

Configuring Battery Storage Products: Comparing Apples and Oranges?

The renewables market is currently being flooded with energy storage products to meet the increasing demand and hype for this technology. All of these products present a similar, well-scripted value proposition and all offer to deliver similar functionality.

As a result, this rapid rush to market of these products and their advertising has created the impression that these products could be interchangeable. However, are these products really so similar that the industry can pick and choose from all these solutions to meet the range of deliverables required by the buying public?

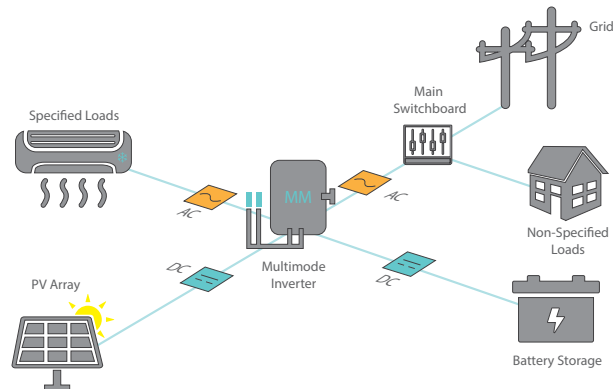
GSES has investigated a range of currently available battery storage solutions and identified six possible configurations. The choice of configuration is impacted by the customer's requirements, equipment functionality, the purpose of the system, and the presence of an existing PV system, amongst many other factors.

“*are these products really so similar that the industry can pick and choose from all these solutions to meet the range of deliverables required by the buying public?*”

The configurations identified are shown below: (Click on image for higher resolution)

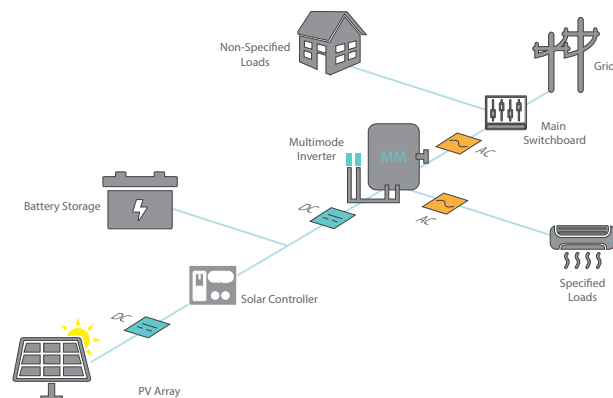
Configuration 1

Single Multimode Inverter: *Comprises a single multimode inverter which acts as both an interactive inverter and a battery charger. "All-in-One" systems typically fall into this category.*



Configuration 2

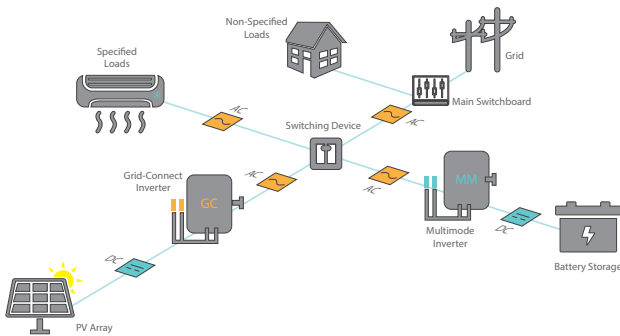
Single Inverter with Separate Solar Controller: *Comprises a separate solar controller that connects the PV array to the battery storage. These components are connected to the specified load/s and the grid by a single multimode inverter. This multimode inverter may or may not contain a battery charger which enables it to charge the battery storage from the grid.*



Configuration 3

Two Inverters with Interconnecting Switching Device:

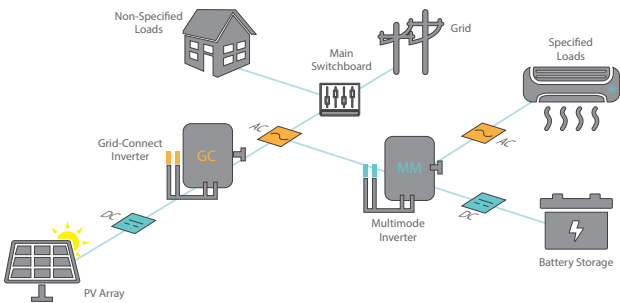
Comprises two separate inverters, one a grid-connect inverter connected to the PV array and one a multimode inverter connected to the battery storage. These inverters are connected to each other, the specified load/s and the grid by an interconnection switching device.



Configuration 4

Two Inverters, including Grid Connect Inverter Connected Directly to the Grid:

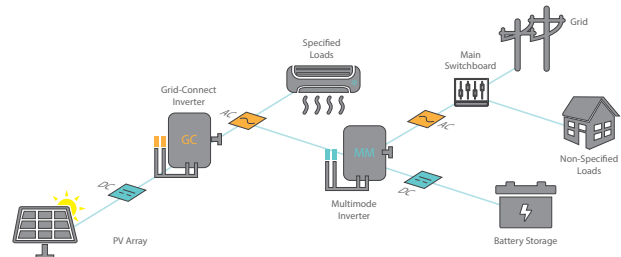
Comprises two inverters; one a grid-connect inverter connected to the PV array and the grid, and the other a multimode inverter connected to the battery storage, the specified load/s and the grid.



Configuration 5

Two Inverters, including Grid Connect Inverter Connected Directly to Specified Loads:

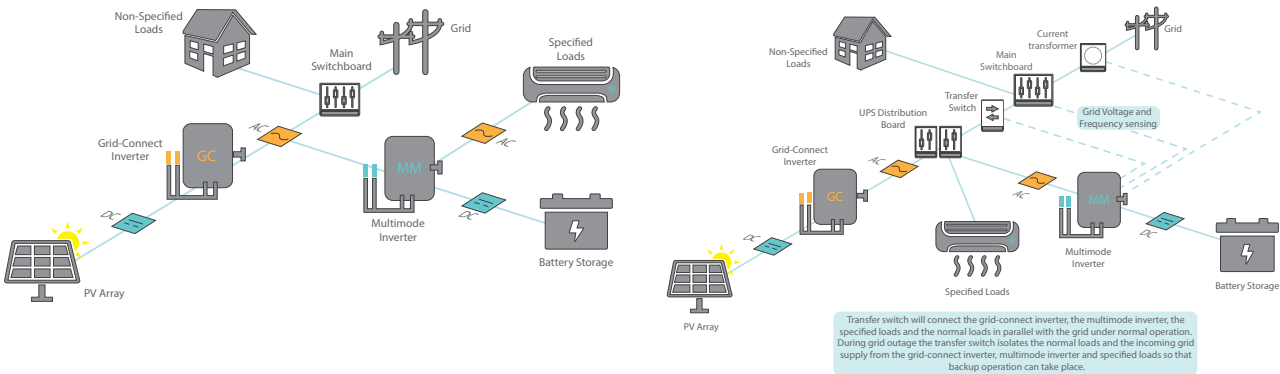
Comprises two inverters; one a grid-connect inverter connected to the PV array, the specified load/s and the grid; and the other a multimode inverter connected to the battery storage, the specified load/s, the grid-connect inverter and the grid.



Configuration 6

Whole House Tariff Optimisation:

Comprises two inverters; one a grid-connect inverter connected to the PV array, the specified load/s and the grid; and the other a multimode inverter connected to the battery storage, the specified load/s, the grid-connect inverter and the grid. This configuration provides electricity to specified loads by signaling for the transfer switch to open the grid connection at which point the multimode inverter takes over the voltage source provision.



All these configurations are capable of providing the functionality of a grid-connected PV system as well as having the capacity to provide basic 'backup' function for selected AC loads. The storage system could also be set up to offset peak load/s onsite to reduce the overall cost of electricity usage.

Having now familiarized yourself with the possible system configurations, how well do the



available battery storage products suit these system requirements?

Following is an extract of products currently offered in the 'battery storage' marketplace. The suitability of each of these products to match these system configurations is shown next to the product name.

Note: most equipment can be made to suit alternative system configurations. The configurations assigned to each technology in the table below (continues to next page) represent only the most likely configurations for which each technology shown is likely to be used.

Product*	Product Type	Configurations
Simpliphi Li-ion Battery	Storage Unit	1,2,3,4,5,6
Aquion Hybrid-ion Battery	Storage Unit	1,2,3,4,5,6
LG Chem Resu Battery	Storage Unit	1,2,3,4,5,6
Sony Fortelion	Storage Unit	1,2,3,4,5,6
Panasonic LJ-SK84A	Inv/Chg and Storage Unit	4,6
Tesla Powerwall	Storage Unit	2
SolarEdge/StorEdge	Inverter	2
Fronius Symo Hybrid	Inv/Chg	2,6
SMA Sunny Island	Inv/Chg	2,4,5,6
Schneider Conext XW	Inv/Chg	2,4,5
Selectronics SP Pro	Inv/Chg	2,4,5
SolaX X-Hybrid	Inv/Chg and MPPT	2,4
Giant Hybrid Grid System	Inv/Chg and MPPT	1,2,4
Victron Multiplus	Inv/Chg	2,4,5
Red Flow Z Cell	Storage Unit	2,4,5
Sonnenschien A600 Gel Pb-Acid	Storage Unit	1,2,3,4,5,6
BAE Secura Gel Pb-Acid	Storage Unit	1,2,3,4,5,6
Samsung ESS	Inv/Chg, Storage Unit, MPPT	1
Bosch BPT-S5 Hybrid	Inv/Chg, Storage Unit, MPPT	1
Ecoult Ultrabattery	Storage Unit	1,2,3,4,5,6
Toshiba SCiB	Storage Unit	1,2,3,4,5,6
Hitachi LL-series AVRLA	Storage Unit	1,2,3,4,5,6
BYD Mini ES	Inv/Chg and Storage Unit	4,6
Century Yuasa Enersun Gel	Storage Unit	1,2,3,4,5,6
Kokam KHESS	Inv/Chg, Storage Unit, MPPT	1
Sunverge SIS	Inv/Chg, Storage Unit, MPPT	1
Outback FLEXpower Radian	Inv/Chg and MPPT	2
Magellan RES	Inv/Chg and Storage Unit	2,4,6
RedBack Smart Hybrid	Inv/Chg and MPPT	2
PhonoCube	Inv/Chg, Storage Unit, MPPT	1
Alpha ESS Storion	Inv/Chg, Storage Unit, MPPT	1
Enphase AC Battery	Inv/Chg and Storage Unit	4



*Please note this product list is not exhaustive, is current at the time of writing and is only a subset of the storage products currently available on the market.

The Australian industry is progressively coming to terms with the evolutionary nature of storage products, their technical characteristics, and the financial potential offered by this market niche at both the consumer level and an aggregated level.

At the same time, the industry is discovering how much it does not know about storage and its safe integration at the consumer level and with the existing electricity network.

The industry transitioned into grid connected solar PV with relative ease. This industry will not have the same easy and expansive passage of storage products into the overall market without fully understanding the products, the technologies and their application as required for compliance and the commercial and consumer markets.

Note: Multimode inverters refer to inverters that are capable of operating in two modes: grid interactive mode when mains power is present and stand-alone operation when mains power is de-energised or not connected. These inverters are used in grid-connected PV systems with battery storage as they allow the loads to operate from the PV array and batteries during certain conditions, such as a blackout, or to manage high electricity prices from the grid.

GSES welcomes feedback on technical papers and other resources available on www.gses.com.au, please contact GSES by email at info@gses.com.au or by telephone on 1300 265 525.

