



Optimize PV Systems



Repower PV Systems



DC-Coupled Storage



Monitoring and O&M

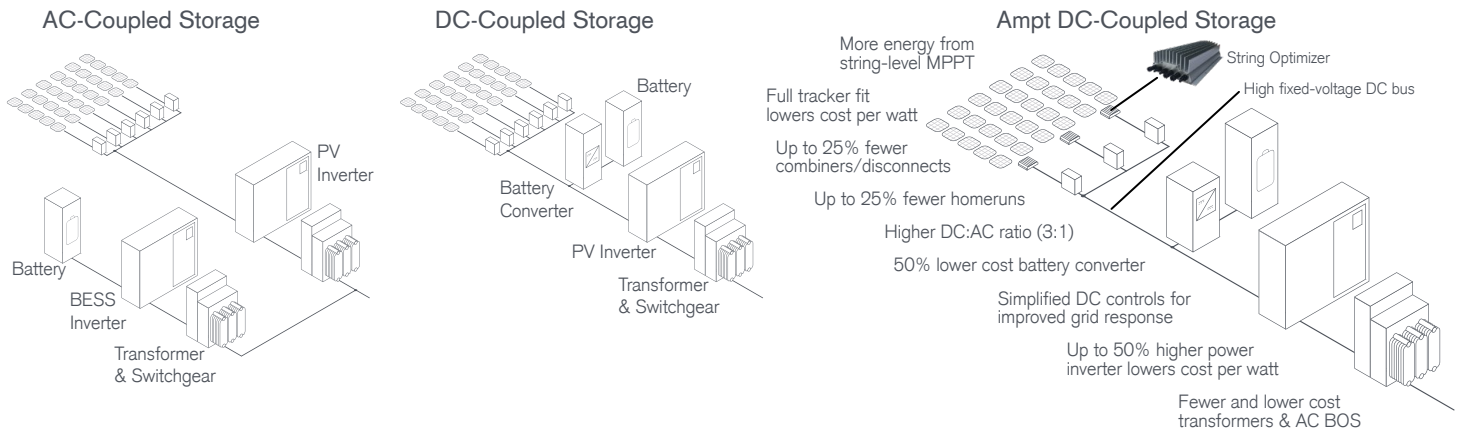


# DC-Coupled Storage with Ampt String Optimizers

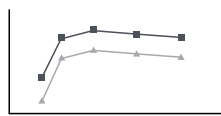
Ampt String Optimizers are DC/DC converters that lower the cost and improve the performance of PV+storage systems. Some of the largest PV plus DC-coupled storage systems in the world are using Ampt optimizers to save on electrical BOS components, battery converters, and inverters while generating and capturing more energy to increase project ROI.

- Lower total system capex
- More energy increases project ROI
- Increase flexibility for future upgrades

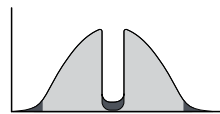
# Cost Savings with Ampt



## Performance Improvement with Ampt



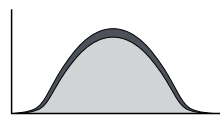
**Storage Roundtrip Efficiency**  
Achieve higher roundtrip storage efficiency while increasing the operating efficiency of the inverter and battery converter.



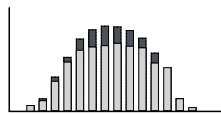
**Low Voltage Harvest**  
Charge the battery storage system even when the array voltage is below the inverter turn on voltage to maximize energy production.



**Clipped Energy Harvest**  
Charge the battery when the PV inverter is clipping output power. Ampt enhances this benefit with higher DC:AC ratios (up to 3:1).



**Mismatch Recovery**  
Deliver more energy by recovering mismatch losses from various sources with string-level maximum power point tracking (MPPT).



**Curtailment Harvest**  
Capture array power that would normally be lost by charging the battery during periods of AC power curtailment.



**Mitigate Degradation**  
Recover energy losses caused by variable degradation of PV cell and modules within a system to improve lifetime system performance.

## Ampt's Patented Features Increase System ROI

**Dual MPPT per optimizer** – Ampt String Optimizers put maximum power point tracking on each of its two input strings of PV modules. This mitigates or eliminates mismatch losses to deliver more energy under changing environmental and system conditions over the lifetime of the power plant.

**High Fixed-Voltage Bus (HFVB)** – Ampt's advanced DC power management technology allows for HFVB system designs which turn the variable voltage of the PV array into a fixed and predictable DC bus voltage to achieve system-level economic advantages.

**Ampt Mode®** – Inverters in Ampt Mode® operate in a fixed or narrow input voltage range that is closer to the maximum system voltage. This allows the inverter to deliver a higher AC output voltage at the same current which raises the inverter's rated output power up to 50% to lower the inverter's cost per watt.

**String Stretch®** – Ampt's patented String Stretch® technology puts voltage and current limits on the output of each optimizer which doubles the number of modules per string and allows for smaller conductor sizing per kilowatt delivered to save up to 25% on electrical BOS costs.

**Direct-to-Converter™** – For DC-coupled energy storage systems with Ampt, the DC bus operates at a fixed voltage that is always higher than the battery voltage which eliminates 50% of the battery converters' power circuitry while increasing its power density to lower the converter's cost per watt.

**High DC:AC** – This Ampt feature allows PV system designers to achieve optimal DC:AC ratios (up to 3:1); expand the DC power on existing systems without replacing inverters, combiners, or cables; optimize inverter utilization; and increase storage durations – all at a lower capex.

**V-match®** – The output of our optimizers matches the DC bus voltage set by the inverter or battery converter while delivering full available power from the PV modules. This uniquely allows PV arrays with Ampt to automatically adapt to legacy or future power equipment to repower existing systems, upgrade inverters, mix new and legacy PV modules, deploy optimized DC-coupled storage systems, and other applications.

**Full Tracker Fit** – Ampt optimizers overcome string-voltage sizing constraints to fit more modules on a tracker than systems without Ampt. Increasing the number of modules per tracker allows system designers to fully use the tracker's mechanical capacity and lower tracker cost per watt.

**Wireless Communication** – Ampt String Optimizers incorporate wireless communication to provide optional string-level data that is highly accurate, synchronous, and scalable to improve O&M.