

Segen Storage Guide **For installers**

Need Reliability?

The solution is...

solis

inverters



Solis Inverters provide two solutions for your residential storage requirements. Installers familiar with Solis's broad range of string inverters will find moving into storage seamless with both the RHI and RAI solutions.

- **Solis RHI Hybrid Inverter:**
Dual MPPT Hybrid Inverter,
3/3.6/4.6/5kW, Off-Grid, Backup
- **Solis RAI AC Coupled**
AC Coupled Charge Controller,
3kW, Quick and Easy Install
- **Battery Compatibility - Pylon Tech / BYD**
- **APP/Webportal - Remote Upgrade/Monitoring**



Contact us today

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Welcome

Battery storage is key to the future of PV – and as always, we are here to help.

Throughout this document you will be guided through everything you need to know, including:

- Why sell storage?
- Types of storage system
- Battery sizing
- Transport and storage
- Compatibility

There is also an overview of the Segen storage portfolio, available now [on the portal](#), including exclusive packages.

Before you get going – we would recommend you review the following documents:

- [Pre-sale Checklist](#) (P.25)
- [Grid Connection Requirements](#) (P.26)
- Review the IET Cod of Practice for [Electrical Storage Systems](#)
- EREC Compliance Requirements [G98 / G99](#)

Should you have any questions, please don't hesitate to contact your account manager who will be happy to help.

Andy Pegg
CEO

Why Sell Storage Solutions?

Customers are becoming more aware of their energy costs and are looking at cost-effective solutions to not only make savings but to minimise their reliance on the grid.

Solar storage benefits include

Power when you need it – make sure the energy they generate is the energy they use. A battery will store energy the PV system generates throughout the day, for use when they get home from work or once the sun's gone down.

Energy security – ensures they still have access to electricity even if the grid is down.

Lower energy bills – timely use of PV generate energy means homes will be drawing less electricity from the grid, protecting them from rising energy prices.

Environmental – energy generated using photovoltaic technology creates less pollution than fossil fuels during their comparative lifetime uses.

Visibility – energy consumption monitoring allows end users to see where and how much they could save.

Future proofing – as we start to see the introduction of electric vehicles, future proof your home to ensure its ready to cope with new technologies.





**RELIABILITY
CREATES VALUE**



With the ADVANTAGE of vertical industrial chain from lithium cells to modules integration with its own BMS Technology, Pylontech has been delivering LFP battery over 6 years for Residential, Commercial and Industrial ESS application.

 **DIY your systems flexibly with Pylontech modules.**

Types of Storage System – DC Coupled

DC coupled storage is connected to the DC side of a PV system, directly between the PV modules and the inverter's DC input. These types of systems monitor energy levels within the household and will use any surplus energy to recharge the batteries during the day and discharge them during periods when energy consumption levels are higher than energy production levels.

When planning a DC coupled storage system extra care should be taken to ensure the storage inverter and the PV inverter are suitable to be installed together.

A normal string-connected storage inverter would not be suitable for use with a SolarEdge PV inverter for example, as this would cause issues with the optimiser technology.

Only SolarEdge's StorEdge Interface would be compatible, which could then in turn be connected to an LG Chem battery.

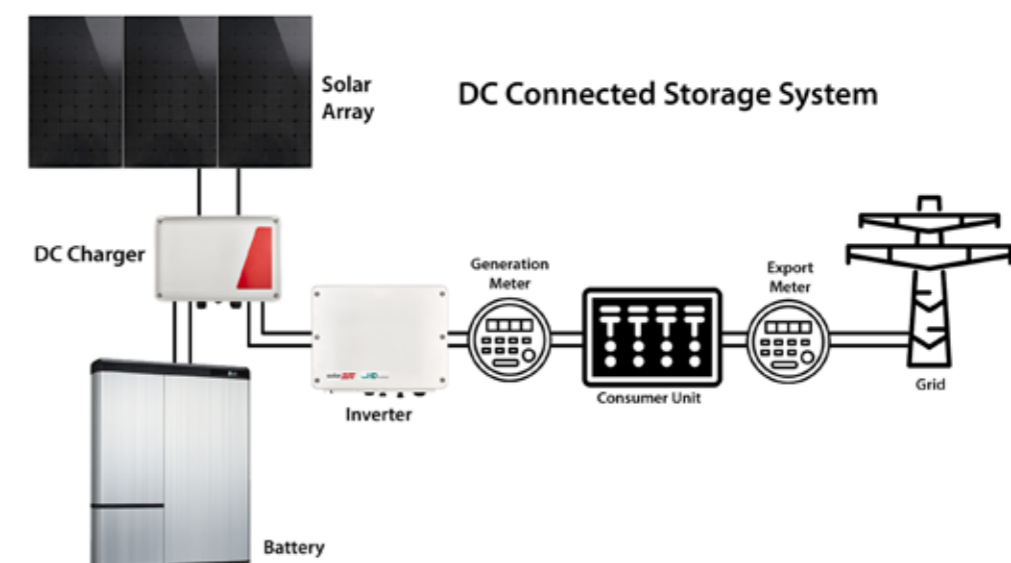
Manufacturer compatibility documents can always be checked to ensure suitability between PV inverters, storage inverters and batteries.

Due to the reliance of DC coupled storage on

surplus PV generation being available to charge the batteries, it's crucial that the process of sizing the battery is undertaken carefully, and with the specific properties electrical loads and usage profile taken into consideration.

During Winter when production falls, oversized DC coupled batteries can be at risk of remaining at low charge for extended periods of time and this can lead to degradation of the cells and a reduction in efficiency and longevity – reinforcing why it's vital to take appropriate care during the planning process.

Even small batteries can remain uncharged on large PV systems if the consumption levels remain consistently higher than production levels throughout the day.



Types of Storage System – AC Coupled

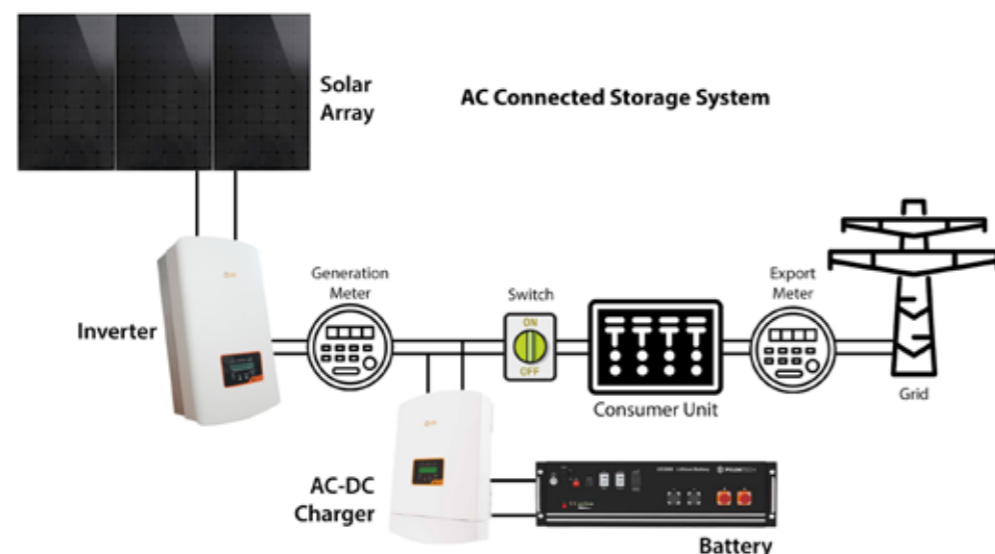
An AC coupled storage system still requires a DC battery, but this battery is located on the AC side of the property. In this set-up a battery will be connected to an AC coupled inverter, which acts in reverse of a normal PV inverter, converting AC to DC so that it can be stored by the battery. AC energy can be supplied from the grid or from an existing PV inverter on the property, depending on what mode of operation the system is running in.

Energy is subject to conversion losses during the charge and discharge process, but these losses are minimal, only working out at around 5-7% more than their DC coupled counterparts. Despite the higher losses AC coupled storage systems are still very popular due to the flexibility they grant installers and end users when it comes to the planning, installation and operation of their storage systems.

For example, when proposing DC coupled storage you should remember this must be connected to the PV inverter's DC strings. If the existing PV inverter has been installed in a loft, this environment will likely be unsuitable for a storage system whether that be due to space, temperature or ventilation. AC coupled storage on the other hand does not need to be connected on the DC circuit between inverter and panels so suffers from no such restrictions.

The fact that an AC coupled storage system can be charged completely with energy supplied by the grid means that the property doesn't even need a PV system. This in turn provides far greater freedom when it comes to sizing batteries for the property, as you are no longer limited by sizing in line with surplus PV energy. Because no PV system is needed in the first place, it is irrelevant as to what is installed on the DC side as compatibility does not need to exist between the PV inverter and the AC storage inverter.

Unfortunately, this does come with a caveat, as the AC storage inverter is considered its own PPM (Power Park module) meaning that when installed in conjunction with an existing PV inverter, the net capacity of site includes the rated AC output of both units. This often pushes site capacity above 16A/3.68kW per phase and as a result requires the submission of a G99 application prior to installation.



Types of Storage System – Hybrid

We have discussed DC and AC coupled storage and their respective advantages and disadvantages, but to summarise:

	ADVANTAGES	DISADVANTAGES
DC	Often cheaper for small systems - equipment and install	Compatibility required between battery, string connected DC charger and PV inverter
	High efficiency	Potential storage capacity is restricted to volume of potential surplus PV energy
	Can avoid G98/G99 application process if rated AC output of existing system is unaffected	Must be installed on DC side of inverter - may be hard depending on location of existing inverter
AC	Can be charged with energy supplied by a local PV system(s) or the grid. Meaning greater flexibility when planning storage capacity.	Is considered an individual PPM and so permission must be sought from the DNO under the relevant classification depending on aggregate AC output of combined PPM's installed.
	More flexibility proposing location of storage system within the property	Can often be more expensive due to the requirement for the AC coupled inverter

Hybrid inverters combine many of the advantages offered by AC and DC coupled storage to offer a solution that is both flexible and cost-effective.

A Hybrid inverter is a PV inverter and battery charger rolled into one unit.

Batteries are still connected on the DC side but can be charged from the AC supply, this means there are fewer restrictions when it comes to battery sizing as there are when only working with surplus PV energy. Also, regardless of the battery capacity, your system size is determined by the rated AC output of your Hybrid inverter.

A good example would be the SolaX 10kW 3PH Hybrid inverter; When connected to a 3PH supply this inverter will push out just over 3.3kWh per phase, meaning that it can be connected under G98. However, you can connect up to 4 x 6.3kWh Triple Power SolaX batteries to that inverter for a total of 25kWh's storage capacity. And despite this capacity, the system will only need to be compliant to G98 because the rated AC output of the SolaX hybrid determines what can be exported back to the grid.

Combining this technology inside one machine reduces the cost of equipment and labour whilst speeding up the time it takes to install. As all the processing power is taking place inside one unit there is no need to worry about compatibility between equipment, which saves one more headache during the planning stage.

The big disadvantage of most Hybrid inverters is that they are first and primarily PV inverters and as such, require PV in order to energise and operate. Additionally, if there is an existing PV system on a property looking for storage, you may have difficulty attempting to justify the removal of a working PV inverter to replace it with an equivalent Hybrid. Which is why for existing systems it may be wise to consider a retrofit, for new storage enquiries a Hybrid solution offers the most advantages.

Battery Sizing Considerations

The choice of battery type and size is not a simple decision, there are many factors to consider. We always recommend that a comparison is made and a look at the total cost over the life of the system as simply choosing the lowest initial cost option in many cases can be more expensive over the life of the system.

This table describes some of the factors that must be considered when determining battery size:

Attribute	Comments																																																		
Essential Load Energy Usage	<p>For a grid-backup solution the most important thing to consider is the loads that need to be supported when the grid has failed. It is not generally practical to consider powering all the loads in the property, e.g. an electric oven will consume considerable amounts of electricity and would require a very large battery to run even for a short time. A good way to consider this is to generate a list of essential energy loads to be backed up and the amount of time they're needed in a typical day. An essential load is basically something energy must always be available for. This could be something normal like a freezer or burglar alarm, or something site specific like a fish tank. If no power was available, would it lead to loss of fish or just defrosted ice cream? In the UK, power cuts are relatively rare but for more remote locations or other countries it is definitely worth considering. A lot of loads won't require their maximum power all the time, so you can add a factor to take that into account. Once that's done, you'll have an accurate baseline of energy consumption and be able to consider the appropriate battery capacity.</p> <table border="1"> <thead> <tr> <th>Load</th> <th>Power (W)</th> <th>Time</th> <th>Factor</th> <th>Daily (Wh)</th> </tr> </thead> <tbody> <tr> <td>Lights</td> <td>200</td> <td>5</td> <td>1</td> <td>1000</td> </tr> <tr> <td>Fridge</td> <td>150</td> <td>24</td> <td>0.3</td> <td>1080</td> </tr> <tr> <td>Freezer</td> <td>150</td> <td>24</td> <td>0.2</td> <td>720</td> </tr> <tr> <td>Wi-Fi Router</td> <td>10</td> <td>24</td> <td>1</td> <td>240</td> </tr> <tr> <td>Phones</td> <td>50</td> <td>1</td> <td>1</td> <td>100</td> </tr> <tr> <td>Fish Tank</td> <td>30</td> <td>24</td> <td>1</td> <td>720</td> </tr> <tr> <td>TV</td> <td>170</td> <td>4</td> <td>1</td> <td>680</td> </tr> <tr> <td>Other</td> <td>100</td> <td>24</td> <td>1</td> <td>2400</td> </tr> <tr> <td>Total</td> <td></td> <td></td> <td></td> <td>7690</td> </tr> </tbody> </table>	Load	Power (W)	Time	Factor	Daily (Wh)	Lights	200	5	1	1000	Fridge	150	24	0.3	1080	Freezer	150	24	0.2	720	Wi-Fi Router	10	24	1	240	Phones	50	1	1	100	Fish Tank	30	24	1	720	TV	170	4	1	680	Other	100	24	1	2400	Total				7690
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Battery Operating Time	The next critical decision is to decide the number of hours that the system needs to power the essential loads for. Typically a failure due to a grid fault will typically last for between 1 and 24 hours. The decision on how many hours to allow for is largely driven by the budget available as the cost of the battery pack will be directly related to its size; and its size will be directly related to the number of hours chosen. Usually a system will be sized to support the essential loads for between 12 - 24 hours.																																																		
Space Available	Especially when choosing a lead-acid battery the space available to hold the installed battery and the strength of the floor may be a consideration that imposes a limit on the maximum size of the battery that can be installed. With a Li-Ion battery this is unlikely to be a major concern as a Li-Ion battery will be much smaller and lighter than a similar usable capacity of lead-acid battery.																																																		
Charging Time and Rate	The battery will be charged from the surplus energy available from the PV system, this is the difference between the energy generated by the solar PV system and that used by the loads during the daylight hours. It is therefore important to ensure that the battery can be fully recharged during a typical day of sunlight, especially in the winter months. A battery pack which is too large relative to the PV system will not get fully recharged and therefore not be fully available to provide power in the event of a grid failure.																																																		
Maximum Depth of Discharge	Each battery pack will have a recommended maximum depth of discharge, e.g. lead-acid might be 50% and Lithium Ion might be 90%. Having determined the total energy required to be generated from the battery pack with the equation: 'essential loads energy in 24 hours divided by 24 multiplied by the required battery operating time' then the gross battery capacity needs to be determined by dividing by the recommended DOD. E.g. 7,690Wh / 24 * 12 hours / 90% DOD = 4,27kWh.																																																		

Segen's Battery Sizing Tool

Calculating the amount of excess energy available for a battery storage system requires an analysis of the hourly energy generation throughout the year and the expected hourly energy usage of the property.

Segen provides a unique tool that assists in this process by allowing;

- Input of the system size.
- Input of a location near to the target property to enable detailed irradiance calculations.
- Selection of the property load profile from a set of pre-defined examples.

Simply fill in the requested fields and it will generate a detailed summary for the property (either on the page or in a convenient PDF format). There is a guide to using the Segen Battery Calculator on the portal - [download it here](#).



Segen's Battery Calculator tool

Table E - Surplus [Wh]

	01:00:00	02:00:00	03:00:00	04:00:00	05:00:00	06:00:00	07:00:00	08:00:00	09:00:00	10:00:00	11:00:00	12:00:00	13:00:00	14:00:00	15:00:00	16:00:00	17:00:00	18:00:00	19:00:00	20:00:00	21:00:00	22:00:00	23:00:00	24:00:00	Total
Jan																									17460.18
Feb																									17327.75
Mar																									16484.44
Apr																									15111.71
May																									13151.84
Jun																									10725.35
Jul																									7925.75
Aug																									5427.25
Sep																									3223.14
Oct																									1552.28
Nov																									50.77
Dec																									6

Table F - Deficit [Wh]

	01:00:00	02:00:00	03:00:00	04:00:00	05:00:00	06:00:00	07:00:00	08:00:00	09:00:00	10:00:00	11:00:00	12:00:00	13:00:00	14:00:00	15:00:00	16:00:00	17:00:00	18:00:00	19:00:00	20:00:00	21:00:00	22:00:00	23:00:00	24:00:00	Total
Jan																									-17460.18
Feb																									-17327.75
Mar																									-16484.44
Apr																									-15111.71
May																									-13151.84
Jun																									-10725.35
Jul																									-7925.75
Aug																									-5427.25
Sep																									-3223.14
Oct																									-1552.28
Nov																									-50.77
Dec																									-6

Table G - Battery Charge By Year (£)

	01:00:00	02:00:00	03:00:00	04:00:00	05:00:00	06:00:00	07:00:00	08:00:00	09:00:00	10:00:00	11:00:00	12:00:00	13:00:00	14:00:00	15:00:00	16:00:00	17:00:00	18:00:00	19:00:00	20:00:00	21:00:00	22:00:00	23:00:00	24:00:00	Total
Jan																									11260.18
Feb																									11027.75
Mar																									10184.44
Apr																									8811.71
May																									7051.84
Jun																									5295.35
Jul																									3495.75
Aug																									2127.25
Sep																									1273.14
Oct																									552.28
Nov																									15.77
Dec																									0

The tool will display the expected PV generation values for the chosen location. Table E (Surplus) and Table G (Battery Charge By Year) are particularly useful (shown above).

Battery Storage & Transport

Temperature

Batteries should be stored and transported in accordance with the temperature range as stated on the data sheet. Battery discharge is affected at different rates depending on temperature. Higher temperatures result in charge being lost rapidly.

Batteries should not be allowed to discharge beyond manufacturer specified limits during storage, considering this it is never advisable to leave batteries in storage for long periods of time. If batteries must be stored for extended periods, you can apply a force charge to keep them above the minimum stated cell voltage which will ensure the battery is ready to be installed when it arrives on site. Allowing batteries to remain undercharged for extended periods will cause degradation of the cells, which will lead to a reduction in the longevity of the unit and inevitably would invalidate the warranty if identified by the manufacturer.

The acceptable duration of which a battery can be left in storage will vary from manufacturer to manufacturer and battery model to battery model. You can often determine this from a label on the battery packaging which may state "Energise by". Alternatively, you can measure the cell voltage or consult the data sheet or seek advice.

Do not let the packaging get wet as this is a barrier for safe transport.

Insurance

The property owner will need to inform their Insurance provider of the products being installed.

The installer/distributor will need to inform their insurance company of the product, storage and distribution details as they are classed as dangerous goods.

There are many regulations which cover lithium metal batteries and lithium-ion batteries as they are covered under the heading Dangerous goods.

- The regulations are controlled by IATA for air, ADR for road and IMDG for sea.
- They are Class 9 dangerous goods and come under three headings:
- Batteries transported on their own UN3090 UN3480
- Batteries transported with equipment UN3091 UN UN3481
- Batteries contained in Equipment UN3091 UN3481

All goods must be considered dangerous even in small quantities and must be handled and labelled accordingly.

As the goods are hazardous goods you need to understand the regulations around how they are handled and what to do in an Emergency.

Fire fighting

There are many different ways to deal with lithium ion battery fires. Covering goods with Carbon dust in a circular motion and waiting for up to 2 days for them to go out is usual.

Pouring water over them can be dangerous as water and lithium can ignite.

DO NOT USE Halon as this causes lithium to ignite.

Up to 20% more energy with Jinko MX Module

Our smart modules are optimized at the cell-string level

Key Benefits of Jinko MX

PERFORMANCE	Module cell string optimization ↓ Higher energy harvest
RELIABILITY	Optimizer instead of bypass diodes ↓ Elimination of Hot-Spots
FLEXIBILITY	Increased string length, flexible tilts and orientations ↓ Easier design and maximized use of space
SIMPLICITY	No additional components or cabling for communication ↓ Compatibility with all main inverters and monitoring systems



Solis

Solis RHI Hybrid Inverter

The Solis RHI series is a range of hybrid inverters which works in a PV system with a battery to optimise self-consumption.

They have dual MPPT to make system design easier and help to mitigate negative effect of shading or support east-west orientation for example. The RHI series can offer backup for properties with unreliable mains electricity supplies. It works with PylonTech LV and BYD L3.5 lithium ion batteries and Segen can supply the RHI with batteries as a package.

The RHI series can offer off-grid backup with a fast response time for properties with unreliable mains electricity supplies

Available in 3kW, 3.6kW and 5kW

Key selling points:

- Dual MPPT
- Works on-grid and in backup
- G100 Export Limitation compliant



SOL-3.6K-RHI-48ES-DC

Solis RAI AC Coupled Inverter

The Solis RAI series is a charger inverter which can be added to any grid-tied PV system. Because it's AC coupled, it can be used to upgrade any existing PV system to battery storage and can even be used without PV as a battery backup system.

Advanced BMS optimises battery usage and lifespan.

IP65 outdoor rated, suitable for multiple installation environments.

Key selling points:

- Inverter independent
- Natural cooling means no fan noise
- Optional Stand-alone mode
- Competitively priced
- Based on 5th generation of Solis inverters



SOL-3.0K-RAI-48ES-5G-AC



SolarEdge

SolarEdge StorEdge Interface

The SolarEdge StorEdge interface brings battery storage to SolarEdge single phase inverters.

Designed for new StorEdge installations or to upgrade existing SolarEdge systems to the StorEdge on-grid solution. The StorEdge interface supports simple installation and connection of the high voltage storage battery (currently LG Chem RESU range of high voltage batteries, RESU7H and RESU10H) and SolarEdge energy meter to the SolarEdge inverter. It is suitable for indoor or outdoor installations and includes a 10-year standard warranty.

Key selling points:

- Integrates into existing SolarEdge systems
- Simple installation
- StorEdge/LG Chem battery packages (including disconnect switches, current transformers and energy meters) available on the portal



SE-STI-S4

SolarEdge StorEdge Hybrid Inverter

By combining a SolarEdge single phase PV inverter with a StorEdge STI DC interface, Segen offers a SolarEdge Hybrid inverter package which, together with LG Chem RESU Batteries, can be used on new installations that require storage.

Key selling points:

- HD Wave latest inverter technology
- Full SetApp software integration
- StorEdge/LG Chem battery packages available on the portal
- Perfect for new installations

Hybrid packages are currently available as 3680W, 4000W and 5000W.



SolarEdge StorEdge AC Coupled Inverter

Designed to upgrade existing installations of non-SolarEdge inverter or three-phase SolarEdge inverter. The SolarEdge AC coupled inverter handles battery charging only and doesn't work with power optimisers or as a standard solar inverter. Thanks to AC Coupling it's suitable for any existing PV system. Uses the StorEdge interface and LG RESU batteries. SetApp software package enables monitoring of battery status, PV inverter production and self-consumption.

Key selling points:

- Suitable for 3rd party PV inverter systems
- Suitable for 3phase systems
- Charging from grid compatible
- Quick commissioning through SetAPP



SE-5000H-APP-AC



SolaX

SolaX X1 Hybrid Inverter

X1-Hybrid is the third generation of SolaX storage inverters and offers grid backup, export control and advanced connectivity for grid trading applications.

High voltage battery compatibility reduced costs of cabling.
Works with 1 to 3 SolaX batteries (of the same capacity).

Key selling points:

- Available as a highly cost-effective package with SolaX batteries (see portal)
- 10 years warranty
- 3.0kW, 3.7kW and 5.0kW options
- SolaX Cloud online monitoring platform compatible
- Export limitation built in
- Emergency Power Supply built in



X1-3700T

SolaX X1-AC/X1-Fit AC Coupled Inverter

Upgrade any PV system with the addition of a SolaX AC coupled inverter charger.

Works with 1 to 3 SolaX batteries per BMS (of the same capacity). Suitable for grid trading applications.

Key selling points:

- Available as a highly cost-effective package with SolaX batteries (see portal)
- Existing inverter independent
- SolaX Cloud online monitoring platform compatible
- 10 years warranty
- 3.0kW, 3.6kW and 5.0kW options



X1-FIT-5.0

X1-AC-3.6



SolaX cont.

SolaX X3 Three-Phase Hybrid

The X-Hybrid three-phase inverter from SolaX offers a flexible and scalable solution for both domestic and commercial applications. The three-phase series includes inverters ranging in size from 5 to 10kW, and the ability to install multiple inverters in parallel allow for scalable battery storage systems to be designed. The inverter is equipped with a built-in EPS (Emergency Power Supply), has multiple communication options and can be controlled remotely.

X3 Hybrid is supports unbalanced phase loads.
And is suitable for grid trading applications.

Key selling points:

- Up to 25.2kWh storage per inverter
- Up to 10kW Max charge/discharge
- G100 Export Limitation compliant
- 5.0kW, 6.0kW, 8.0kW, 10.0kW options



X3-8000T

SolaX Batteries

SolaX's Gen2 triple power HV batteries are designed to work with SolaX's one- and three-phase hybrid and AC coupled inverters (X1-Hybrid, X3-Hybrid, X1-AC and X1-Fit). They are available in 4.5kWh and 6.3kWh. Sizes cannot be mixed, and 1-3 batteries can be used in a single-phase system and 2-4 in a three-phase system.

Each system requires one master control BMS.

Key selling points:

- Scalable to 25.2kWh
- Up to 6kW charge/discharge
- Floor and wall mountable
- High Voltage - so thinner cables can be used
- Easy installation – plug and play with all cables supplied



SOLAX-T45-G2-BMS

Battery Size	4500Wh	6300Wh
DoD	90%	
Usable Capacity	4050Wh	5670Wh
Discharge Current	30A Max	
Number of Cycles	6000	6000
Cycle Efficiency	95%	
Weight (BMS = 5.7kg)	56.6kg	67.5kg
Warranty	5 years, extendable to 10 years	

PylonTech

Pylon Lithium Iron Phosphate Batteries

A range of low voltage Home Energy Storage Systems containing lithium iron phosphate cells and battery management control system

Available in 2.4kWh (US2000) 3kWh (US3000) modules. Multiple batteries can be combined in parallel to expand capacity as required.

BMS monitors temperature current, voltage, SoC and SoH. Safety approved to TÜV CE UN38.3.

Key selling points:

- Competitive pricing
- Cycle life of 6000 cycles / 7 years standard warranty
- Compatible with many hybrid and AC coupled inverters - [see page 22](#)
- Available in cost effective packages with many inverters on the Segen portal

	US2000	US3000
Battery Size	2400Wh	3552Wh
DoD	90%	
Usable Capacity	2,200Wh	3,200Wh
Discharge Current Rec/Max	25A/50A	37A/74A
Number of Cycles	6000	
Weight	24kg	32kg
Life Expectancy	15 years	
Warranty	7 years, extendable to 10 years	



US2000B-PLUS

Pylon Force-L2 Low Voltage Batteries (NEW)

A new low voltage Lithium-Ion Phosphate battery storage system designed for high power storage in limited installation space. The Force-L2 features a built-in Battery Management System (BMS) which manages cell voltage, current and temperature. It also balances cell charging and discharging, extending the battery life.

Multiple cells can be connected in parallel to extend capacity depending on the level of storage required.

Key selling points:

- Consumer-friendly modules featuring no connecting cables and no exposed connectors
- IP55 rated for indoor or outdoor installation
- Non-toxic materials throughout, environmentally friendly
- Silent operation
- 2 to 4 cell options available as packages on the Segen portal



PYL-L2-BMU-BASE-L14.21



BYD

BYD Low Voltage Batteries

A lithium battery system with a battery control unit (BCU) for usage with an external inverter.

Key selling points:

- Modular design with no cables inside
- Up to 4 batteries per BCU can be used in parallel, in 3.5kWh steps to a maximum of 42.0kWh
- 100% DOD

Battery Size	3,500Wh
Nominal Voltage	51V
Depth of Discharge	100%
Usable Capacity	3,500Wh
Discharge Max	5.0kW, 10s
Cycle Efficiency	95.3%
Weight	65kg
Warranty	10 years



BYD-BAT-BOX-L3.5

BYD High Voltage Batteries

A high voltage system operating with 5 to 9 battery modules to provide up to 11.52kWh usable storage capacity.

Key selling points:

- Modular design with no cables inside
- True High Voltage design for quieter operation
- 100% DOD
- High Output Power

Battery Size	5 modules = 6,400Wh	9 modules = 11,520Wh
Nominal Voltage	256V	460V
DoD	100%	
Usable Capacity	6,400Wh	11,520Wh
Discharge Max	12.80kW, 5 mins	23.04kW, 5 mins
Cycle Efficiency	95.3%	
Weight	148kg	252kg
Warranty	10 years	



BYD-B-BOX-H11.5



Enphase

Enphase AC Battery

Enphase's ACB1.5 is an AC battery which, due to its relatively low weight and size, can be easily installed to the household's AC wiring. It contains Enphase's microinverter technology to convert between AC and DC internally which offers added safety and efficiency to the installer and system owner.

Lithium ferrous phosphate chemistry ensures long cycle life. The internal BMS monitors cell packs to optimise reliability and efficiency. TimeOfUse optimised for cost effective grid charging.

Key selling points:

- Easily expandable
- Quick to install
- AC coupled for increased compatibility
- Safety tested and certified by TÜV Rheinland

Battery Size	1200Wh
Depth of Discharge	100%
Usable Capacity	1200Wh
Discharge Current	270W max
Number of Cycles	3650
Cycle Efficiency	>92%
Weight	23kg
Warranty	10 years



EN-STORAGE-AC-1.2-V2



LG Chem

LG Chem Low Voltage Batteries

Low voltage battery packs designed for photovoltaic systems from well known domestic brand.

Key selling points:

- 3.3kW, 6.5kW and 10kW size batteries available.
- Can be cross connected using RESU Plus for greater storage capacity.
- Wall or floor mountable
- Battery safety proven in automotive industry

	RESU 3.3	RESU 6.5	RESU 10
Battery Size	3,300Wh	6,500Wh	9,800Wh
Depth of Discharge	90%		
Usable Capacity	2,900Wh	5,900Wh	8,800Wh
Nominal Voltage	51.8V		
Discharge Current	71.4A	100A	119A
Cycle Efficiency	>95%		
Weight	31kg	52kg	75kg
Life Expectancy	>10 years		
Warranty	10 years		



RESU3.3

LG Chem High Voltage Batteries

High voltage battery packs from well known domestic brand, featuring high energy density and operating at 400V DC.

- High voltage means low current and thinner cables
- Floor standing design
- IP55 certified, can be installed in a sheltered outdoor environment
- Two types compatible with different inverter brands



RESU10H-R



















	RESU7H-C	RESU7H-R	RESU10H-C	RESU10H-R
Communication Interface	CAN (SMA)	RS485 (SolarEdge)	n/a	
Battery Size	7000Wh		9800Wh	
DoD	95%			
Usable Capacity	6600Wh		9300Wh	
Discharge Current	8.1A		11.7A	
Weight	87kg	75kg	99.8kg	97kg
Warranty	10 years			



Compatibility Chart

The chart below states battery and battery controller/inverter compatibility for the Segen portfolio.

What does it work with?

LG Chem LV			Goodwe GW3600S
LG Chem HV			SMA SB Storage
			SolarEdge Storage
BYD LV			Solis Hybrid
BYD HV			SMA SB Storage
PylonTech US2000B			Solis Hybrid
			Solis AC Coupled
PylonTech US3000			Solis Hybrid
			Solis AC Coupled
SolaX Triple Power			SolaX X3 Hybrid
			SolaX X1 AC Coupled
			SolaX X1 Hybrid

Segen Storage Packages

All battery storage systems require a number of different components to fully function and, to make these easier to configure and purchase, Segen has defined a number of packages ranging in system type and size.

Grid Backup Packages

All these packages are capable of providing energy to defined essential loads in the property in the event of a grid-failure. Segen have created packages in a range of sizes to suit customer requirements.

These packages are made up of the following:

- Solis & SolaX Hybrid Inverters
- SolaX AC-FIT Coupled
- Solis AC Coupled Battery Charger / Inverter
- PylonTech, SolaX, LG Chem & BYD batteries

In order to locate these packages on the [Segen Portal](#), select "Products" from the top bar menu and select "Storage Systems". You can then select "[Grid Backup Packages](#)" from the menu.

 <p>SolaX SolaX X1 RetroFit AC Coupled 5.0kW with 4.5kWh battery and Meter package</p> <p>8 Due: 11 Oct 2019 8 Due: 11 Oct 2019</p>	 <p>SolaX SolaX Hybrid X1-3.0kW with 4.5kWh Battery and Meter package</p> <p>4 in Stock 8 Due: 18 Sep 2019</p>	 <p>SolaX SolaX Hybrid X1-3.0kW with 4.5kWh battery and Meter package</p> <p>4 in Stock 8 Due: 16 Sep 2019</p>	 <p>Solis 5.0kW Storage Hybrid / Pylon 4.8kWh Package</p> <p>2 in Stock 11 Due: 11 Sep 2019</p>
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Self-Consumption Packages

These packages enable the property to utilise a greater proportion of the energy generated by the PV system but do not operate in the event of a grid-failure.

These packages are made up of the following:

- Enphase AC Batteries
- LG Chem Batteries
- SolarEdge AC Coupled Charger / Inverters

In order to locate these packages on the Segen Portal, select "Products" from the top bar menu and select "Storage Systems". You can then select "[Self Consumption Packages](#)" from the menu.

Enphase Residential Storage System



Enabling energy independence for your home



Reliable

- Distributed AC architecture with no single point of failure
- Proven reliability with 21+ million microinverters installed worldwide
- No moving parts



Smart

- Remote firmware upgrades to both inverter and battery
- Monitor the battery status, PV production, and consumption data
- Smarter energy consumption to reduce electricity bills
- Remote diagnostics



Scalable

- Plug and play installation
- Interconnects with standard household AC wiring
- Modular 1.2 kWh capacity at 100% depth of discharge (DoD)



Safe

- No high voltage DC in system
- LFP chemistry (safest) with 10 years warranty or 3650 cycles
- Cells safety tested by TÜV Rheinland

Store now to use later

Our high-performance AC Battery brings you more intelligence and best life time value.



Size Doesn't matter

Our batteries come in 1.2 kWh size. So you can easily add more storage as and when you need it.



enphase.com/en-uk



Pre-sale Checklist

When planning a storage proposal there are a few things that you can take into consideration which will help you and the customer decide on the suitability of storage for the site, what type of storage system would most closely reflect their energy requirements and what storage capacity they would be able to effectively utilise.

1. Is there an existing PV system installed on the property already? If yes, does this system generate enough surplus energy throughout the day to charge the battery? The answer to this would affect the viability of DC coupled storage, which can only charge from surplus PV energy. For example, there may be more scope for storage on a 5kW PV system with low usage than a 20kW PV system with very high usage, because the 5kW system produces more surplus energy in comparison to the 20kW, resulting in more surplus energy available to be captured.

2. Can the customer provide details of their energy usage or does the existing inverter on site capture export data? Consumption and Production data at this stage of the planning process is invaluable.

3. Is the proposed location of the installation suitable? Is the property itself accessible and is the proposed location within the property accessible? It is important to install in line with the IEC code of practice and we know many systems feature inverters installed in lofts, however this does not mean the same protocol should be followed when connecting storage. If the battery is in the loft and is only accessible through a step ladder, this would not be considered accessible and could be considered dangerous.

4. Does the property have an internet connection for the system to allow monitoring and to enable to full manufacturer warranty where applicable?

5. Is the existing inverter compatible with the new storage system? Is a firmware or hardware upgrade required? Or do you have to consider looking at AC storage?

6. If the rated AC output of the system changes with the addition of storage, has permission been sought from the DNO beforehand? Do the products have the necessary certification to be connected in line with current UK regulations and has the homeowner been advised to notify their building and contents insurance companies?

7. What is the usage profile/occupation status of the property? Is this occupied year-round? A property with a UK average profile (Parents at work & kids at school throughout day – period when generation is highest) will benefit the most from a system that promotes self-consumption. A holiday home out in the countryside which is only occupied for parts of the year would benefit more from a battery backup system for example.

8. If the proposal is for a grid-backup system, has the customer been made aware of what loads and for how long they would be able to power these in the event of the power cut? Additionally has it been made clear to the system owner that the system would only provide backup power if there was remaining capacity within the battery – so if the power cut happened at 9PM at night after the batteries have already discharged, they will not be able to provide backup.

9. Is there a fire alarm within close proximity to the storage system.

10. Have the storage figures provided to the homeowner taken into account the efficiency of the system as well as the degradation factor over system lifetime?

Grid Connection Requirements

The following DNO rules apply when connecting battery storage to the grid:

1. If you add an AC coupled storage inverter to a property, and the combined rating of any existing PV inverter and the new storage inverter exceeds 16A per phase, you will need to make a G99 grid connection application prior to the installation.
2. If the AC coupled inverter has a rating of less than 16A per phase it will need a G98 certificate
3. You do not need to notify the DNO when adding DC coupled storage that doesn't change the AC rating connected to the grid.

Find out more here - www.energynetworks.org/electricity/engineering/distributed-generation/dg-connection-guides.html

Contact Us

Contacting Segen

As an active customer, you not only have access to the [Segen Portal](#), but you also have support from a dedicated account manager, order processor and technical advisor.

If you want to talk about the portfolio on offer, or if you need portal or ordering support please contact your Account Manager.

If you have placed an order and have a query about it, please contact your Order Processor.

If you require advanced technical advice, please contact your Technical Contact.

Contact details for your contacts can be found on the [Segen Portal](#)

If you do not yet have an account with us, please email info@segen.co.uk and a member of staff will be in touch to help you set up your account.

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