

AllCell Technologies Energy Storage Systems



AllCell Technologies

- Headquarters: Chicago, IL
- Core Technology: thermal management for Li-ion batteries using phase change materials (PCM)
 - Several US patents, international patents, and pending applications
 - Recently licensed to Dow-Kokam co-founder Townsend Ventures for automotive market
 - Based on research done at Illinois Institute of Technology
- Capabilities:
 - Battery design, prototyping, and testing
 - Manufacturing and battery pack assembly
- Products: standard and custom batteries for light electric vehicle and renewable energy storage markets



AllCell Solves the Heat Problem

The Heat Problem

- Heat is the enemy of all Li-ion batteries
 - Capacity degradation
 - High discharge rates
 - Safety
- Heat is a concern regardless of:
 - Chemistry
 - Source (internal vs. external)



The AllCell Solution

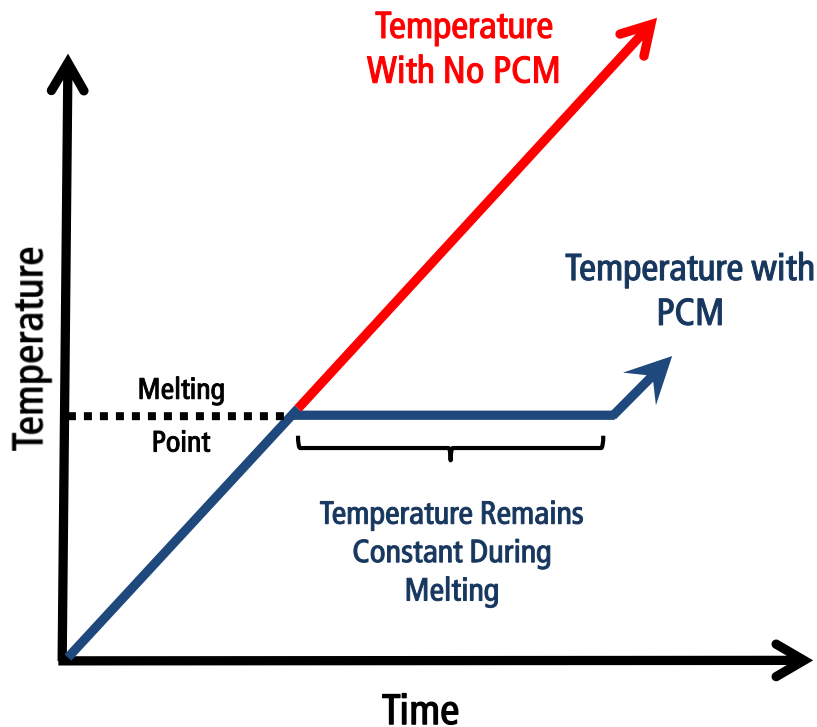
- Proprietary phase change material (PCM) composite
 - Graphite
 - Wax
- Inexpensive, lightweight, and passive
- Simultaneously solves both performance degradation and safety concerns



How Does AllCell's PCM Work?

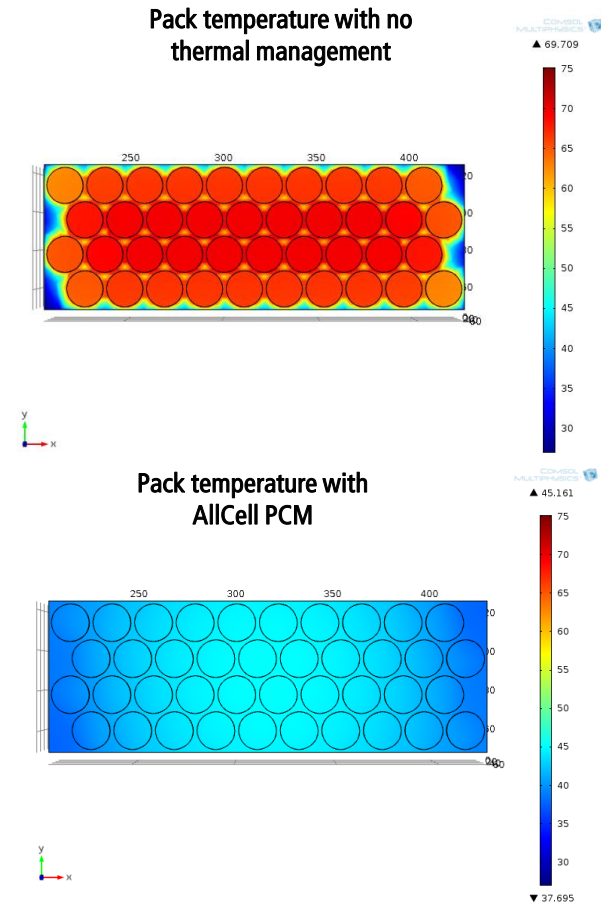
Problem: Overheating is harmful and dangerous

Solution: Wax absorbs heat as it melts



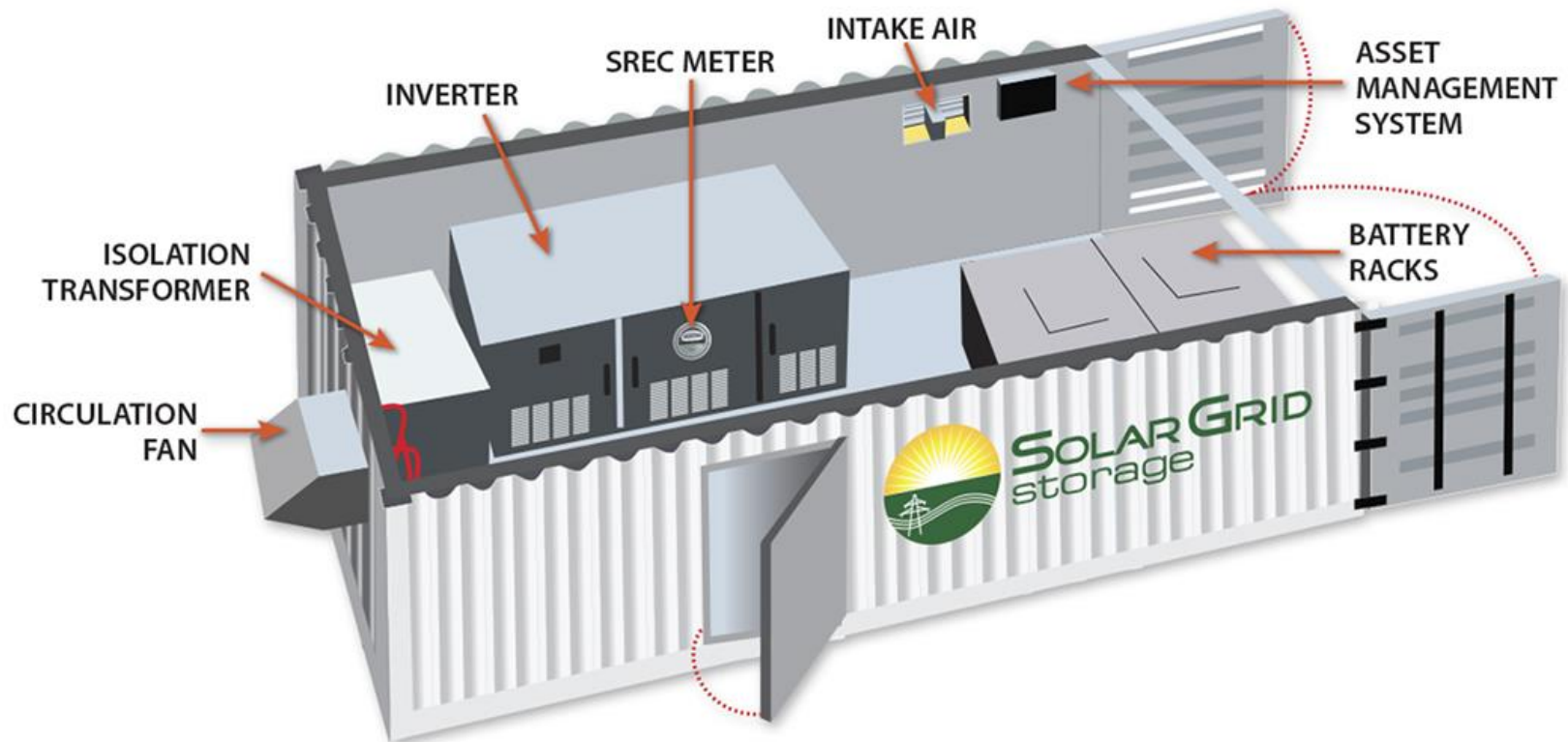
Problem: Hotspots limit capacity

Solution: Graphite distributes heat evenly



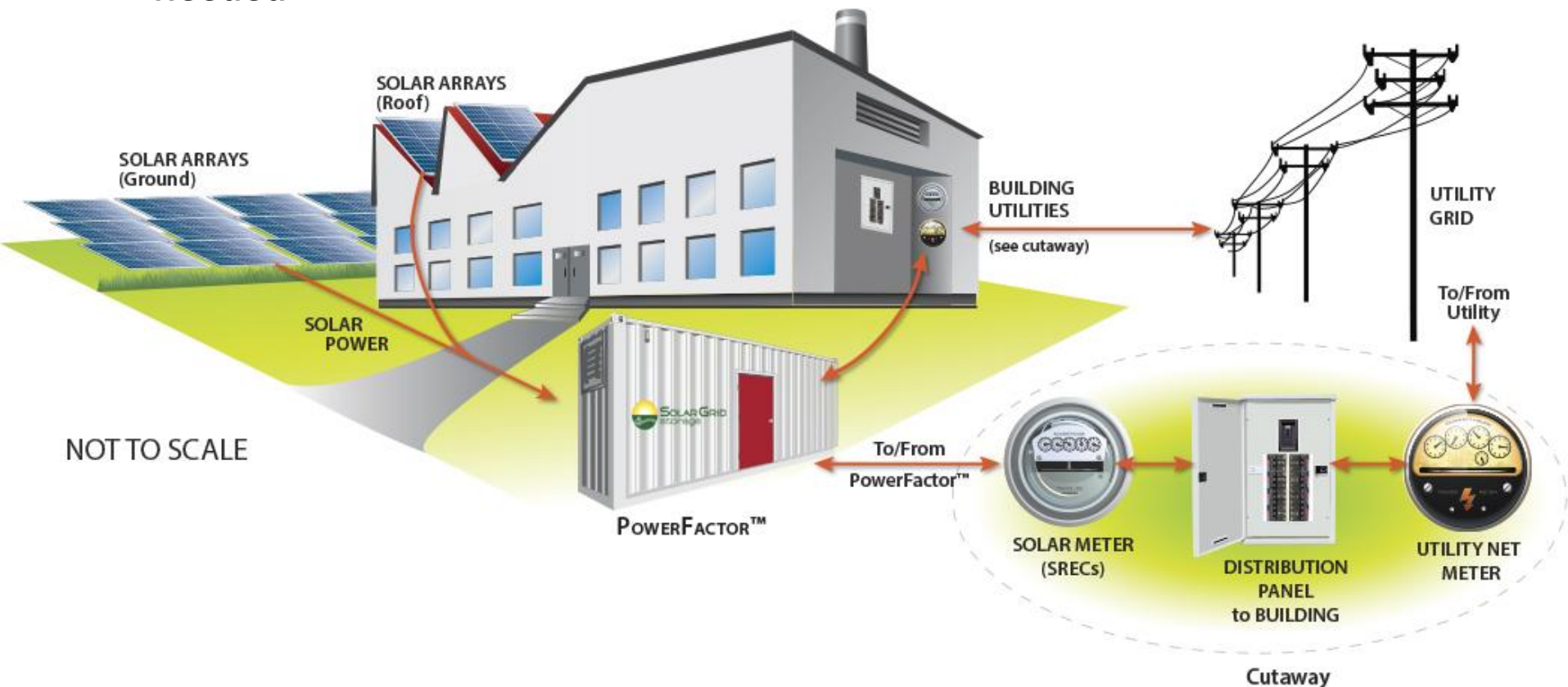
Case Study: Solar + Storage

- 60-250 kWh batteries for grid support and back-up power with Solar Grid Storage at commercial solar installations
 - 24/7 operation with high charge & discharge rates (up to 500 kW)
 - Installed without A/C in container with inverter
 - Long cycle life (7+ years)



Seamless Integration to Solar Array, Customer and Utility

- Single inverter supports both solar and battery
- Grid support services generate ongoing revenue stream to support third party finance (TPO) model
- Back-up power and demand charge avoidance available to customer as needed



First 1+ MW of Solar + Storage



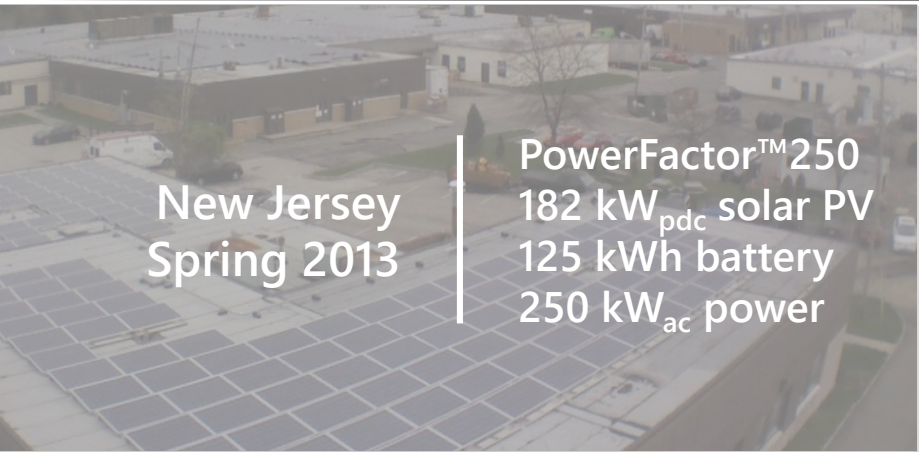
Philadelphia
Spring 2013

PowerFactor™250
600VDC / 480VAC
66 kWh battery
125 kW_{ac} power



New Jersey
Winter 2012

PowerFactor™250
184 kW_{pdc} solar PV
125 kWh battery
250 kW_{ac} power



New Jersey
Spring 2013

PowerFactor™250
182 kW_{pdc} solar PV
125 kWh battery
250 kW_{ac} power



Maryland
Summer 2013

PowerFactor™500
402 kW_{pdc} solar PV
300 kWh battery
500 kW_{ac} power

Standard Products

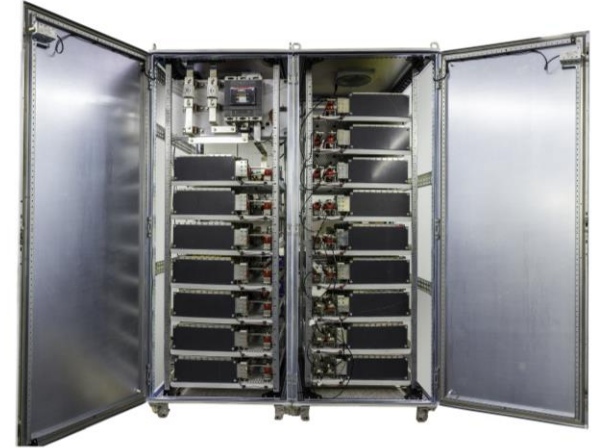
- 1.4 kWh building block
 - 52V 26Ah
 - 26V 52Ah
- Proprietary BMS with programmable CAN communication
- 1900 cycles @ 2 hour discharge rate
- Connect in series and/or parallel
- NEMA 1 steel enclosure
- Connectors
 - Anderson standard
 - Other options available



Module Specifications	HE-5213	HE-2613
Nominal Capacity	26 Ah	52Ah
Nominal Voltage	51.8 V	25.9 V
Size*	12.1 x 10.1 x 4.3" 31 x 26 x 11 cm	12.1 x 10.1 x 4.3" 31 x 26 x 11 cm
Weight*	25.4 lbs / 11.5 kg	25.4 lbs / 11.5 kg
Energy Density*		
Volumetric	211 Wh/L	211 Wh/L
Gravimetric	149 Wh/kg	149 Wh/kg
Operating Voltage	58.8 ~ 40 V	29.4 ~ 20 V
Charge Voltage	58.8V	29.4 V
Maximum Discharge		
Continuous	26A	52A
Pulse (10ms)	52A	104A
Maximum Charge	13A	26A

Custom Products

- Custom configurations (<250 kWh)
 - Cell selection
 - Voltage, power, and capacity
 - Size, shape, and enclosure/racking
 - BMS/communications
 - Duty cycle
- Rapid prototyping and scale up volume
- Experienced design team
 - Electrical, mechanical, and chemical engineers
 - On-grid and off-grid applications
- Certification and standards compliance support
 - IATA/UN 38.3
 - EMI/EMC
 - IEC
 - NFPA
 - CE
 - UL



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