Energy storage kits for residential and commercial customers

Ken Hobbs
Technical Director, CCL Components

Dean Kalek
Technical Trainer, SMA Solar UK
Greater Independence

➢ “The electricity produced during the daytime can also be made available during the night.”

➢ “As the producer of your own energy, you become independent from price increases. You help to shape your own electricity price.”

➢ Independence that really pays off: “Once you factor in your grid feed-in profits, your bottom line will really benefit.”
Self-Consumption

“How much does electricity from your electric utility company currently cost? Why don’t you produce your own electricity at a lower cost?”

“Try to use as much energy you produce on your own for yourself. Take advantage of your system’s yield because it offers a huge savings potential.”

“The higher your self-sufficiency rate, the greater your financial benefits — and the more you can reduce the costs of purchasing electricity.”
Motivation: Grid Supply vs. PV Energy

- Electricity prices in UK have risen by an average of **30% in last 4 years**
- Energy consumption is steadily increasing
- PV system costs decreased by more than **50% in the last 3 years**

Already today, we see a significant cost advantage of PV generated energy in various markets – tendency growing. This advantage will be maximized by storage systems and energy management (EM).
Energy management in a typical household

20 – 30% self-consumption is possible without additional measures

+ 15% self-consumption with manual or automatic shifting of loads

+ 10% self-consumption with Sunny Boy Smart Energy and battery storage

Over 50% reduction in energy costs
Key Facts:

- PV inverter with integrated lithium-ion battery
- Designed for typical home installations
- 2 kWh usable capacity
- SB 3600/5000
HERE’S HOW IT WORKS
Outstanding System Efficiency in Power Conversion and Temporary Storage of Power in Excess of 94%

For example: Sunny day, 2 p.m., battery is empty

1. The inverter checks whether current is being consumed in the household
2. If current is being consumed, all household devices (e.g. light, dishwasher, TV) are supplied first
3. The battery is charged if no current is being consumed or more solar energy is being produced than is being consumed. This energy can be used later, when the solar energy does not cover the energy consumption
1. Once the battery is full and more energy is being produced than is being consumed, it is fed into the grid.
Simple Planning and Installation

- No separate design and installation of the battery system
- Component’s weight does not exceed 30 kg
- Easy transportation
- Easy wall mounting
Wall mounting in four steps
Wall Mounting In Four Steps
Wall Mounting In Four Steps

Suspension

Battery installation
Wall Mounting In Four Steps

Battery installation
Wall Mounting In Four Steps

DC and AC connection
Wall Mounting In Four Steps
Technical Information and Battery Details

- LG Chem delivers lithium-ion storage batteries in the form of a black box
  - Voltage range: 120–166 V\text{DC}
  - Usable capacity: 2 kWh (15 Ah)
  - Weight: 27.5 kg maximum
  - Service life: at least 7 years (to 80% SOH)
  - Life expectancy approx. 10 years (to 70% SOH)
  - Dimensions in mm: 650x350x200
  - 800 kWh throughput annually

- Integrated battery management system (BMS) for
  - Voltage monitoring at a cell level
  - Evaluation of current battery state
Smart Home — Load Control

Sunny Boy SE behavior

- The Sunny Boy SE will **not** access the utility grid to perform a float charge.

- The battery will be delivered at half capacity (voltage at delivery approx. 140 V) allowing it to be stored for several months on end without a loss in capacity.

- Since the battery only suffers minimal self discharge in a low state of charge (up to 5% possible), operation during winter months is less problematic than with lead-acid batteries.

- The ability to charge quickly (full charge possible in under two hours). Lead-acid batteries, on the other hand, can require several hours to charge.

- During transitional months (fewer hours of sun) there is a better chance of fully charging these batteries (more self-sufficient than lead-acid batteries)
## Sunny Boy Smart Energy Monitoring

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<td><img src="image2" alt="SMA Energy Meter" /></td>
<td><img src="image3" alt="Sunny Home Manager" /></td>
<td><img src="image4" alt="Sunny Portal" /></td>
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**Available features**

- The Sunny Boy SE receives necessary battery charge and discharge information via connection to energy meter.
- Monitoring information is sent directly to Sunny Portal via integrated Speedwire Webconnect communication (2 x RJ45 plugs) and Internet connection.
  - Standard Sunny Portal pages
  - Yields, power output, feed-in tariff and CO\(^2\)-avoidance
  - System logbook with recent events
  - Current system and operator data
  - Inverter comparison
  - Battery status display on a separate icon
  - Energy balance display
- Natural self-consumption with additional battery power without configurable optimization of self-consumption

The Sunny Boy SE can only be ordered together with a battery.
Sunny Boy Smart Energy Protection Classes

Battery part

Protection class IP 21

Protection against the intrusion of solid foreign bodies ≥ 12.5 mm in diameter. Protection against finger access to dangerous parts.

Protection against the intrusion of water (vertical drip) with damaging effects.

Inverter

Protection Class IP 54

Protection against dust intrusion. Protection against access to dangerous parts with a wire.

Protection against the intrusion of water (water jet).
The Sunny Boy Smart Energy is only suitable for operation indoors.

- Ambient temperature must be between 0°C and 40°C.
- Optimal ambient temperature for batteries (100% capacity): 15–30°C.

The Sunny Boy Smart Energy is not suitable for operation outdoors.

- Exterior walls, open basements, garages, attics, etc. are not suitable installation sites.
The proper combination of temperature range and installation site is required. The warranty will otherwise lose its validity.

SMA Solar Technology AG
Sunny Boy Smart Energy—Warranty

➤ Standard:
Full 5-year warranty for inverters
Full 5-year warranty for batteries

➤ Optional extended warranty:
Inverters 10 / 15 / 20 years *

➤ Customers will receive a new battery if their battery fails during the warranty period

*Inverter only
Sunny Boy Smart Energy

- **Easiest** battery system in the market due to time-saving wall mounting and integrated battery
- Best cost battery system with **economical** optimized battery size to increase self consumption
- Highest **safety** standards, with world leading manufacturer (LG Chem)
- Outstanding **efficiency** in power conversion and temporary storage of power

**Inverter with integrated energy storage solution in one enclosure**
Thank you for your attention

Dean Kalek
Energy Storage + Backup

Domestic and Small commercial

Ken Hobbs
CCL Components Ltd
QUESTION

Who has been asked by a customer for Backup or Self Consumption System?
Benefits

• Power Security
• Increased Self Consumption
• Insulation from rising Energy Costs
• Limited Grid Export areas

• Reduce Consumption
  – Seeing power usage causes most to reduce use.
**SMART ENERGY**

- 2kwh Lithium Ion
- NO BACKUP POWER
- Max PV size 6.6kw (SE5000)
- Single phase system

**SUNNY ISLAND**

- Retrofit to Existing Systems
- Backup Power on Grid Failure
- Selectable Battery Capacity
- Max PV Size 16kw*
- Single or 3 phase possible.
- Scalable up to 12 Sunny Islands*
Components

- Sunny Island
- Battery Bank
- Switch Box (for backup systems)
- Home Manager Communications
Why SMA over others

- Proven reliability
  - Grid Parallel design
  - Proven technology from Off Grid applications
  - Proven Battery management.
- G59 certification for Sunny Island.
- Switching only when grid fails.
  - Reduced switching for higher reliability.
I agree with you it sounds like a grid connected inverter – and therefore yes it should be certified

If the manufacturer has updated the software and this update now allows export of power to the grid then that product and its protection will need to comply with either G83 or G59. The DNO will expect to see the relevant type test certification before allowing connection to the grid.

ENA - Energy Networks Association
How it sticks together
Single Phase Install
Battery Options

- VRLA / FLA / NiCad
- Lithium Ion
How Much can I save?

• It depends!
  – PV Size
  – Usable Battery Capacity
  – Load Profile / Usage Patterns

• Be wary of over exaggerated claims.
  – 20% self consumption typical with NO storage.
  – 50-60% self consumption typically achievable.
PV Size + Battery Sizing

Influence of battery and solar capacity on the autarky degree

- Usable battery capacity in kWh
- PV-capacity in kWP

- 10%
- 20%
- 30%
- 40%
- 50%
- 60%
- 70%

Source: Weger, Tietjen, Quackbold, HTW Berlin
PV Size + Battery Sizing

Which autarky degree can be reached?

Useable battery capacity
- 6 kWh
- 8 kWh
- 10 kWh

Autarky degree vs. PV-capacity in kWp
Target Customers

• Domestic installs 3kw and above
  – 4kw + main target
  – Less than 3kw ROI just doesn’t work
  – Last gasp high FITs rate installs...

• Commercial Customers
  – Larger battery storage can also provide backup.
  – Single or 3 phase systems. Up to 100kw*
  – Remember this is NOT a UPS.
Small Scale Storage
System Cost 21p FITs
Monitoring

Graph showing consumption and generation over time.

**Consumption**
- External energy supply: 7.12 kWh
- Battery discharging: 3.80 kWh
- Direct consumption: 7.18 kWh
- Battery charging: 5.00 kWh
- Grid feed-in: 3.40 kWh

**Generation**
Consumption

Energy balance

Austwick Cook
Lancaster, United Kingdom

Yearly consumption:
- Total yield year: 492,179 kWh
- Grid feed-in: 107,635 kWh
- Self-consumption: 384,544 kWh
- Purchased electricity: 408,069 kWh
- Annual yield: 792,813 kWh
- Self-consumption rate: 78%
CCL Components Ltd

dcpower@cclcomponents.com

Tel: 0845 092 0104
Large Scale Storage