Spirit Energy Battery Storage Systems [Domestic Single Phase (230V) and Three Phase (400V)] - *Sept 2023 v3*

Rough Cost, Use, Components and Sizing						
	Tesla Powerwall 2	**Tesla Powerwall 3**	**MyEnergi libbi**	**GivEnergy Modular**	**GivEnergy All in One**	**Victron + BYD/Pylontech**
Rough Installed Cost (ex VAT) VAT is 0% if installed domestically with solar panels, 20% otherwise	**£ 7350 + VAT** £544 per kWh storage **~ 16p per kWh storage 'slot'**	**TBC** - Not yet announced, we predict £12,000 - £15,000	3.6kW / 5kWh: **£ 6500 + VAT** 5kW / 20kWh: **£ 14500 + VAT** from £788 per kWh storage **from 9p per kWh storage 'slot'**	HY5.2 +9.2kWh: **£6600 + VAT** AC3.0 +5.2kWh: **£ 4750 + VAT** HY5 +19kWh: **£ 9600 + VAT** from £632 per kWh storage **from 9p per kWh storage 'slot'**	**£ 7800 + VAT** from £424 per kWh storage **from 9p per kWh storage 'slot'**	Varies: e..g. Quattro 8000 + 15.4kWh BYD: **£ 14000 + VAT** from £909 per kWh storage **from 9p per kWh storage 'slot'**
Chemistry[(1)] **Typical number of lifecycles for this chemistry**	Lithium Manganese Cobalt ~ 4,500	**TBC**	Lithium Ferro Phosphate ~ 6,000 – 10,000	Lithium Ferro Phosphate ~ 6,000 – 10,000	Lithium Ferro Phosphate ~ 6,000 – 10,000	Lithium Ferro Phosphate ~ 6,000 – 10,000
Back-Up Capability[(2)] *(for a standard 230V grid connection)*	**'Whole house backup or emergency loads**; solar works in a power cut.	**'Whole house backup or emergency loads;** solar works in a power cut.	**Emergency loads backup only** *(optional extra to price shown).*	**Emergency loads backup only** *(optional extra to price shown).*	**'Whole house backup or emergency loads;** solar works in a power cut.	**'Whole house backup or emergency loads;** solar works in a power cut.
Use Case[(3)] AC coupled: add storage to an existing PV system?	Yes	Yes	Yes	Yes *(use GIV-AC3.0)*	Yes	Yes

DC coupled: install storage and solar using the same inverter for battery and PV? Mix DC coupled and AC coupled?	No No	No **TBC**	Yes Yes	Yes *(use GIV-HY)* No	No No	Yes Yes
System Accepts Generator Connection?	No	**TBC** – (unlikely)	No	No	No	Yes – *Quattro allows for grid and / or generator plus battery*
Size Per Unit Max AC Output Power ***(sizes are per unit - see below for units per phase)***	3.68kW / 5.0kW[4]	11.5kW - *Specifics unknown*	3.68kW / 5.0kW[4]	AC Coupled: 3.0kW[5] DC Coupled: 3.0kW[5] / 5.0kW	6.0kW	Various units, from 3.0kW to 12.0kW
Battery capacity Per Unit *Note the most useful capacity is usable capacity (nominal x 80% - 90% depth of discharge = DofD x Nominal*	Usable: 13.5kWh	Usable: 13.5kWh	Nominal: Choice of 5kWh / 10 kWh/ 15 kWh / 20 kWh Depth of discharge: 90% Usable: Choice of 4.5kWh / 9kWh / 13.5kWh / 18kWh	Nominal: Choice of 2.6kWh / 5.3kWh / 9.5kWh Depth of discharge: 80% Usable: Choice of 2.1kWh / 4.2 kWh / 7.6 kWh	Usable: 13.5kWh	Choice of: **BYD**: 15.4kWh battery (usable capacity 15.36kWh). **Pylontech**: offers a range, typical usable capacity being circa 2.1kWh.
Max No of Units per Phase *(Most domestic properties*	**Up to three:** allows 40kWh storage	**Up to 40.5kWh**	**One:** allows 20kWh storage capacity, with 5.0kW power.	**One inverter, up to 5 batteries:** allows up to 38kWh	**Up to three:** allows 40kWh storage capacity.	**Up to six inverters:** system design allows up to

have one phase - 230V).	capacity with 15kW power.			storage capacity, with 5kW power		~ 90kWh storage capacity, 30kW power.

(1) Lithium ferro phosphate is a superior chemistry to lithium manganese cobalt for two reasons:
a) It offers many more lifecycles (one lifecycle being a round-trip in and out of a kWh) – i.e. many more storage slots. Typically 6,000 – 10,000 lifecycles for lithium ferro phosphate, compared to 4,500 for lithium manganese cobalt.
b) There are reports of possible child labour issues associated with cobalt mining. Therefore lithium ferro phosphate is generally preferred.

(2) Emergency Loads require a second distribution board separating emergency loads from non-emergency loads. Whole House does not require this; however in a power-cut usage will be limited to the power output of the storage system. Setting up a second distribution board with loads that will function in a power cut is best practice (and good discipline!) but the additional electrical work does increase upfront cost.

(3) Solar PV panels generate DC electricity, and batteries charge and discharge with a DC current. DC coupled storage systems allow you to combine the solar PV and battery storage into one inverter; AC coupled storage systems do not. DC coupled systems are ideal for new or extension PV installs. They are most efficient, keeping AC/DC conversion losses to a minimum, and they also reduce the upfront system cost and the on-going maintenance cost. AC coupled storage systems are best used when retro-fitting storage to an existing solar system. Flexible (AC and DC Coupled options) systems allow for both AC and DC coupled solar. They offer the best of both worlds.

(4) 5kW can be limited to 3.6kW if required by DNO operator (SSE etc),

(5) Reduced to 2.5kW for emergency loads in a power-cut. Further limited in a power cut to 1.3kW with 2.6kWh battery.

Normal Operating Modes / Functionality in a power cut (Islanded Mode)						
	Tesla Powerwall 2	**Tesla Powerwall 3**	**MyEnergi libbi**	**GivEnergy Modular**	**GivEnergy All in One**	**Victron + BYD/Pylontech**
Normal Operating Modes **- Self-Consumption**	Yes	Yes	Yes	Yes	Yes	Yes

- Timed (grid) charge / discharge **- Reserve specified % for back-up**	Yes Yes	Yes Yes	Yes No	Yes Yes	Yes Yes	Yes Yes
Scope of Back-Up[2]	Total flexibility: Whole House or Emergency Loads	Total flexibility: Whole House or Emergency Loads	Emergency Loads Only - but as an Optional Extra (non-standard).	Emergency Loads Only (up to 2.5 kW – See [5] above)	Total flexibility: Whole House or Emergency Loads	Total flexibility: Whole House or Emergency Loads
Does the system provide an uninterrupted power supply (UPS)?	No	**TBC**	No	No	Yes – 20 milliseconds	Yes – 20 milliseconds
Will the Solar PV work in a power cut?	Yes	Yes	No	Giv-AC 3.0: No Giv-Hy: only if the inverter sees a minimum load of 50W via the emergency power supply.	Yes	Yes
Max Solar PV system that can be installed to operate in a power cut	7 kWp (more solar can be connected 'upstream')	13.8kWp	N/A	N/A	7.2kWp	The 1:1 Rule applies (similar to Powerwall). Same size PV system as inverter rating.

Operating modes, functionality, and warranty						
	Tesla Powerwall 2	**Tesla Powerwall 3**	**MyEnergi libbi**	**GivEnergy Modular**	**GivEnergy All in One**	**Victron + BYD/Pylontech**
Monitoring	Tesla APP	Tesla APP	Monitoring portal and APP	Monitoring portal and APP	Monitoring portal and APP	Monitoring portal, APP and local touch screen.
Internal or External installation?	Either	Either	Inverter / battery: either, but not in loft. Controller: must be indoors.	Either (although install canopy over the inverter outside to avoid direct sunlight or rainfall).	Either	Indoors, with batteries close to inverter-charger to minimise dc cable run.
Wall-mounted or floor-mounted?	Either Stacking kit available for multiple Powerwalls	Either Stacked up to 40.5kWh - Specifics of stacking unknown	Either	Wall-mount the inverter, batteries can be floor-standing indoors or wall-mounted indoors and outdoors.	Either	Inverter-charger is wall mounted, batteries are floor-standing.
Warranty	10 year defects. 80% storage capacity retained after 10 years.	10 year defects. 80% storage capacity retained after 10 years.	Inverter/charger and controller: 5 years Battery: 10 years with unlimited cycles within that time as long as MyEnergi controller is in use.	Inverter: 5 years Battery: 70% storage capacity retained after 10 years, or (smaller batteries only) 5000 full cycles at 90% DOD, 5000 lifecycles,	12 Years	Inverter: 5 years Battery: **BYD** – 60% storage capacity retained after 10 years **Pylontech** – 10 year 'time value replacement' guarantee, meaning the 'time

				whichever comes first.		value' of the batteries is replaced based on linear depreciation over 10 years.

Three phase (400V) grid connections						
	Tesla Powerwall 2	**Tesla Powerwall 3**	**MyEnergi libbi**	**GivEnergy Modular**	**GivEnergy All in One**	**Victron + BYD/Pylontech**
Can the system be installed on a three phase connection?	Yes, up to three Powerwalls per phase. Note that ONLY one phase will work in a power cut.	**TBC**	Not recommended. But is technically possible, up to three libbi's per phase.	Not recommended. Use GivPCS-30, GivPCS-50, GivPCS-100 instead (GivEnergy's three phase systems).	Not recommended. But is technically possible, up to three All in One's per phase.	Yes, typically up to four or five units can be installed per phase.
Will the system work in a power cut?	Only one phase can work in a power cut, even if Power walls are installed on more than one phase. Three phase loads and three phase solar PV will not work in a power cut.	**TBC**	N/A	N/A	N/A	Yes, any phase to which a Victron unit is installed will work in a power cut. Thee phase loads and solar PV will work if Victron units are installed on every phase.