

	'All-in-One'		Separate Inverter-Charger / Battery	
System	Tesla Powerwall 2	MyEnergi 'libbi' Not Released until Q1 2023	GivEnergy	Victron MultiPlus or Quattro + BYD / Pylontech battery
Summary: Rough Cost, Use, Components and Sizing				
Rough Installed Cost (ex VAT) VAT rate is 0% if installed with solar panels, 20% otherwise	£10,550 + VAT £780 per kWh storage ~ 16p per kWh storage 'slot'	3.6kW / 5kWh: £7,000 + VAT 5kW / 20kWh: £15,175 + VAT from £840 per kWh storage ~ from 9p per kWh storage 'slot'	HY 5.2 + 9.2 kWh: £7,150+VAT AC 3.0 + 5.2kWh: £5,610+VAT AC 3.0 + 19kWh: £11,100 + VAT from £730 per kWh storage ~ from 9p per kWh storage 'slot'	Varies: e.g. £11,800+ VAT for Quattro 8000 + 15.4kWh BYD £770 per kWh storage ~ 10p per kWh storage 'slot'
Chemistry⁽¹⁾ Typical number of lifecycles for this chemistry	Lithium Manganese Cobalt ~ 4,500	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⁾ <i>(standard 230V grid connection)</i>	'Whole house' backup or emergency loads; solar works in power cut.	Emergency loads backup only <i>(optional extra to price shown).</i> TBC if solar works in power cut.	Emergency loads backup only (limited to 2.5kW). Solar limited in a power cut.	'Whole house' backup or emergency loads; solar works in power cut.
Use Case⁽³⁾ AC coupled: add storage to an existing PV system? DC coupled: install storage and solar using the same inverter for battery and PV? Mix DC coupled and AC coupled?	Yes No No	Yes Yes Yes	Yes <i>(need to use Giv-AC 3.0, not hybrid inverters)</i> Yes <i>(use Giv-HY 3.6 & Giv-HY 5.2).</i> No	Yes Yes Yes

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System Accepts Generator Connection?	No	No	No	Yes – Quattro allows for grid and / or generator plus battery.
Size Per Unit Max AC Output Power <i>(sizes are per unit – see below for units per phase)</i>	3.68kW / 5kW ⁽⁴⁾	3.68kW / 5kW ⁽⁴⁾	AC Coupled: 3.0kW ⁽⁵⁾ DC Coupled: 3.6kW ⁽⁵⁾ / 5.0kW	Various units, from 3.0kW to 12.0kW
Battery capacity Per Unit <i>Note the most useful capacity is usable capacity (nominal x 80% - 90% depth of discharge (DofD))</i> <i>Usable = DofD x Nominal</i>	Usable: 13.5kWh	Nominal: Choice of 5kWh / 10kWh / 15kWh / 20kWh 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 / 4.2kWh / 7.6kWh	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 <i>(Most domestic properties have one phase – 230V)</i>	Up to three: allows 40kWh storage capacity with 15kW power.	One: allows 20kWh storage capacity, with 5.0kW power	One inverter, up to 5 batteries: allows up to 38kWh storage capacity, with 5kW power.	Up to six inverters: system design allows up to ~ 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 retrofitting 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.*

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Normal Operating Modes / Functionality in a Power Cut (Islanded Mode)				
Normal Operating Modes				
- Self Consumption	Yes	Yes	Yes	Yes (with optional BatteryLife)
- Timed (grid) charge / discharge	Yes	Yes	Yes	Yes
- Reserve specified % for back-up	Yes	TBC	Yes	Yes
Scope of Back-Up⁽²⁾	Total flexibility: Whole House or Emergency Loads.	Emergency Loads Only as an Optional Extra (non-standard, not included in price above).	Emergency Loads Only. (up to 2.5 kW – See ⁽⁵⁾).	Total flexibility: Whole House or Emergency Loads.
Does system provide a UPS: uninterrupted power supply	No	No	No	Yes (20 milli-seconds)
Will the solar PV work in a power-cut?	Yes	TBC	Giv-AC 3.0: No; Giv-Hy: only if the inverter sees a minimum load of 50W via the emergency power supply.	Yes
Max Solar PV that can be installed on the system to operate in a power-cut	7kWp per Powerwall	TBC		The 1:1 Rule applies (similar to Powerwall). Same size PV system as inverter rating.

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Operating Modes, Functionality and Warranty				
Monitoring	Tesla APP	Monitoring portal + APP	Monitoring portal + APP	App, touch screen, VRM Portal
Internal or External installation?	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).	Indoors, with batteries close to inverter-charger to minimise dc cable run. Avoid sleeping areas due to fan noise.
Wall-mounted or floor-mounted?	Either Stacking kit available for multiple Powerwalls	Floor-standing	Wall-mount the inverter, batteries can be floor-standing indoors or wall-mounted indoors and outdoors.	Inverter-charger is wall mounted, batteries are floor-standing.
Warranty	10 year defects. 80% storage capacity retained after 10 years.	Inverter/charger: 5 years Controller: 5 years Battery: 10 years with unlimited cycles within that time as long as MyEnergi controller is in use.	Inverter: 5 years Battery: Warrants that 70% storage capacity retained after 10 years, or (on smaller batteries only) 5000 full cycles, whichever comes first.	Inverter: 5 years Battery: <ol style="list-style-type: none"> 1) BYD – 60% storage capacity retained after 10 years 2) Pylontech – 10 year 'time value replacement' guarantee, meaning the 'time value' of the batteries is replaced based on linear depreciation over 10 years.

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Three phase (400V) grid connections				
Can the system be installed on a three phase connection?	Yes, up to three Powerwalls per phase. We recommend GivEnergy or Victron three phase systems instead.	TBC	Not recommended. Use GivPCS-30, GivPCS-50, GivPCS-100 instead (GivEnergy's large scale three phase systems).	Yes, typically up to four or five units in parallel.
Will it work in a power cut?	Only one phase can work in a power cut, even if Powerwalls are installed on the other phases.	TBC	N/A	Yes, if a Victron unit is installed on one phase only, that phase will work in a power cut. If units are installed on each phase in parallel, all phases will work in a power cut (including three phase loads).
Will solar PV work in a power cut?	Only PV installed on the 'back-up' phase using a <u>single phase</u> inverter will work (max 7kWp)	TBC	N/A	Yes as long as it is DC coupled, or AC coupled, installed on AC out. With one Victron unit per phase, AC coupled solar using a three phase solar inverter will work in a power cut (if installed on AC out).