



Smart Energy Management with Power Backup & Device Control

Guy Lichtenstern, Product Manager

SolarEdge in Numbers

9.6GW

of our systems
shipped worldwide



30.9M

power optimizers
shipped



Over **750,000** monitored systems
around the world



1.3M

inverters shipped



Presence
in **25**
countries



1,398 employees



140 awarded patents and
additional patent applications

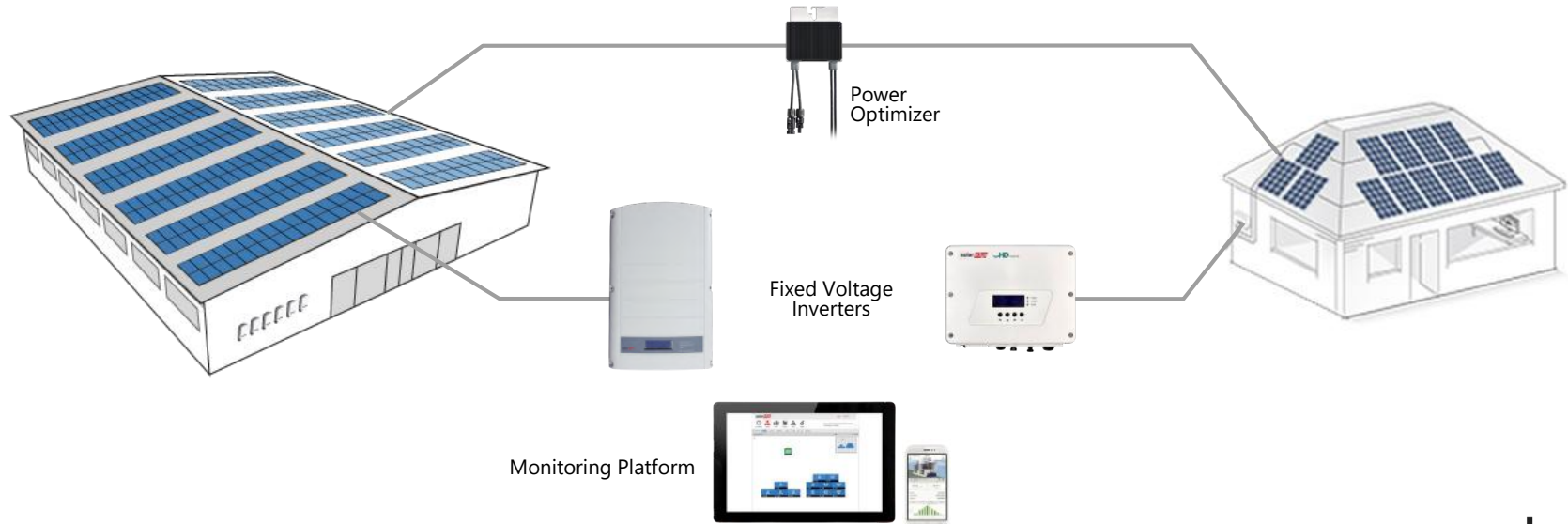


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solaredge

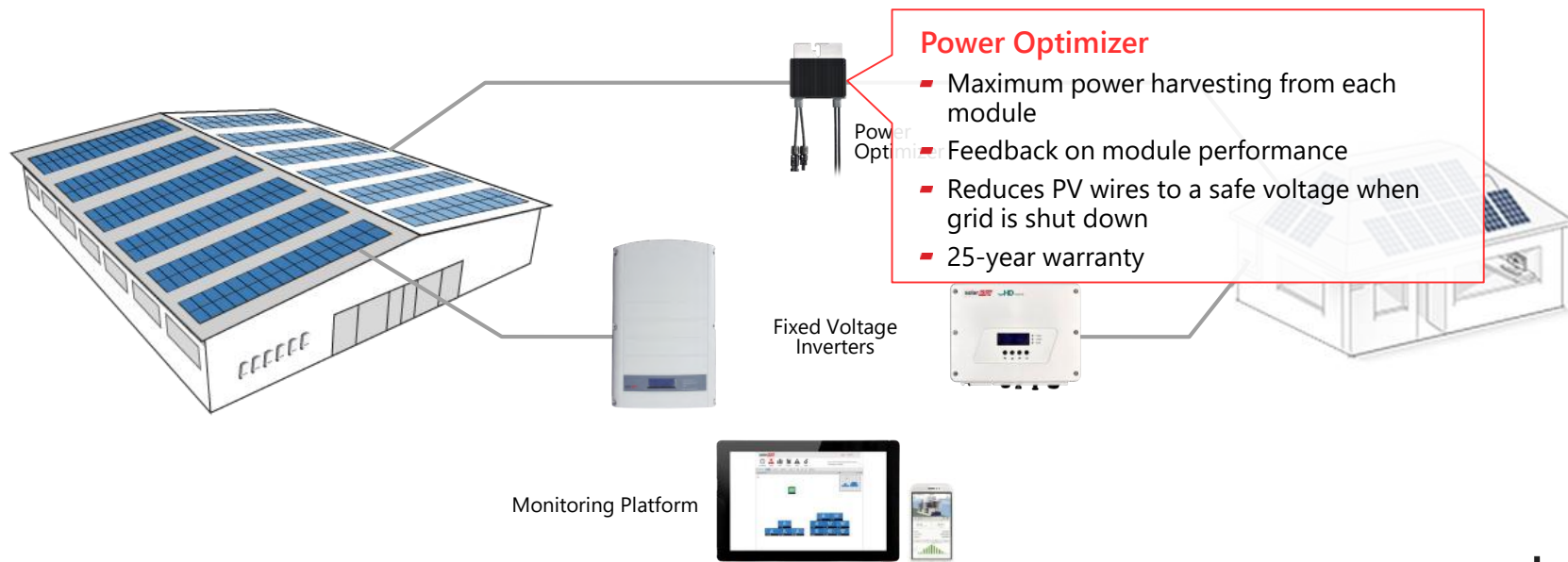
The SolarEdge Solution

- Split the traditional inverter functionality into two:
 - The power optimizer to maximize energy production for each module
 - A simplified inverter only responsible for DC -AC inversion and grid management



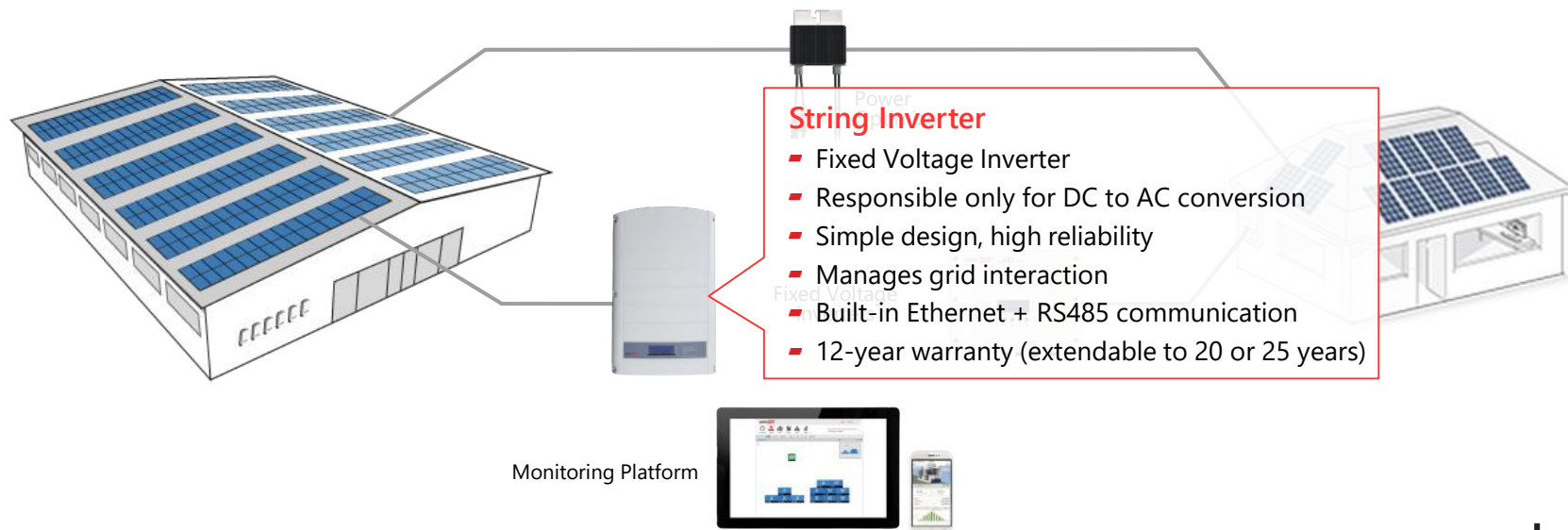
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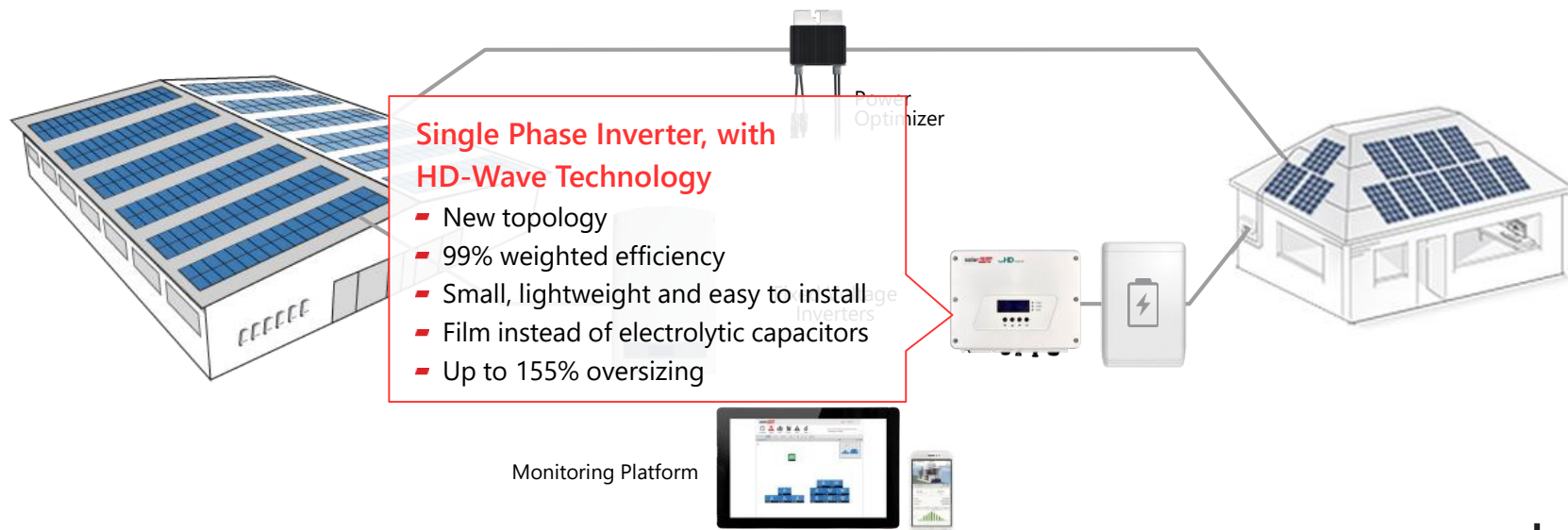
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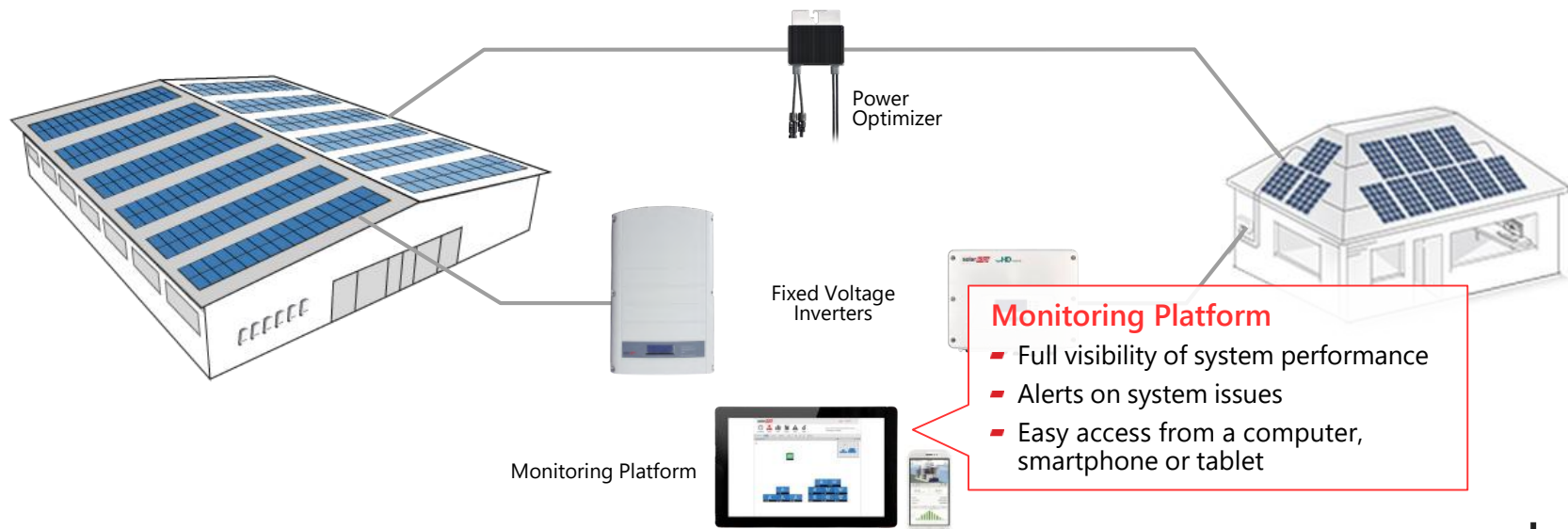
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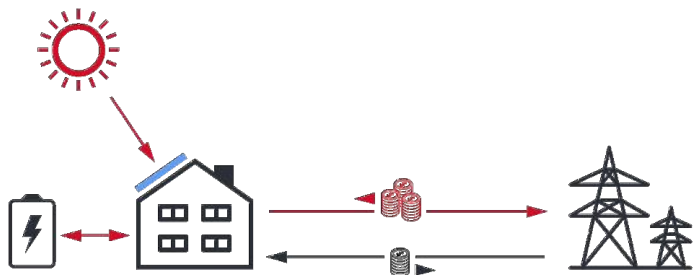
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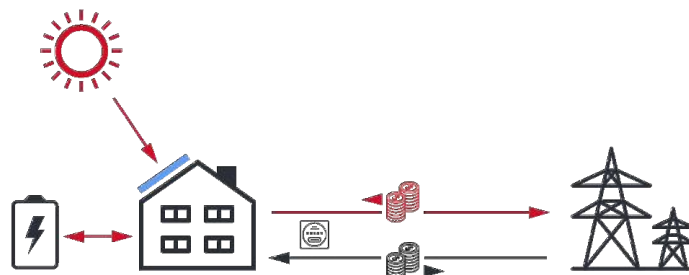


The Motivation

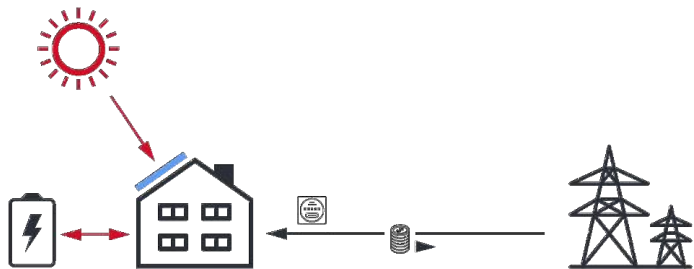
The Evolution of Incentive Structures



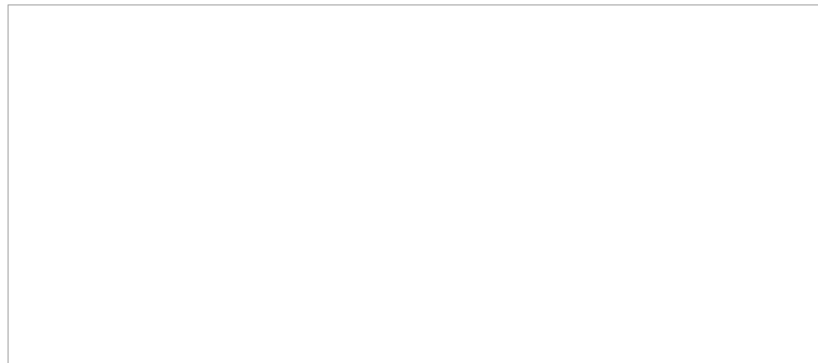
FiT | Utilities pay renewable energy producers a fixed and above-retail rate for electricity supplied to the grid.



Net Metering | The cost of the electric energy consumed from the grid is offset by the electric energy generated by the renewable source.

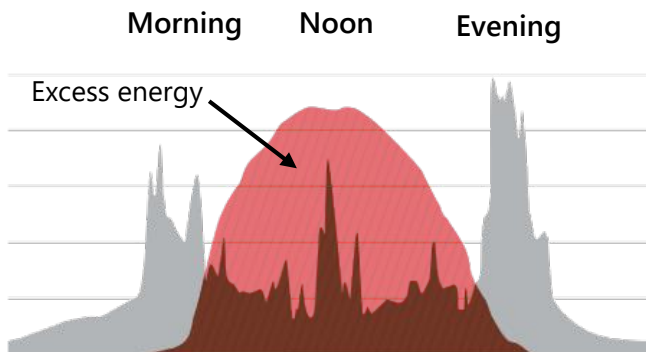


Self Consumption | PV system owners consume self-generated solar electricity.



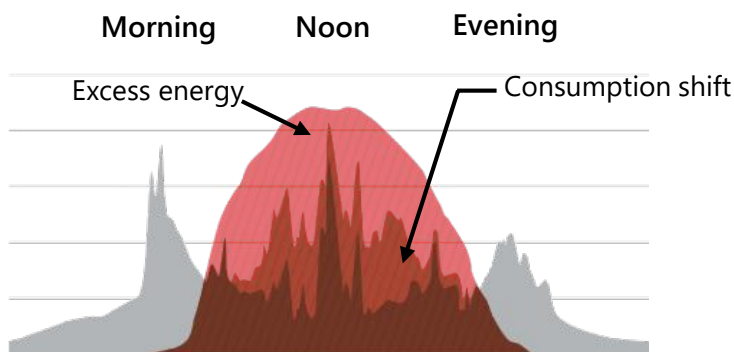
PV Production does not Align with Consumption

Without
Smart Energy



* The graph is for illustration purposes only

With
Smart Energy



Necessity of Backup Power

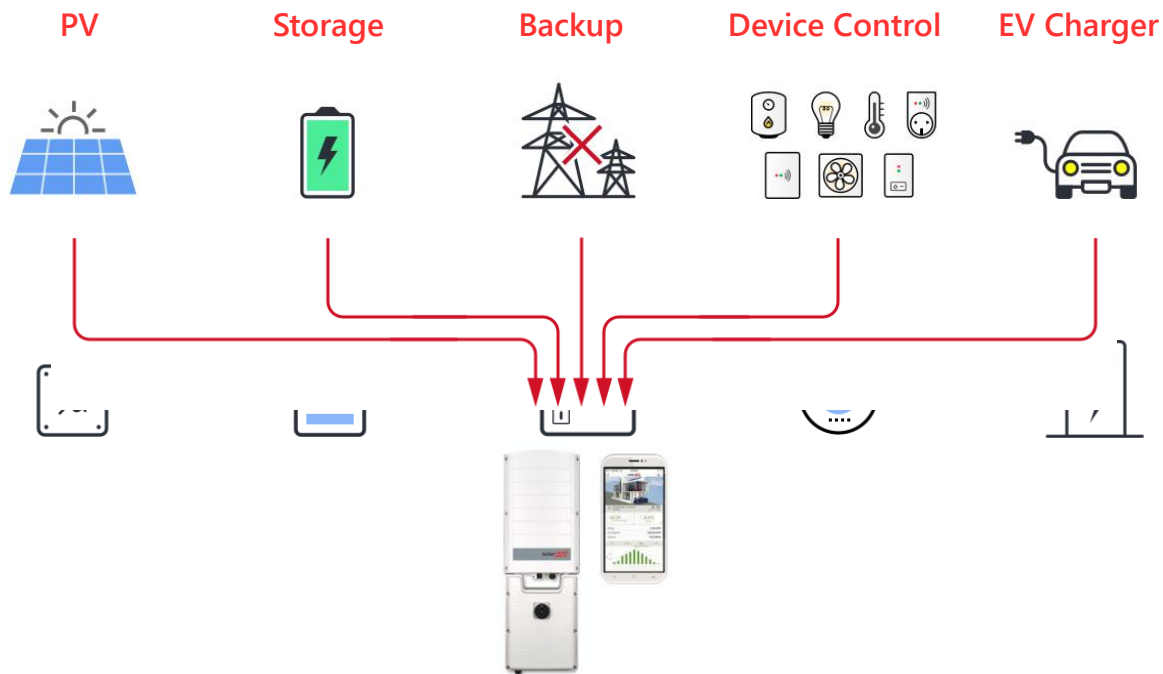
- Power outages are becoming a major concern in parts of the world
- Extended outages result in:
 - Frozen water pipes
 - Dark nights
 - Spoiled food
 - No electric heat
 - No means to charge mobile communication devices
- During such scenarios, backup power can be supplied day or night by a combination of PV and battery
 - Power backed up loads such as lights, refrigeration, fans, cells phones, PC, etc.



Offering a Solution

Maximizing Self-Consumption & Independence

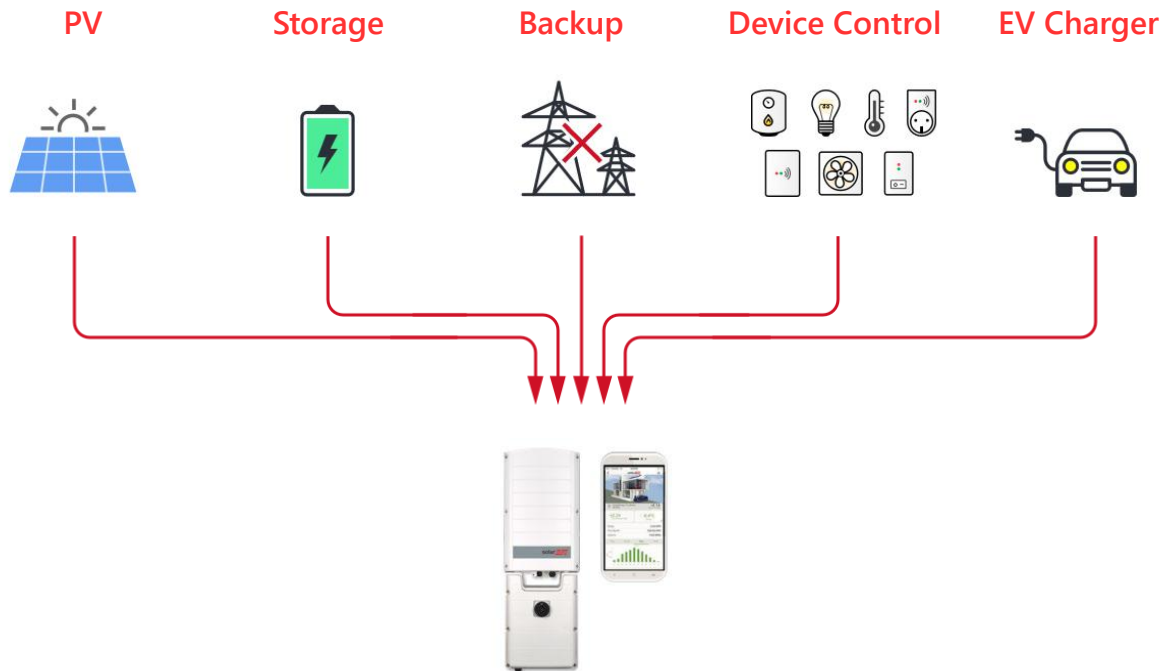
- There are multiple ways to maximize energy independence
- Each solution can have its own separate management system
 - Expensive, inefficient, complicated
 - Self-consumption management is not synchronized between the different mechanisms



One Inverter for All Applications

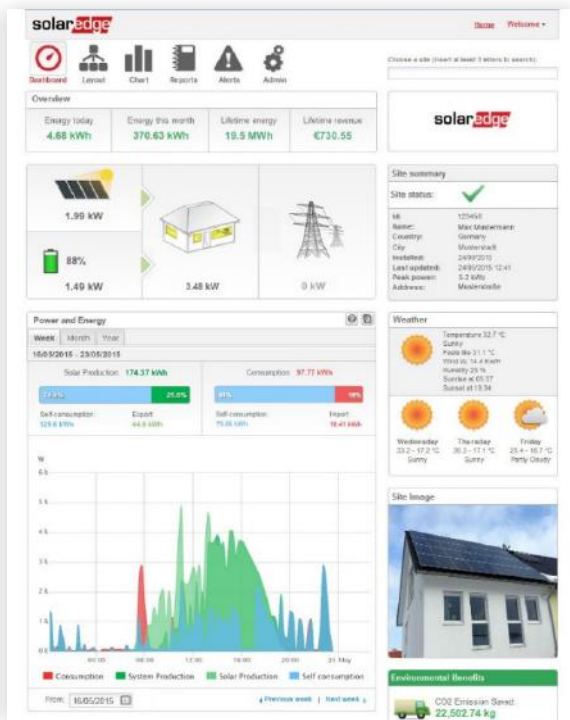
Combine energy management of all features into one inverter

- Simple design
- Fast installation
- Cost effective
- Centralized energy management
- Designed to work together; seamless and synchronized



One Dashboard for Energy Management

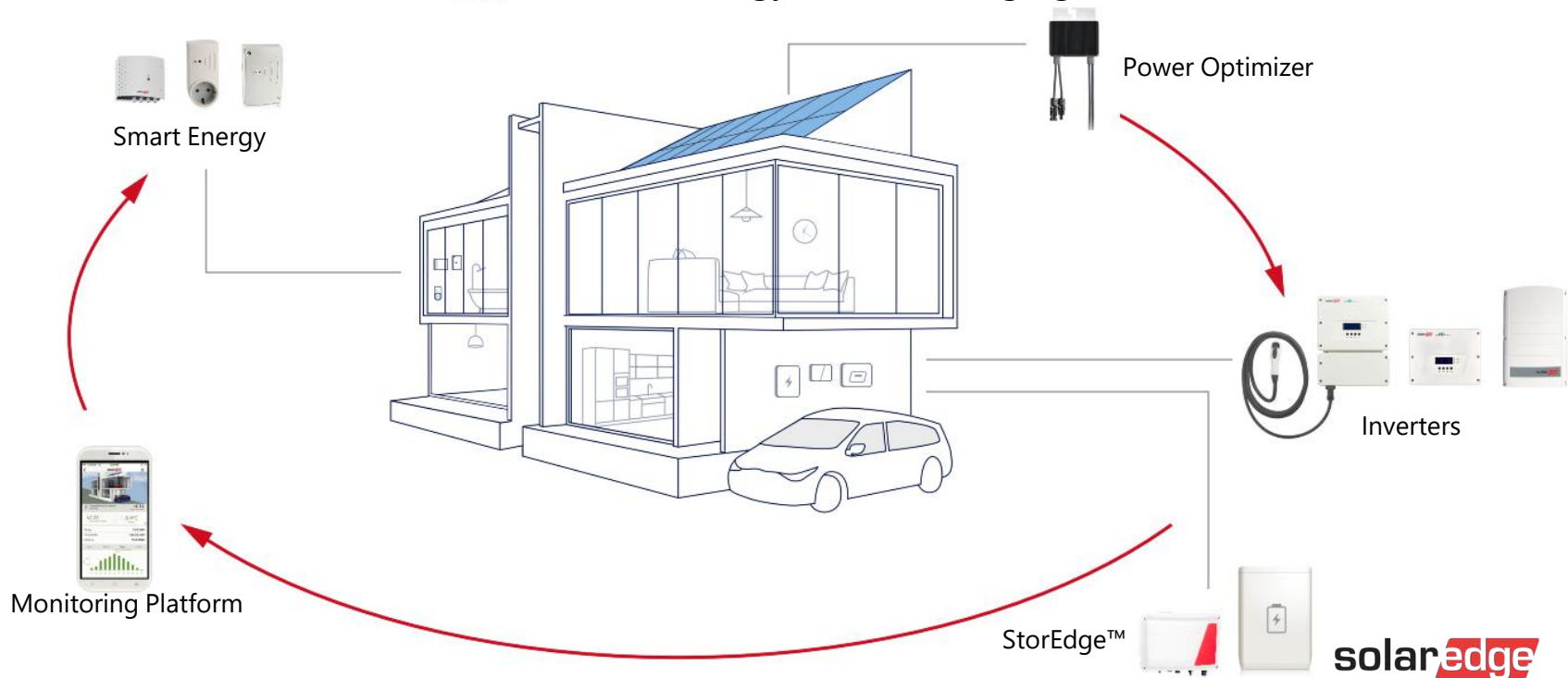
Combine energy management of all features into one dashboard



A Complete Residential Solution



A single solution for PV, Storage,
Smart Energy and EV Charging



Smart Energy Applications

StorEdge Solution Components



SolarEdge Single Phase StorEdge Inverter with Backup

The StorEdge inverter manages battery, system energy and backup power, in addition to its functionality as a DC PV inverter

Self-Consumption with Backup Power



SolarEdge Modbus Meter

For production / consumption readings

Meter is not required for a backup-only solution



Battery Pack

Compatible with DC coupled, high-voltage and high-efficiency batteries from LG Chem

Self-Consumption Example — Without Battery

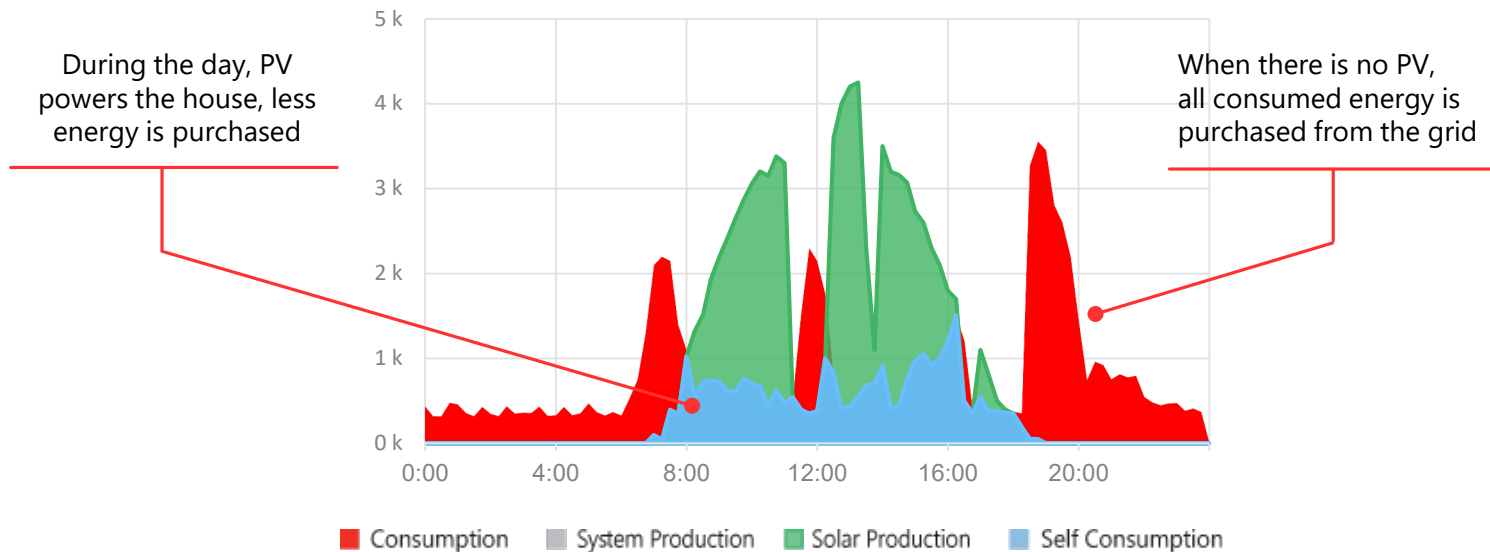
5kW System on April 8, 2015 (before battery installation)

Total produced energy
21.37 kWh

Total purchased energy
13.57 kWh

Total consumed energy
20.61 kWh

Self-consumption level
33%



Self-Consumption Example — With Battery

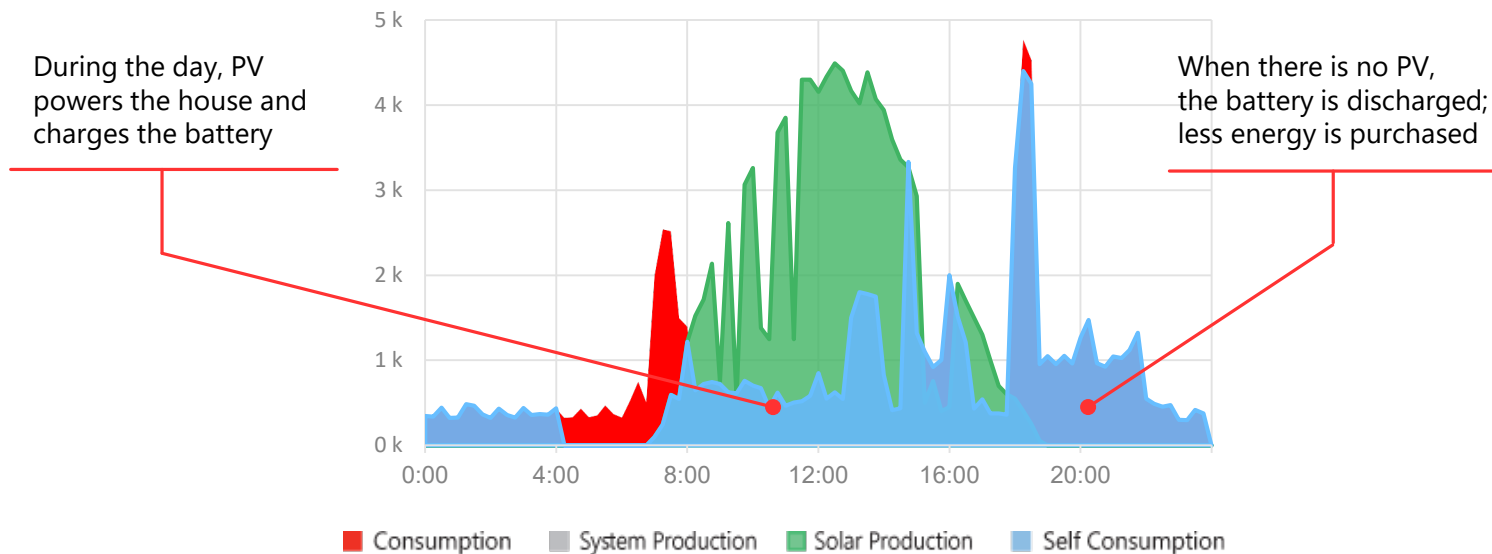
5kW System on April 15, 2015 (Assuming 6.4kWh battery installation)

Total produced energy
25.41 kWh

Total purchased energy
3.17 kWh

Total consumed energy
21.53 kWh

Self-consumption level
72.3%



Backup Power at Work

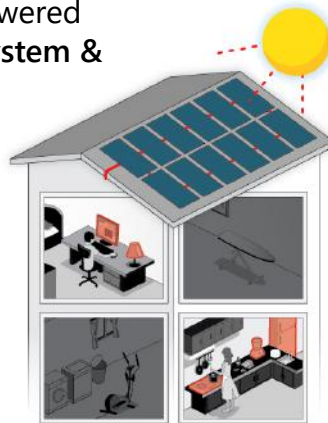
Grid is On

Charge battery
from PV system



Grid is down

Daytime: Important
loads are powered
by the PV system &
battery



During long power outages, the battery
can be charged by the PV system

Nighttime: Important
loads are powered by
the battery



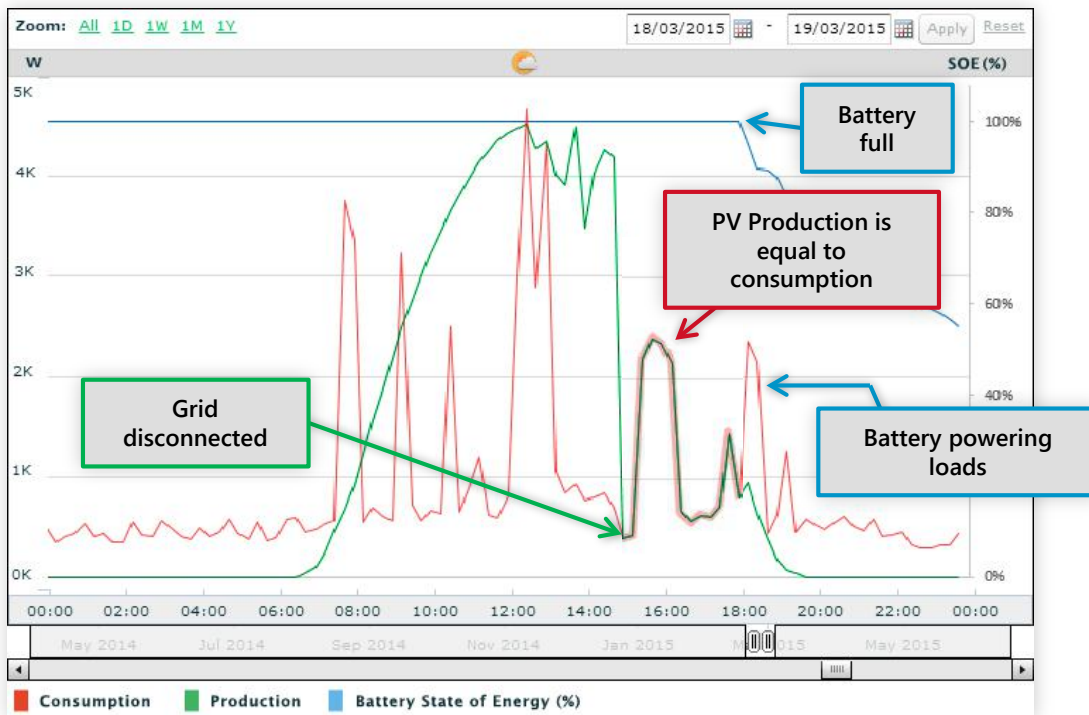
Power Backup Visualization in Monitoring

Grid Disconnection

- Inverter switches to backed up loads only
- Backed up loads powered by PV production (battery is not used)
- Since the battery is full, PV production is equal to backed up loads consumption

Battery Backup

- PV does not meet load requirement
- Backup loads are powered from the battery



Smart Energy Products

Monitoring & Control



Main dashboard

Setting device schedule



Smart Energy Hot Water



Plug-In Socket with Metering



Smart Energy Switch



Smart Energy Relay

Smart Energy Products



Smart Energy Hot Water

- ✓ Maximizes self consumption by adjusting the output power based on excess PV power
- ✓ Enables repetitive scheduled operation and remote ON/OFF functionality
- ✓ Provides cost effective energy storage
- ✓ Includes built-in consumption meter
- ✓ Features ZigBee® wireless communication



Smart Energy Socket

- ✓ Suitable for typical home appliances such as heaters, garden lighting, fans and more – AC loads up to 3kW
- ✓ Enables repetitive scheduled operation and remote ON/OFF functionality
- ✓ Features ZigBee® wireless communication



Smart Energy Switch

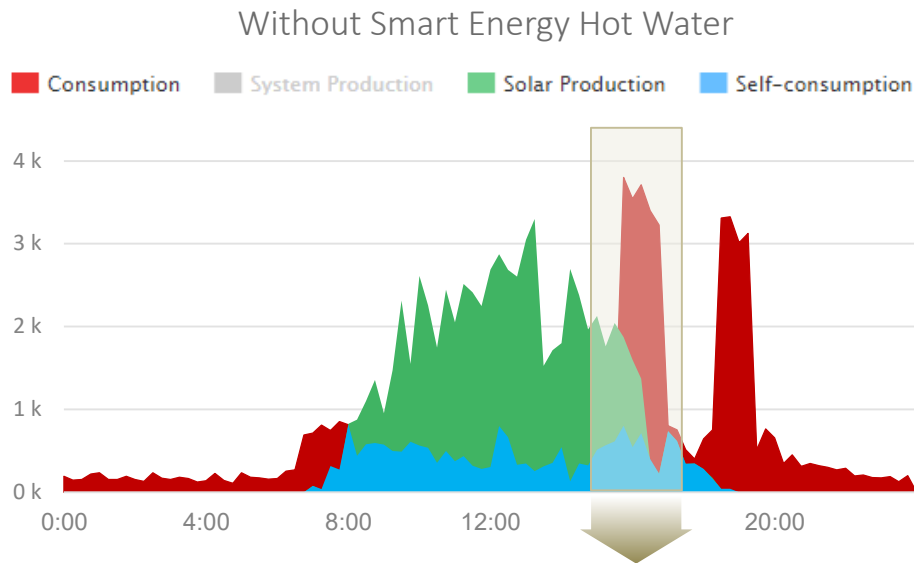
- ✓ Suitable for Smart Grid Ready appliances such as heat pump control
- ✓ Supports wide input voltage range (0-250 Vac/Vdc)
- ✓ Enables repetitive scheduled operation and remote ON/OFF functionality
- ✓ Features ZigBee® wireless communication



Smart Energy Relay

Smart Energy Hot Water: Savings

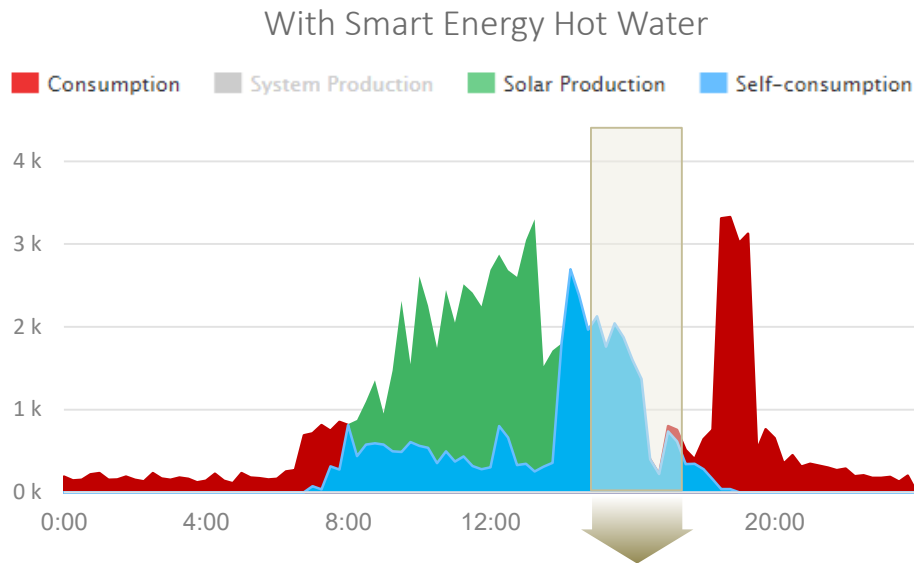
Daily Household Power Production & Consumption (Home with Rooftop Solar PV)



* The graph is for illustration purposes only

Smart Energy Hot Water: Savings

Daily Household Power Production & Consumption (Home with Rooftop Solar PV)

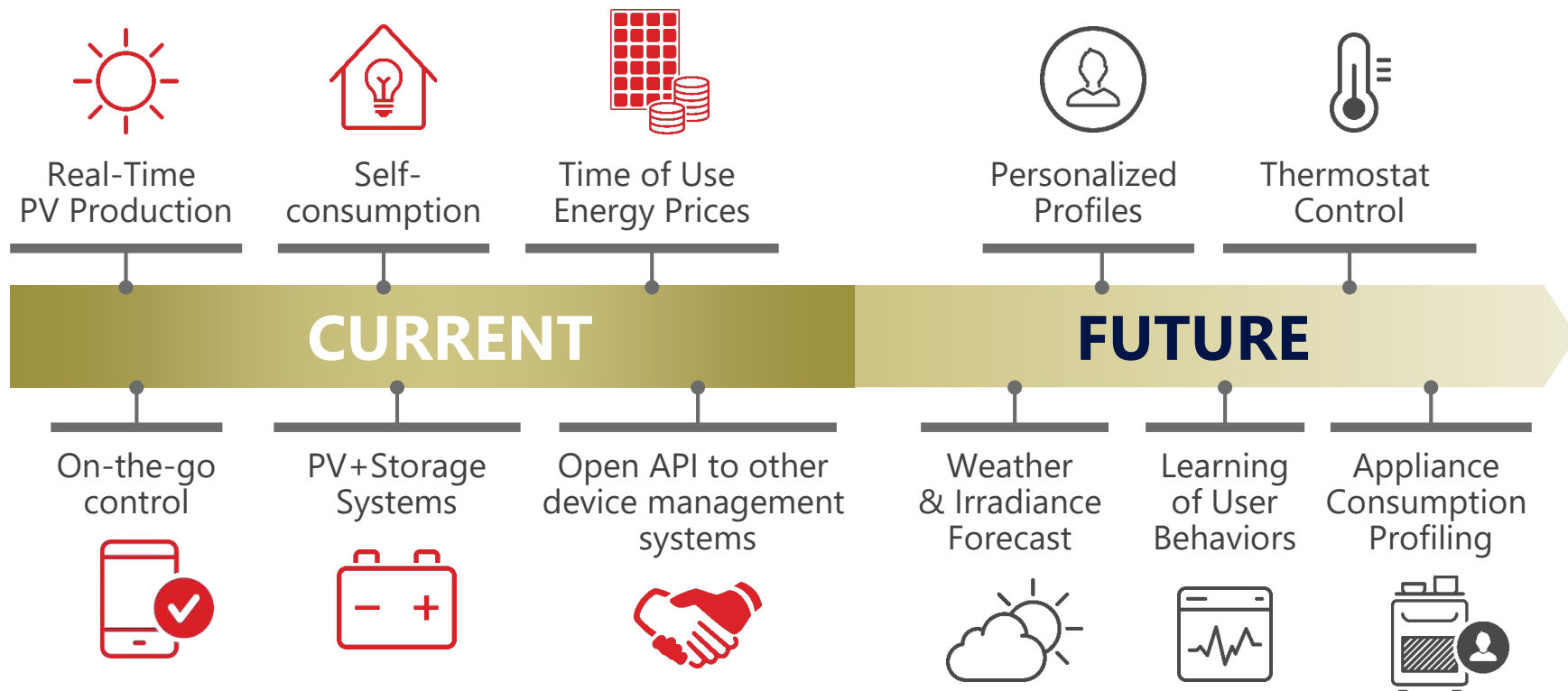


Diverting excess PV to heat water cuts costs

This example shows 3.5 kWh energy savings from the grid → Direct cost saving

* The graph is for illustration purposes only

Looking Ahead – Getting Smarter



The Inverter as the Linchpin for Grid Services

- Smart inverters are well positioned to provide the required systematic flexibilities:
 - Grid sensing
 - Consumption and generation metering
 - Cellular/Ethernet communications
 - Advanced computing and memory capabilities



Thank You!

Cautionary Note Regarding Market Data & Industry Forecasts

This power point presentation contains market data and industry forecasts from certain third-party sources. This information is based on industry surveys and the preparer's expertise in the industry and there can be no assurance that any such market data is accurate or that any such industry forecasts will be achieved. Although we have not independently verified the accuracy of such market data and industry forecasts, we believe that the market data is reliable and that the industry forecasts are reasonable.

Version #: V.1.0



Additional StorEdge Configurations

StorEdge Solution with
Self-Consumption

Additional StorEdge Configurations

StorEdge Solution

Applications: Maximizing Self-Consumption, Profile Programming, Direct Control

Basic system: Single phase SolarEdge inverter (for PV & storage) + battery



Installation Requirements

More PV power

Connection to a three phase SolarEdge inverter

Connection to non-SolarEdge inverter

How is StorEdge Connected?

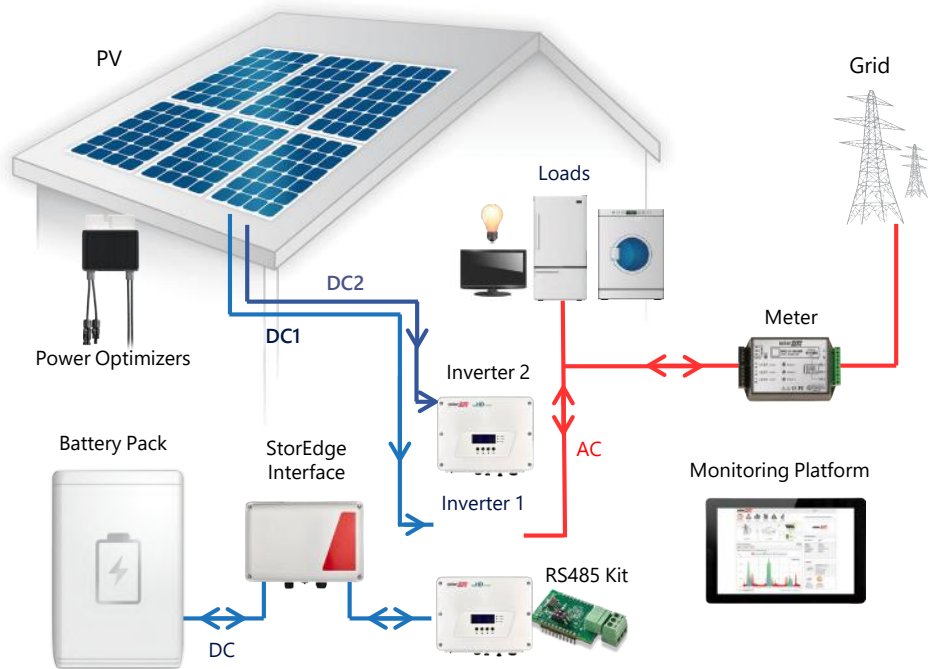
Add a second single phase inverter to handle additional PV power from array

Connect the StorEdge system to the SolarEdge inverter's AC output
(AC-coupled solution)

Connect the StorEdge system to the non-SolarEdge inverter's AC output
(AC-coupled solution)

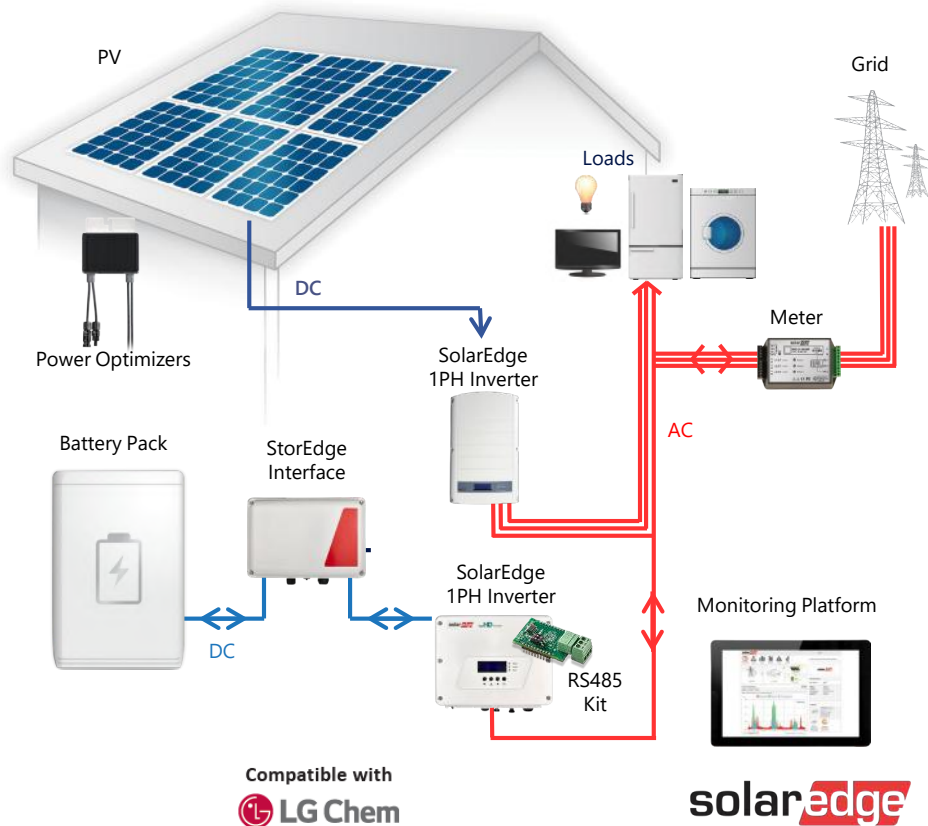
More PV Power

- Single phase inverter for PV & storage
- Another single phase inverter is added to handle additional PV power
- Inverters may be connected to different phases



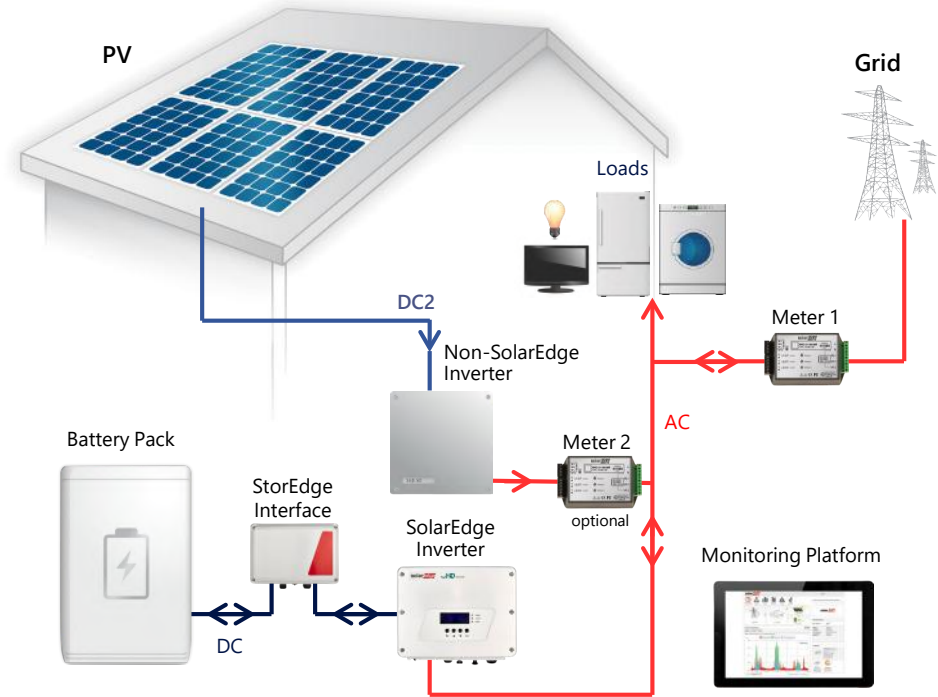
Three Phase SolarEdge PV Systems

- Add storage to systems that require or already have a SolarEdge three phase inverter
- StorEdge system connects to AC output of the SolarEdge three phase inverter (AC coupled)



Non-SolarEdge PV Systems

- Add storage to sites already installed with a non-SolarEdge PV inverter
- The SolarEdge inverter connects to the AC output of the non-SolarEdge inverter (AC coupled)
- The SolarEdge inverter charges the battery using the PV power produced by the non-SolarEdge inverter



Additional StorEdge Configurations

StorEdge Solution with
Backup Power

Additional StorEdge Configurations

StorEdge Solution with Backup Power

Applications: Maximizing Self-Consumption, Profile Programming, Direct Control, Backup Power



Basic system: Single StorEdge inverter (for PV, storage and backup) + battery

Installation Requirements

Connection to three phase SolarEdge inverter

Connection to non-SolarEdge inverter

Backup power with no PV

How is StorEdge Connected?

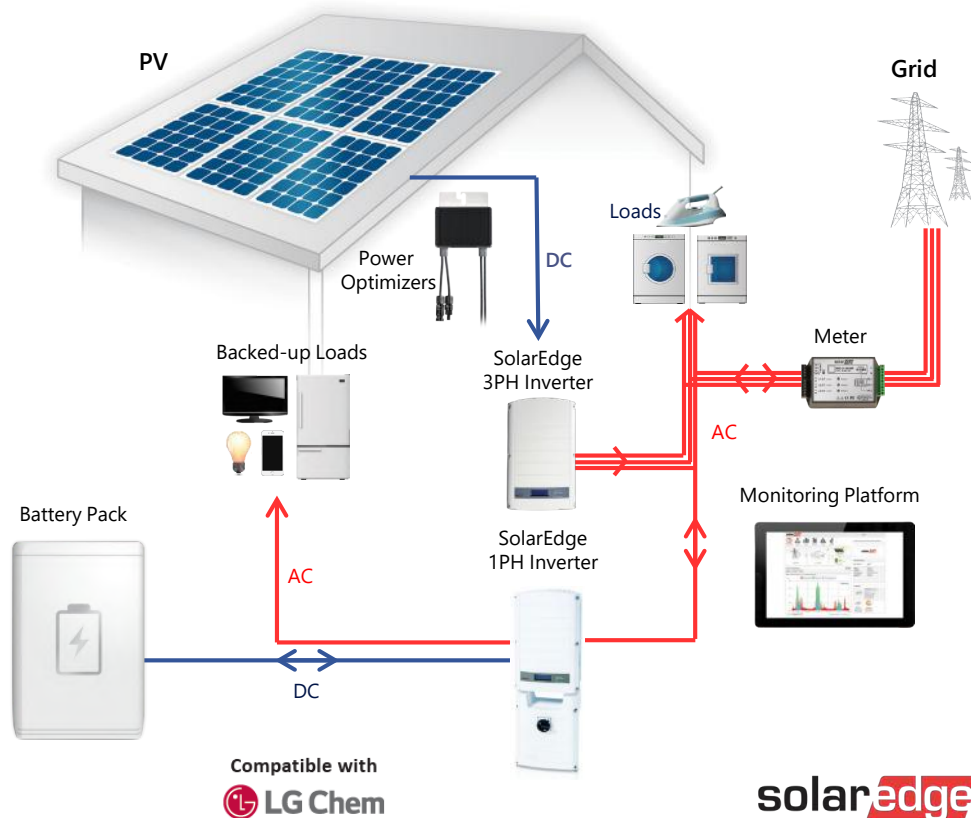
Connect the StorEdge system to the SolarEdge inverter's AC output
(AC-coupled solution)

Connect the StorEdge system to the non-SolarEdge inverter's AC output
(AC-coupled solution)

Same connection as basic StorEdge configuration, with battery charged from grid instead of PV

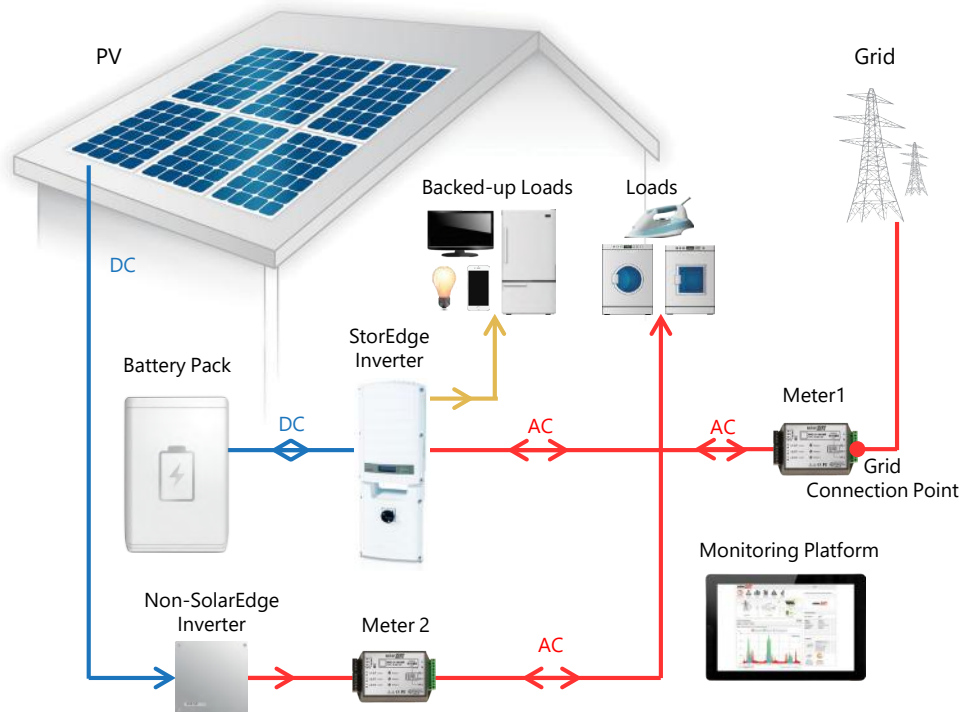
Three Phase SolarEdge PV Systems

- Add storage to systems that require or already have a SolarEdge three phase inverter
- StorEdge system connects to AC output of the SolarEdge three phase inverter (AC coupled)



Non-SolarEdge PV Systems

- Add storage to systems that require or already have a non-SolarEdge PV system
- StorEdge system connects to AC output of the non-SolarEdge inverter (AC coupled)



Backup Power with No PV

- Backup power is automatically provided during grid interruption for backed-up loads
- Battery is charged from the grid

