

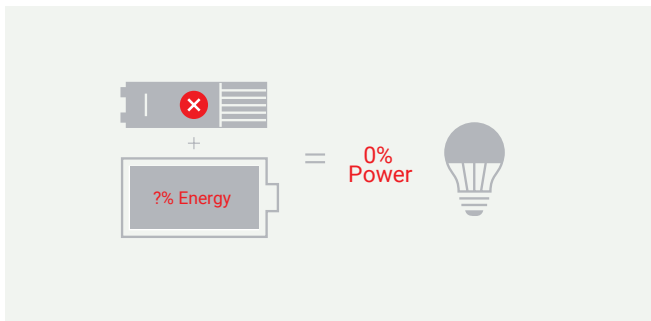


Comparison of Encharge versus Powerwall

Introduction

If you want to protect your family from blackouts, there's really just one thing you need to consider when selecting a solar and storage system... reliability. It doesn't matter how much power you have in your battery or how pretty the battery looks. When there's a power outage, your home power backup system absolutely, positively must work flawlessly.

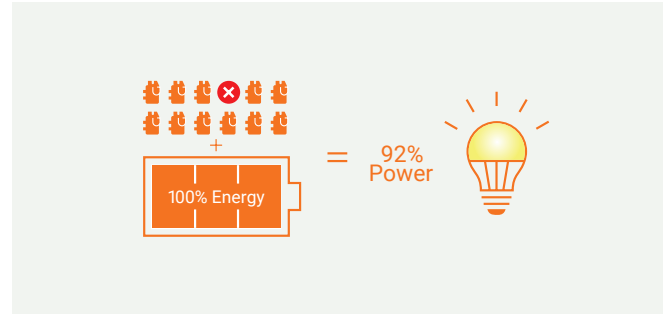
Did you know that most energy storage systems have a single point of failure?



All the energy pulled out of the battery is passed through a single inverter inside the energy storage unit. If this one inverter fails, your battery is essentially useless. That's a lot of responsibility riding on just one piece of the puzzle.

That's why Enphase invented distributed architecture for both solar and storage.

So, what is distributed architecture?



Enphase is the only company in the world to place a microinverter under every solar panel and multiple microinverters in every battery. If a micro on the roof fails, your system keeps producing power. If a micro in the battery fails, you can still get energy out of the battery. It's like having a backup for your backup, and it's the best way to ensure power will be there when you need it most.

Enphase storage and Tesla Powerwall are very similar in most other ways. They're both modular. They can both detect severe weather. Both systems can provide power backup to your entire home, or just critical loads. But only Enphase has distributed architecture, and that's really the most important thing.

On the following pages, we compare the key differences between Enphase storage and the Tesla Powerwall. Beyond reliability, Enphase excels across safety, modularity, and ease of use to provide seamless and automatic backup power for your home.

Enphase Encharge

Enphase offers two sizes of its all-in-one, AC-coupled residential energy storage systems: Encharge 10 has 10.1 kilowatt-hours (kWh) of usable capacity and Encharge 3 has 3.36 kWh. Both are modular, which means that you can mix and match for scalable sizing that can be customized for a home's current and future energy needs.

Encharge can be used for a range of functions:

- **Backup Power:** Powers your home's critical appliances during an outage and automatically switches to off-grid mode with the Enpower smart switch
- **Storm Guard™** ensures your battery is charged in advance of severe weather
- **Power Start™** protects your system from power-hungry appliances that could drain your battery in minutes
- **Time-of-Use Load Shifting:** Saves you money on your energy bill by shifting your home's energy consumption to the battery when electricity prices are high
- **Solar Self-Consumption:** Can be easily paired with your home solar system to optimize your solar energy usage. If Enphase microinverters are on the roof, homeowners can manage everything within a single mobile app

Tesla Powerwall 2

Powerwall 2 is Tesla's second-generation residential energy storage product, offered in a 13.5 kWh size. If one isn't enough, up to 6 Powerwall units can be combined to meet a home's energy demand, similar to the scalable sizing from Enphase. The second-generation Powerwall is AC-coupled and contains an integrated AC to DC inverter. It is considered a marked improvement from the first-generation product, which only offered 6.4 kWh of capacity and was DC-coupled.

Powerwall 2 provides some similar functions as Encharge:

- **Backup Power:** Backup Gateway automatically shifts energy consumption to "off-grid" mode during an outage
- **Storm Watch** functions like Enphase Storm Guard to charge the battery during severe weather that might lead to an outage
- **Time-of-Use Load Shifting:** Time-Based Control mode charges when electricity rates are low and discharges when rates are high
- **Solar Self-Consumption:** Integrates with and charges from your home solar system

At-a-glance comparison

The table below compares the technical specifications and features across the Enphase Encharge 10 and the Tesla Powerwall 2. It is important to note that, despite the capacity and output differences, both units offer scalable sizing with additional units.

Please see the following pages for additional comparison details on reliability, safety, modularity, and ease of use.

	Enphase Encharge 10	Enphase Encharge 10 + 3	Tesla Powerwall 2
Energy capacity	10.1 kWh	13.5 kWh	13.5 kWh
Power output	5.7 kVA peak / 3.84 kVA continuous	7.7 kVA peak / 5.1 kVA continuous	7 kVA peak / 5 kVA continuous
Dimensions and weight (WxHxD)	42.13" x 26.14" x 12.56" / 341 lbs	(42.13" + 14.45" x 26.14" x 12.56") 341 + 114 lbs	45.3" x 29.6" x 5.75" / 251.3 lbs
Battery Chemistry	Lithium-Ion Phosphate (LFP)	Lithium-Ion Phosphate (LFP)	Lithium Nickel Manganese Cobalt Oxide (NMC)
Depth of Discharge	100%	100%	100%
Warranty	10 years	10 years	10 years
Backup capability	✓	✓	✓
Monitoring app	✓	✓	✓
Over-the-air updates	✓	✓	✓
Weather preparedness	✓	✓	✓
All-in-one solar + storage	✓	✓	✓
Distributed architecture	✓	✓	✗
Power Start™ technology	✓	✓	✗
Generator support	✓	✓	✗
Safe cobalt-free battery	✓	✓	✗

The bottom line: more storage for the grid

Both energy storage units offer homeowners a path to energy independence and peace of mind with battery backup. In places like California where the grid is being pushed to the limit, any additional capacity that can flex with demand is a good thing.

While both are quality products, Encharge pulls ahead of Powerwall 2 due to its ability to seamlessly integrate with microinverters that provide superior reliability,

a battery chemistry that has increased safety, and a modular system that is simple and adapts easily to each home.

Ready to size your energy storage system?

Enphase's System Estimator tool provides you with an instant estimate for the optimal energy storage size for your home's energy needs. Check it out to get started on your home energy storage journey.



Reliability

	Enphase	Tesla
Micro Technology to eliminate a single point of failure	✓	✗
Passive Cooling	✓ Designed to cool passively, without any mechanical pieces to maintain over time	✗ <ul style="list-style-type: none"> • Moving parts, including fans and coolant pump, represent added points of failure and ongoing maintenance • Toxic coolant is an environmental hazard if it leaks • Fans can also create noise and vibrations in the system • Active cooling does allow system to be installed in more extreme environments
Solar commitment	✓ <ul style="list-style-type: none"> • Solar installed on more than 1 million homes worldwide • 8th generation of solar microinverter technology • Loyal network of Enphase Installer Network partners, experts and enthusiasts 	✓ <ul style="list-style-type: none"> • Relies on industry partnerships for whole home solar and storage • While company is not solely focused on solar and storage, Tesla is committed to sustainability
Inverter expertise	✓ <ul style="list-style-type: none"> • Over 28 million Enphase microinverters installed • 10+ years of experience designing solar inverter technologies 	✗ <ul style="list-style-type: none"> • No direct focus on solar inverter manufacturing. • Relies on third-parties for inverter technology
Storage expertise	✓ Storage installed on more than 30,000 homes worldwide; 3 rd generation of storage	✓ Storage installed on at least 100,000 homes worldwide; 2 nd generation of storage
All-in-one support	✓ Designed, manufactured, and supported by a single company	✓ Tesla has a single point of support for varied components from separate manufacturers
FEMA recommended	✓ FEMA recommends microinverters as they are more reliable	✗
Ease of serviceability	✓ <ul style="list-style-type: none"> • Encharge is easily opened and internal components can be swapped on-site by a certified installer • No single component weights more than 100 lbs, allowing for two-person lift 	✗ <ul style="list-style-type: none"> • Entire unit must be removed or swapped for common issues or maintenance • Entire unit is moved at once, reflecting 251 lbs
Warranty	✓ 25-year solar microinverter warranty; 10-year battery warranty	✓ 10-year solar inverter warranty; 10-year battery warranty



Safety

	Enphase	Tesla
Safest battery chemistry for residential use	<p style="text-align: center;">✔</p> <p>Cobalt-free lithium iron phosphate (LFP) battery chemistry making thermal runaway¹ impossible</p>	<p style="text-align: center;">✘</p> <p>Nickel-manganese-cobalt (NMC) battery chemistry is prone to thermal runaway¹ if punctured or cooling system fails</p>
Solar voltage	<p>Low-voltage AC power – just like the rest of your home</p>	<p>With string inverters, dangerous high-voltage DC power on your roof that can cause arc fault fires</p>
UL 9540A² battery safety certification	<p style="text-align: center;">✔</p> <p>Achieved the most rigorous testing certification for home energy storage</p>	<p style="text-align: center;">✘</p>
Lacks toxic elements for landfill safety	<p style="text-align: center;">✔</p> <p>Cobalt-free lithium iron phosphate (LFP) battery chemistry does not contain toxic elements and is landfill safe</p>	<p style="text-align: center;">✘</p> <p>Nickel-manganese-cobalt (NMC) batteries contain elements known to potentially cause acute toxicity</p>
Conflict-free chemistry	<p style="text-align: center;">✔</p> <p>Cobalt-free chemistry avoids any global impact on abusive mining practices.</p>	<p style="text-align: center;">✘</p> <p>Cobalt mining is known to have a high human cost, including in the Democratic Republic of Congo</p>

¹Thermal runaway occurs when a battery overheats, potentially causing fire or explosion

²UL 9540A battery certification is the most rigorous testing standard for home energy storage management



Modularity

	Enphase	Tesla
Can add more storage later	<p style="text-align: center;">✓</p> <p>Up to 4 Encharge 10 units can be stacked per system</p>	<p style="text-align: center;">✓</p> <p>Up to 10 units can be stacked per system</p>
Varied sizing	<p style="text-align: center;">✓</p> <p>The small storage unit, the Encharge 3, is 3.36 kWh and our largest storage unit, the Encharge 10 is 10.1 kWh</p>	<p style="text-align: center;">✗</p> <p>Tesla has just one size battery with a capacity of 13.5 kWh</p>
Scalable power and energy	<p style="text-align: center;">✓</p> <p>Up to 4 Encharge 10 units can be stacked per system to add more energy and power</p>	<p style="text-align: center;">✓</p> <p>Up to 6 Powerwall 2 units can be stacked per system to add more energy and power</p>
Generator support	<p style="text-align: center;">✓</p> <p>Use a generator within your off-grid system and even charge the battery – more flexibility when off-grid</p>	<p style="text-align: center;">✗</p> <p>No generator support currently</p>



Ease of use

	Enphase	Tesla
Single app to control solar and storage, including module-level monitoring	✓	✓
Module-level monitoring	✓	✗ Monitoring at module level is not available
Detect severe weather and automatically prioritize battery backup	Storm Guard ✓	Storm Watch ✓
Support for power-hungry electric motor appliances like air conditioners and well pumps (inrush current)	Included patented Power Start™ technology that automatically detects electric appliances as they start and throttles power in a fraction of a second so that they can start safely and reliably ✓	While Powerwall may lack an intelligent appliance throttling feature, more units can be added for more power ✓
Consistent power quality	Solar and storage microinverters maintain power frequency at 60 Hz and communicate directly to curtail power as needed ✓	When battery is full and cannot accept charge, the system lowers power quality by raising power frequency to 65 Hz to curtail solar ✗
Automatic time-of-use shifting that automatically uses battery backup instead of grid power when rates are high	✓	✓
Over-the-air updates	✓	✓
System sizing tool	Use Enphase's online estimator tool for custom system sizing ✓	Recommended sizes without user customization options ✗

³Enphase systems automatically reset in the case the home energy demand exceeds designed storage capacity. Powerwall will require a manual reset that could involve flipping breakers at the home circuit breaker panel.

Summary

Enphase designed a seamlessly integrated solar and storage system to ensure reliability, safety, modularly, and ease of use for every home. Our all-in-one system is the only one on the market today that utilizes microinverters for both solar and storage to provide unique value from distributed architecture.

Moreover, we are proud to have roots in the solar industry and are committed to our mission of advancing a sustainable future for all.

Ready to get started with your home energy storage system?

Enphase's System Estimator can help design the perfect system for you or find an installer near you.





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