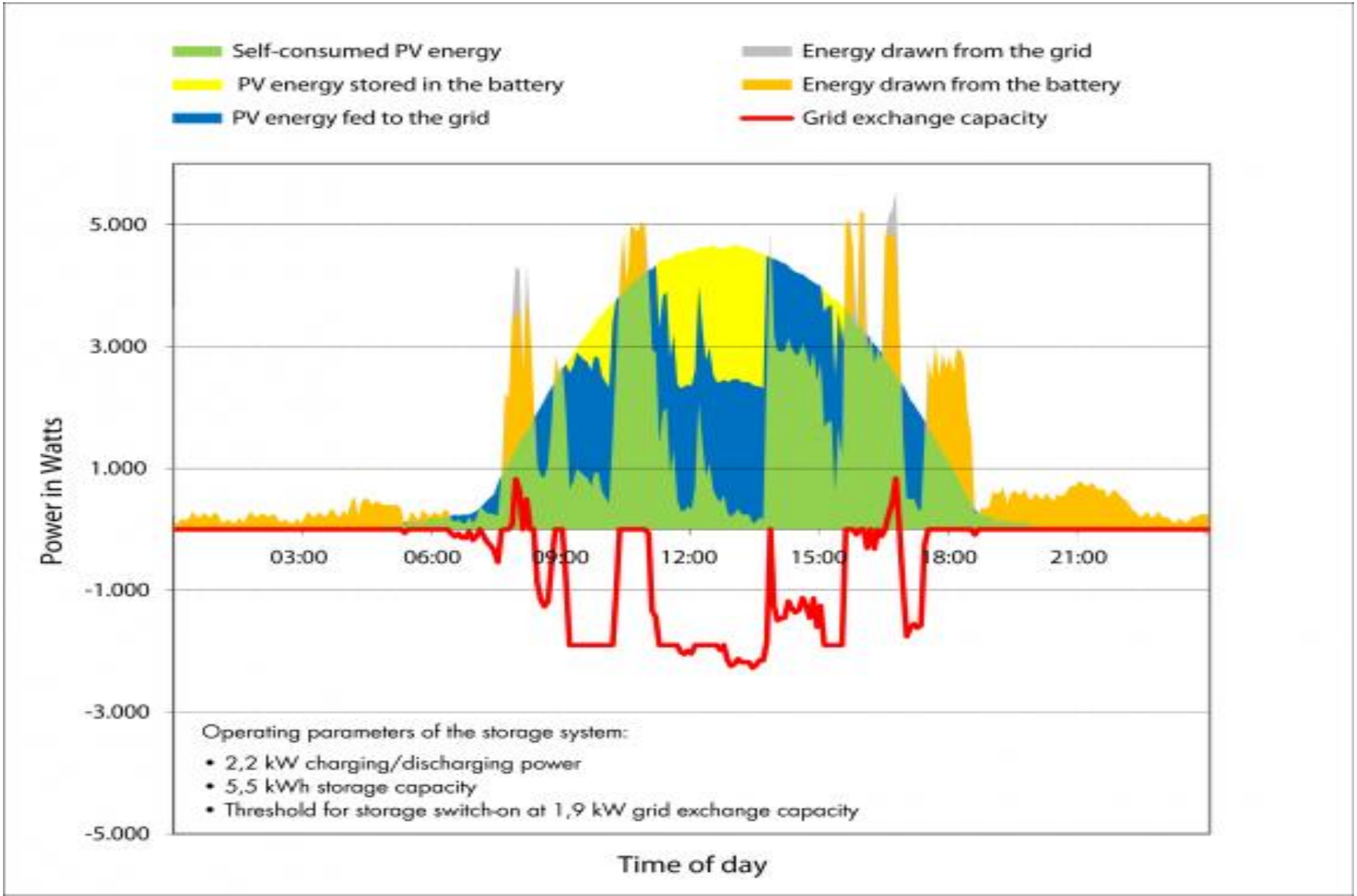
Typical power consumption of a 4 person household with 5kW solar system NO STORAGE



Typical power consumption of a 4 person household with 5kW solar system WITH STORAGE – OPTIMIZED FOR SELF CONSUMPTION



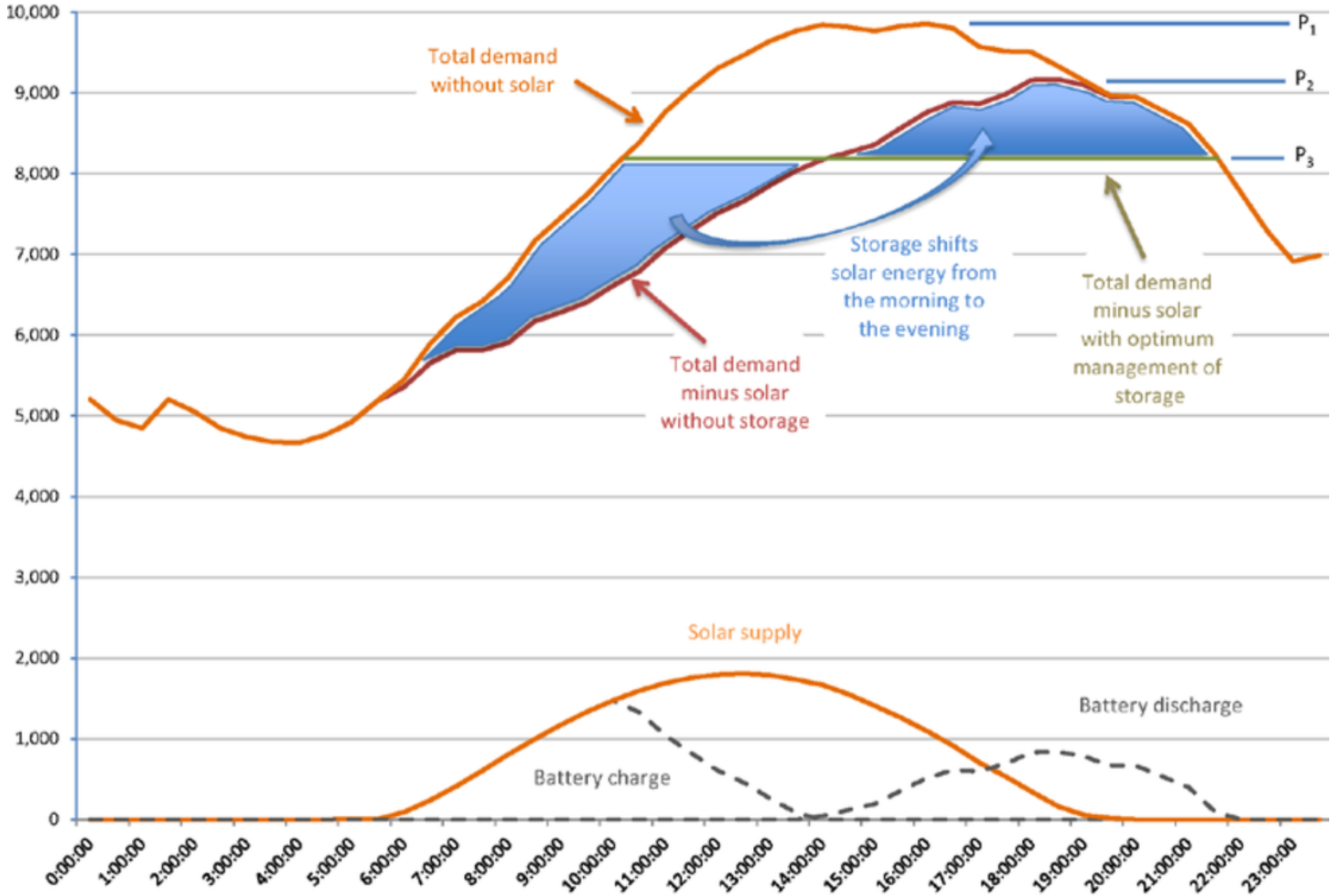
Typical power consumption of a 4 person household with 5kW solar system WITH STORAGE – OPTIMIZED FOR MAXIMUM GRID RELIEF



Demand Management

- Medium and large commercial customer electric bills based on a combination of kWh consumption and peak 15 min. monthly demand (i.e. Demand Charge)
  - Typical $ split is 50/50
- Battery storage with smart software can reduce demand charges by roughly 30%

Peak Demand Reduction with Storage

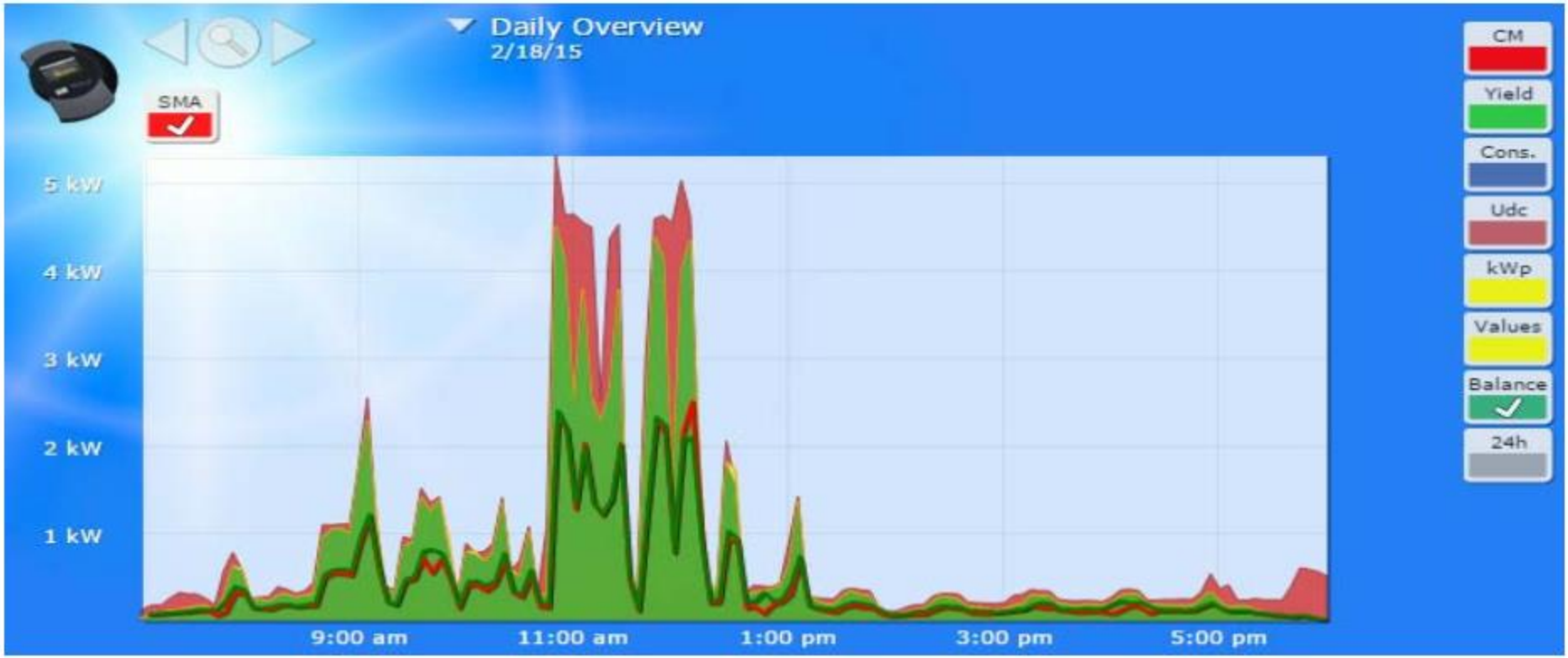


Non-Storage Alternatives

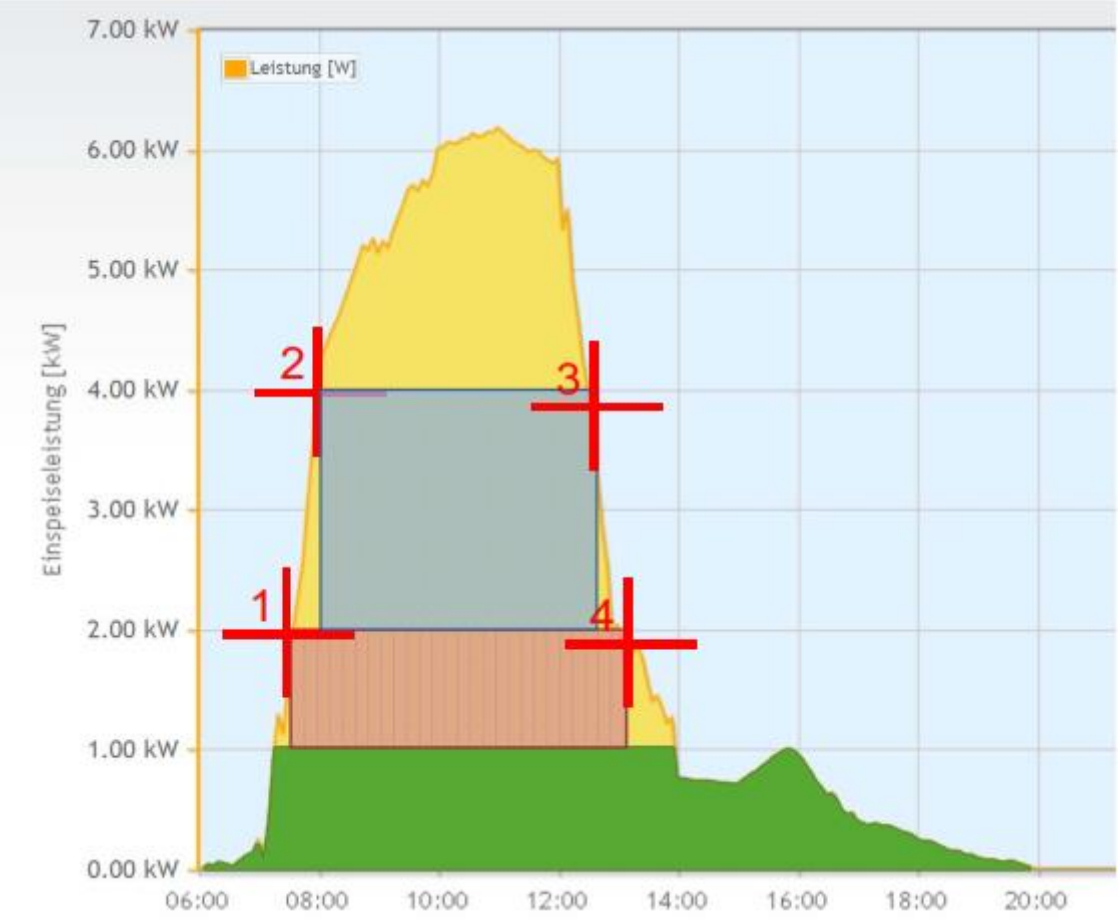
- Load management to reduce peak demand
- Increase self consumption to reduce exported energy
  - DHW, refrig./freezer setpoints, heating/cooling setpoints
- Match inverter output to instantaneous consumption
- Operate loads while the sun is shining!

Net Zero Back Feed with Solar-Log

Monitors demand of building and controls solar inverter to not exceed the load, resulting in no power being exported to the grid



Programmed setpoints for self consumption



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Business Opportunities in Maine

Current:

•Residential and small commercial ‘critical loads’ backup during grid outage

•Commercial peak demand charge reduction

Future:

•Storage optimized for reduced backfeed to grid

•Software and load management to maximize self consumption

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Questions and Answers: