Technology Advisory

Tesla / SolarCity Announce New Residential and Utility Scale Batteries

What has changed?

Behind-the-meter energy storage is widely viewed as a growth industry, with one report listing more than 40 companies that are active in this area[1]. In October 2016 Tesla and SolarCity announced a new "solar roofing" product along with new versions of the PowerWall residential battery and the PowerPack commercial / utility-scale batteries. The full video of the announcement can be watched at here. This advisory focuses on the new batteries. The solar roofing tiles will be addressed in a future advisory when more information is available.

The PowerWall 2 has a capacity of 13.5 kWh / 7 kW and costs $5,500, including an integrated inverter or DC/DC converter. Their website estimates installation and supporting hardware "start at" $1,500. (Tesla notes that "total cost excludes sales tax, permitting and fees.")

The new PowerPack has doubled the capacity of the original version to 210 kWh and includes either a 50 kW DC-AC inverter or an equivalent DC-DC converter for use with larger systems. Tesla also talked about tighter integration between solar, batteries and EV charging, but provided no real details about how this would work.

	PowerWall 2.0	***PowerPack 2.0***
Useable capacity	13.5 kWh-AC	210 kWh-AC
Power (continuous)	5.0 kW	50 kW
Power (peak)	7.0 kW	50 kW
Voltage	120/240 single phase	380 to 480V, 3 phases
Power Electronics	Inverter or DC/DC converter included	Inverter or DC/DC converter included
Depth of Discharge	100%	100%
AC Round Trip Efficiency	90%	88%-89%
Dimensions	44" x 29" x 5.5"	51.5" x 32.4" x 86"
Weight	264.4 lb	3,575 lb
Operating Temperature	-4° to 122°F	-22°F to 122°F
Scalable	Up to 9 Powerwalls	"infinitely scalable"

[1] https://www.greentechmedia.com/articles/read/chart-the-us-behind-the-meter-storage-landscape

What do you need to know about it?

The PowerWall 2.0 has 13.5 kWh of storage, more than double the final specs of 6.4 kWh of the original PowerWall. The unit now also contains either a 7 kW DC-AC inverter or an equivalent DC-DC converter. If used with a PV system, the AC version would still require a PV inverter, while the DC version would require a multi-mode inverter (such as a SolarEdge™ inverter). The warranty is 10 years of unlimited cycles for "solar+backup"[2] with final capacity of 70% of the original rating.

The price of the complete system is now $5,500 for the PowerWall 2.0 before installation. This is just over $400 per AC-kWh. In its pilot program announced last year, Green Mountain Power was selling a complete solar-ready PowerWall system (6.4 kWh rating) to its customers for $6,500 before installation. This works out to just over $1,000 per kWh-AC, so if the PowerWall 2 specs hold true, this is a 60% drop in the cost of energy from the original PowerWall by itself, or approximately 40% drop if you include a solar inverter. As a price comparison, Electrek points out that a 4 kWh "sonnenBatterie eco compact" (which includes a connection for a PV system) costs $5,950, or $1,500 per kWh-AC[3].

The new PowerPack, aimed at the commercial and utility-scale market (Tesla mentioned Kauai Island Utility Cooperative in their announcement video), has a capacity of 210 kWh (vs 100 kWh for the original PowerPack) and now includes either a 50 kWh inverter or a DC-DC converter which can be used in larger systems connected to a central inverter. According to the Tesla website, a single PowerPack 2.0 costs $109,000 plus installation, which works out to $520 per kWh-AC.

What you should do about it

This event was widely anticipated and extensively covered in both the technical press and the general press. Co-op members are going to see this information (especially if they search for "residential battery") and will seek more details from a trusted source, which might start with asking their co-op.

[2] The Australian version gives a performance warranty of 37.8 MWh of total throughput for other applications (which works out to 3,650 daily cycles of 10 kWh).
[3] https://electrek.co/2016/10/31/tesla-powerwall-2-comparison-lg-resu-sonnenbatterie/

The price reduction for the residential battery is going to cause a surge in interest for "behind the meter" energy storage, both from a customer perspective and from a utility perspective. For example, if Green Mountain Power thought that there were benefits from the PowerWall at $1,000 per kWh, what would the benefits be at $400 per kWh?

Prospective customers can order a PowerWall 2 on the website right now with a refundable $500 credit card deposit. According to the website, "Installations begin in January 2017." PowerPack systems are also available for online order with a $1,000 credit card deposit.

Our original member advisory on the Tesla Battery somewhat controversially called the PowerWall a "game changer" for residential battery market. It is still a game changer in that respect, just with a 60% price reduction.

Additional Resources

Have You Thought About Solar Lately?
Co-op Battery Energy Storage Applications
Distribution System Optimization via Substation Storage – Energy Storage Use Case
PV Smoothing – Energy Storage Use Case

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