Why Storage?

- Provides backup power in case of grid disconnection
- Supports grid functionality while connected to grid
- Saves money with changing utility rates: TOU, NEM, Export
- Insulates customer from the uncertainty of future rate changes
Storage Product Needs

- Simple installation; flexible system runs many applications
- High round trip efficiency
- Low $/kWh cost of lifetime energy
  - Low cost battery solution
  - Less parts and components
  - Long system lifetime
- Optimal kWh reserve for battery
What is StorEdge™?
Each panel is connected to a power optimizer to maximize energy harvest
- String Voltage is fixed
- SolarEdge inverter converts DC to AC
- SafeDC™ with module-level shutdown
- Cost efficient maintenance with module-level monitoring
SolarEdge StorEdge™ Solution

- All-in-one solution uses a single DC optimized inverter to manage and monitor both PV generation and energy storage
- Designed with SafeDC™ for battery shutdown
- Battery and PV monitoring
- Compatible with Tesla Powerwall
Storage Topologies

PV System → Battery

DC Sources

 Loads

AC Load / Source

Grid
Storage Topologies – AC Coupled

- Multiple conversions lead to high efficiency losses
SolarEdge StorEdge™ Solution

- String Voltage is fixed
- Direct DC Coupling for less conversion losses than AC Coupling
Best System Architecture

1. MORE Energy
2. SIMPLE Installation
3. Enhanced SAFETY
4. Full VISIBILITY
More Energy

- Power optimizers increase rooftop energy harvest
- PV power is stored directly in the battery
Simple design & installation

- A single inverter for PV, backup and on-grid applications
- Outdoor installation allows flexibility in battery location
- SafeDC integrated into power optimizers and battery
- No high voltage or current during installation and maintenance
Minimal Added Components

**Required:**
- Battery

**Application Specific:**
- Backup
  - Auto transformer
  - Backup load panel
  - Wiring of circuits
- Grid applications
- Meter

**Reduces:**
- Charge controllers
- Additional inverters
Enhanced Safety

- NEC 2014 690.12 Rapid Shutdown functionality
- Low current battery operation
Monitor battery status, PV production & self-consumption
What Can it Do?
**Backup Power**

**Grid is on**
Charge battery from solar power

**Backup loads** are powered by the PV system and the battery

**No Grid Electricity**
Backup loads are powered by the battery
Backup Power

- Automatically provides backup power in case of grid interruption
- Powers backup loads
- Auto transformer needed
Backup Power

Selecting backup loads

- Supports backup loads (*not* the full house)
- Homeowner determines backup loads
- Separate electrical panel required
- Requires home wiring work
- Backup load examples:
  - Refrigerator, microwave, lights, TV, router
  - Few AC outlets (for device charging)
- Total consumption of backed up loads: <5kW
Storage Applications

1. Power Backup

2. On-Grid Applications

No Grid Electricity

Important loads are powered by the PV system and the battery. Important loads are powered by the battery.

Excess energy

Supplied from storage battery

Morning, Noon, Evening

Consume PV energy
On Grid Applications

- Export limitations
  - Ensures no power is back-fed to grid beyond a set limit
  - Clipped excess power is stored automatically
- “Margin” metering (vs. “net” metering)
  - Utility pays less than retail for electricity exported
- Time of Use metering
  - Utility rates vary seasonally and during the day
- Peak shaving for demand charges
- Etc...

<table>
<thead>
<tr>
<th>0 kW AC</th>
<th>1.8 kW DC</th>
<th>0 kW AC</th>
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</thead>
<tbody>
<tr>
<td>1.8 kW DC</td>
<td>46% Discharging</td>
<td>1.8 kW DC</td>
</tr>
</tbody>
</table>
On Grid Applications

Normal PV Only Operation
- PV production serves loads in the home
- Excess production pushed to grid

What if there are Export Limits?
What if you have TOU metering or “margin metering”?

2.0 kW ac
3.3 kW ac
5.3 kW ac
On Grid Applications

StorEdge Operation

- Offers option to store energy vs. push to grid /curtail

- 0 kW ac
- 3.3 kW ac
- 2.0 kW ac
- 5.3 kW ac
- 46% Charging
On Grid Applications

- 4:00am Nighttime; no PV production
- Low utility rate: house powered by grid
On Grid Applications

- 7:30am Morning; low PV production; increased demand
- Part peak utility rate: house powered mostly by grid
On Grid Applications

- 12:00pm Noon; High PV production; low home demand
- Part peak utility rate: house powered by PV, excess PV stored
- Enables: Zero Net export
On Grid Applications

- 3:30pm Afternoon; Cloudy; high home demand
- Peak utility rate: house powered by PV and battery
- Enables: Zero grid draw

0 kW ac  3.5 kW ac  2.0 kW ac

Consumption  Production  Self Consumption

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On Grid Applications

- 8:00pm Night; No PV production; mid home demand
- Peak utility rate: house powered by battery
- Enables: Zero grid draw
StorEdge Market Impact

- One inverter that manages home energy, provides backup & manages all energy needs
- High efficiency enables cost effective on grid applications
- Low cost system reduces $/kWh
- Simple installation; flexible system runs many applications
Thank you

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