

## Extreme Solar: Towards 24-7 Renewable Energy

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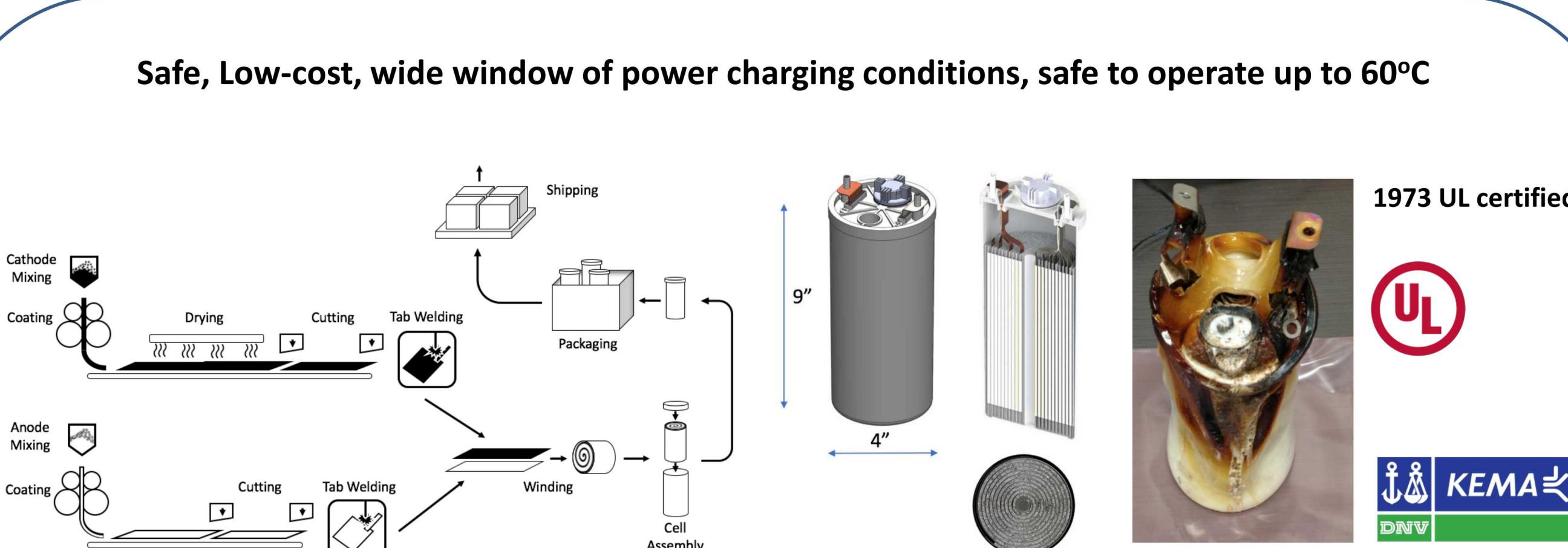
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**What**  
Take distributed solar to the next level by integrating the UEP's Zn-MnO<sub>2</sub> batteries with solar panels and microinverters.

**Why**  
Increase grid resilience and reliability by deploying distributed energy generation and storage.

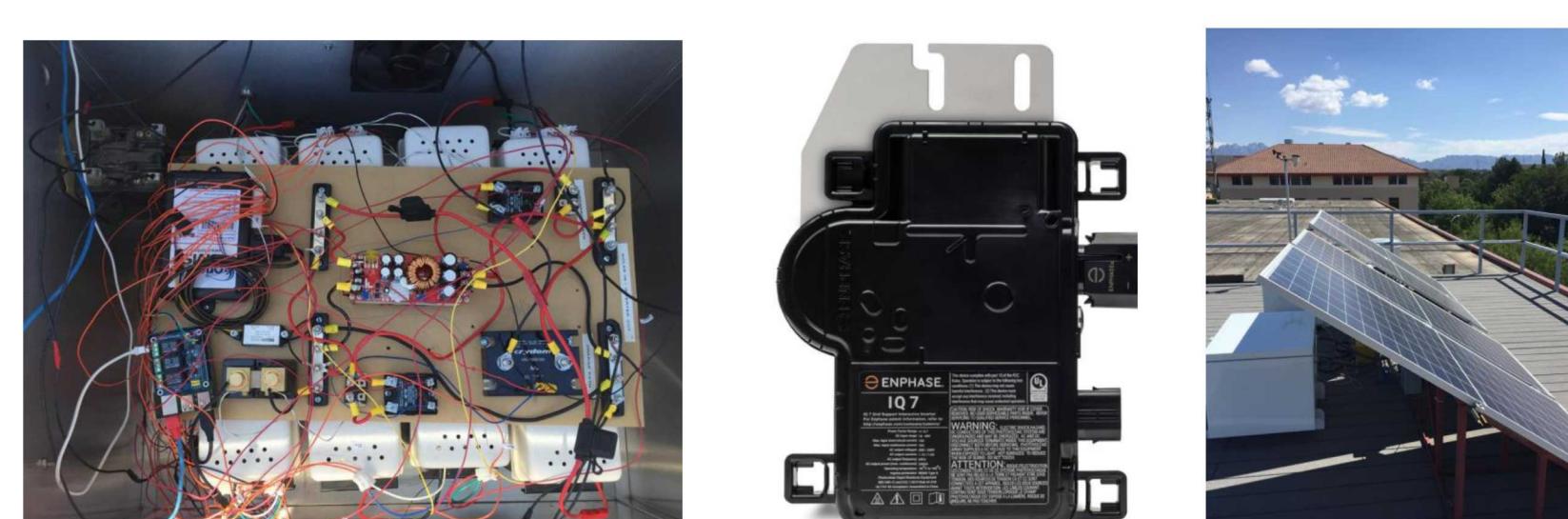
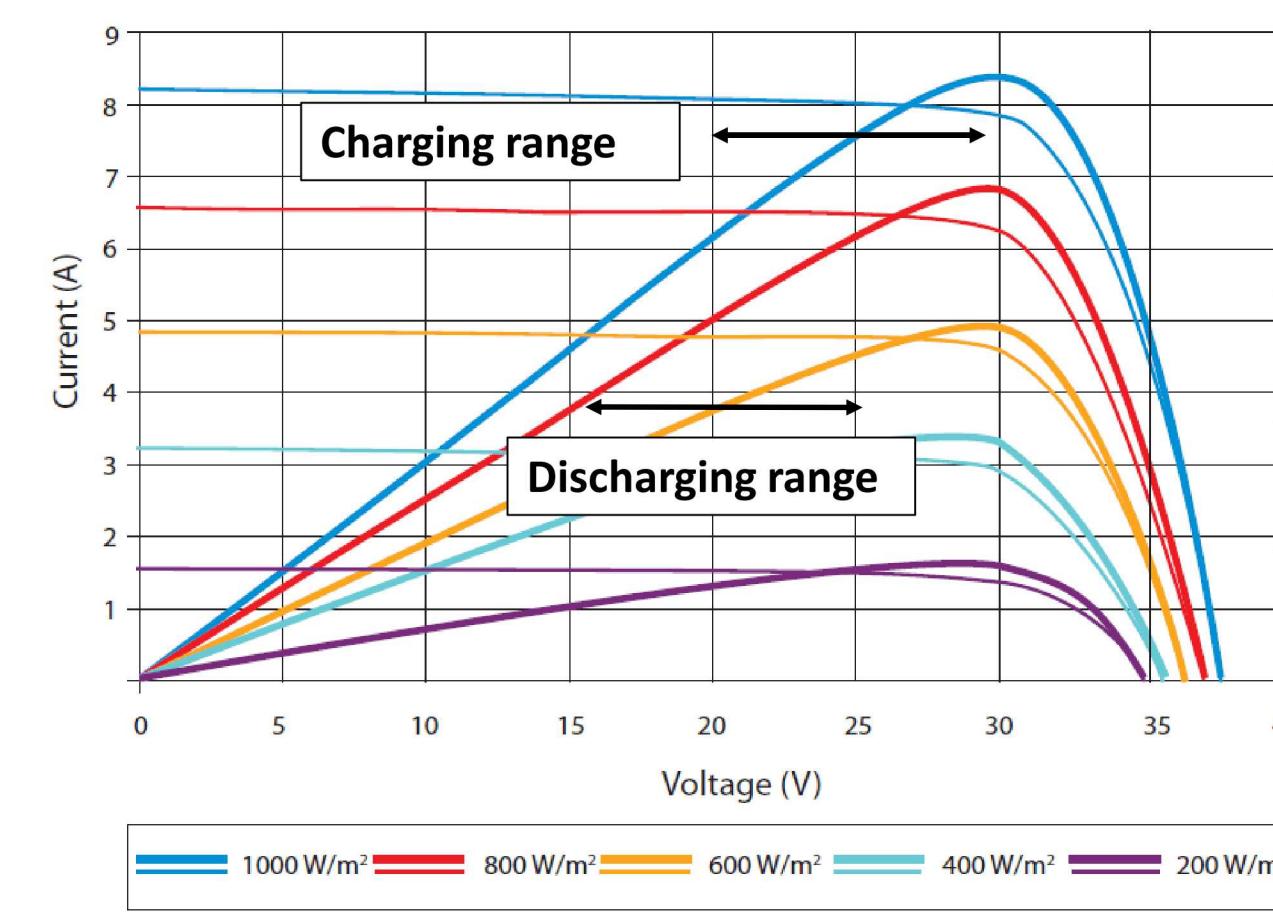
**Metrics**  
Energy in, Energy out  
Energy efficiency  
Cost  
Durability

**Tasks**  
Year 1 (FY19): Proof of concept, installation, monitoring, and operation (completed)  
Year 2 (FY20): Dedicated DC/DC converter and batteries mounted directly under the panels  
Year 3 (FY21): Cost reduction and commercial production



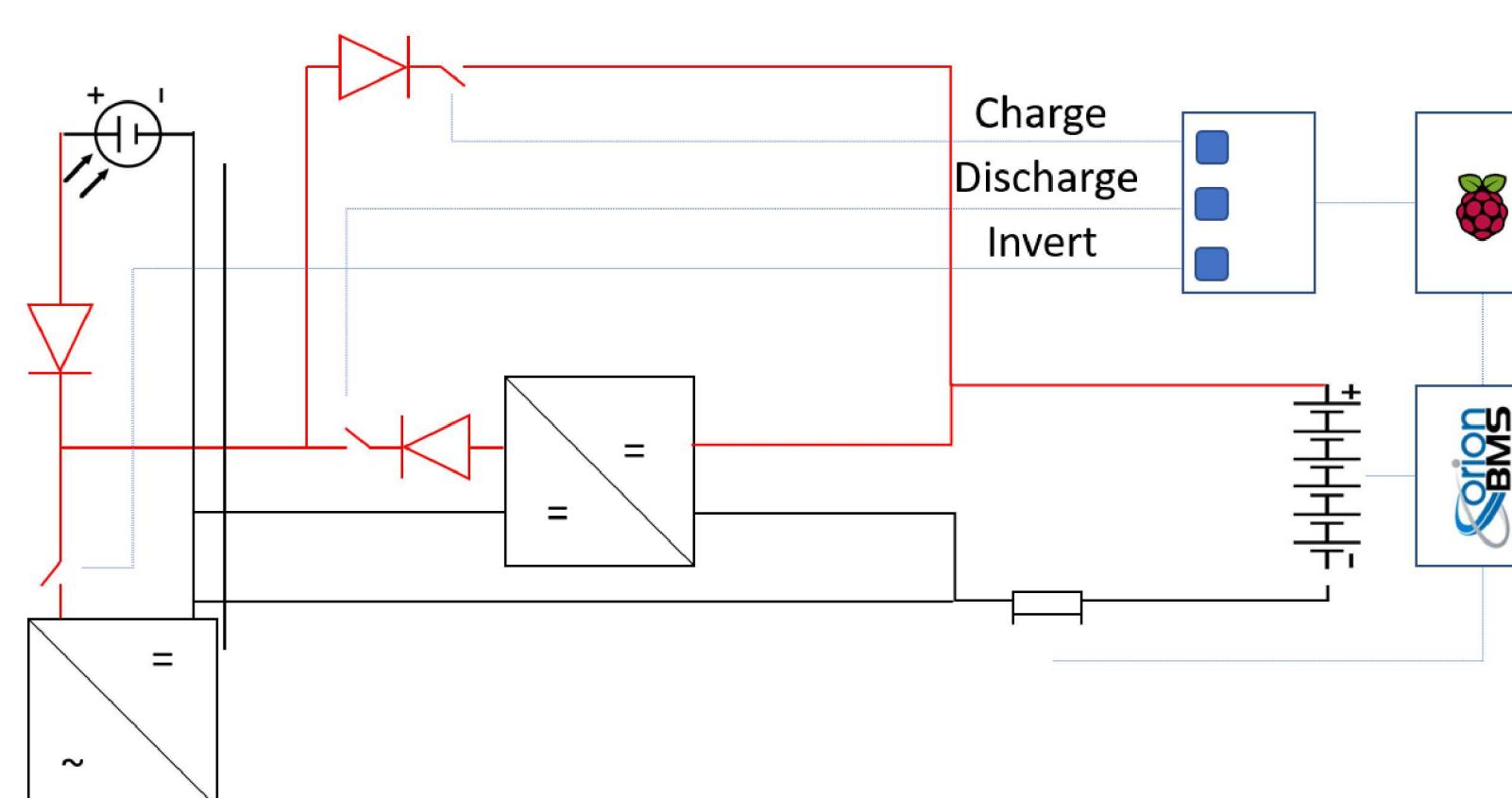
Installation in New Mexico State University  
16 UEP cells connected to solar panels and Enphase inverters

Current-Voltage & Power-Voltage Curve(230-20)

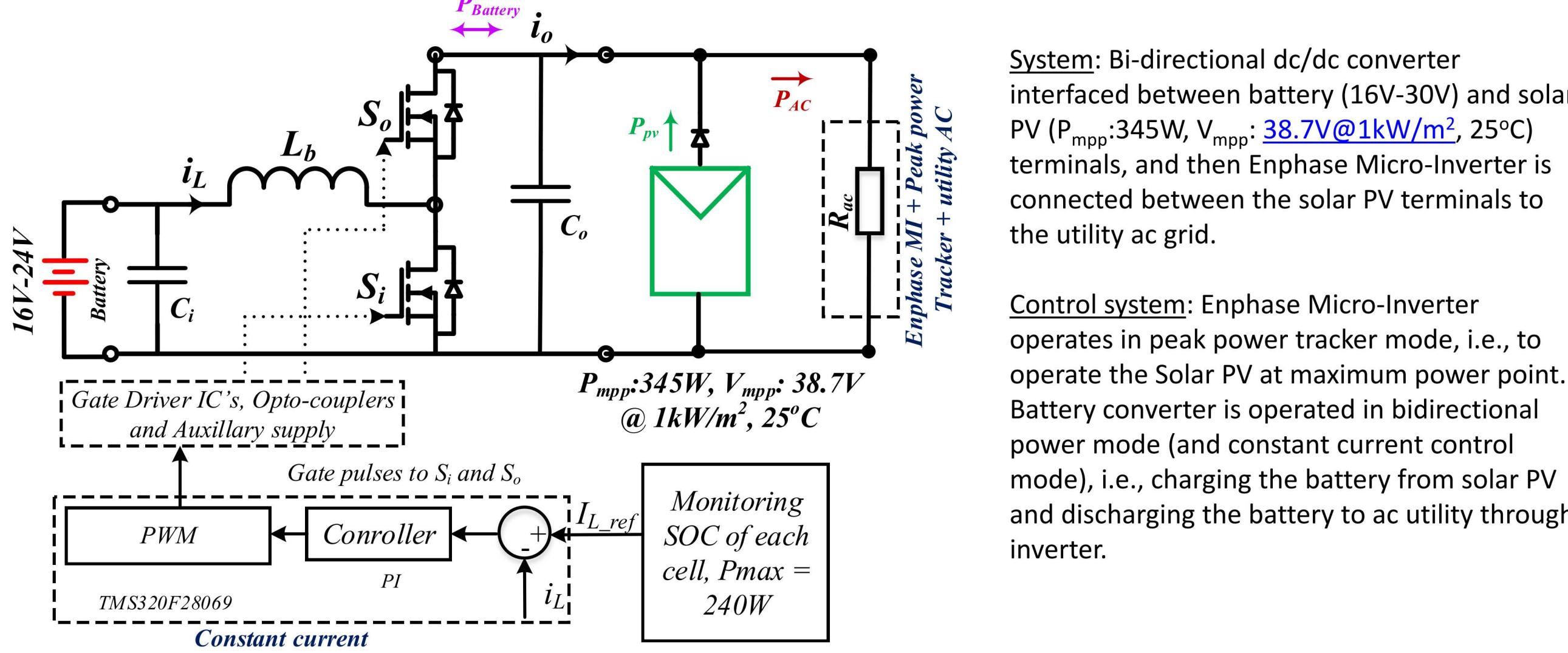


FY 19: Electrochemical charge solution: direct connection between the solar panels and the battery

Mode of operations  
0 to 12 PM: Invert relay closed  
12 PM to 3 PM: Charge relay closed  
3 PM to 12 AM: Inverter relay closed  
7 PM to 8:30 PM: Discharge relay closed



FY 20: Bi-directional DC/DC converter



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