



# Company Introduction and Overview of Liquid Cooling & Heating For Lithium-Ion BESS

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February 2022



# Hotstart Introduction



**Founded in 1942**  
**(80<sup>th</sup> Anniversary in 2022)**

**Headquartered in  
Spokane, Washington**





# Engineering & Manufacturing Firm



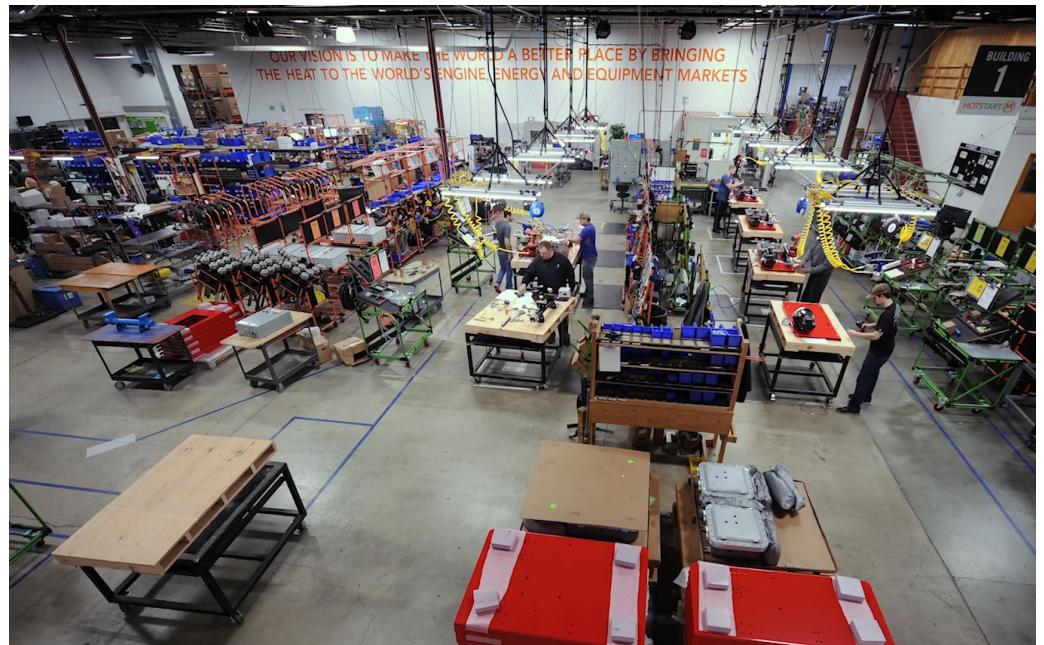
**1942** Founded on the concept of heating school bus engines

**70's** Company moves to current location to accommodate increase in production

**90's** Expands markets served and manufacturing capabilities

**2000's** Opens international sales offices to serve global customers

**2017** Celebrates 75<sup>th</sup> anniversary and launches efforts into Clean Energy market





## HOTSTART North America

Spokane, US      Headquarters  
Houston, US      Oil & Gas  
Chicago, US      Railroad

## HOTSTART Europe & Asia

Köln, DE      Marine  
Birmingham, GB      Sales & Service  
Tokyo, JP      Sales & Service

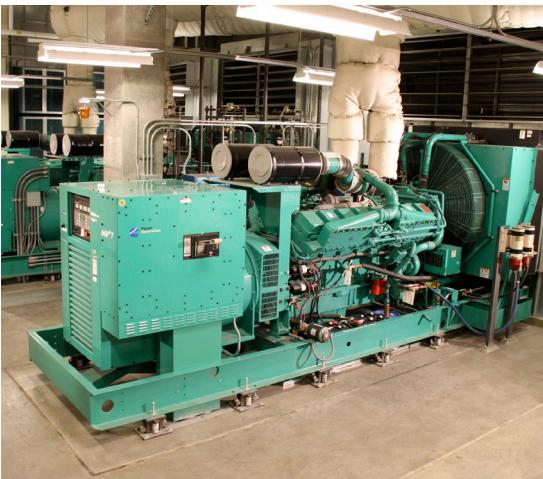
## HOTSTART Worldwide

Distributors: North America,  
South America, Europe,  
Asia, and Australia

# Global Markets



# Diverse Established Markets



Generator



Marine



Truck & Bus



Hazardous Locations /  
Oil & Gas



Rail



Heavy Equipment



# Thermal Management Systems (TMS)



Thermosiphon  
Heaters



Forced  
Circulation



Forced  
Circulation



Forced  
Circulation



Forced  
Circulation



Hazardous  
Location  
Systems

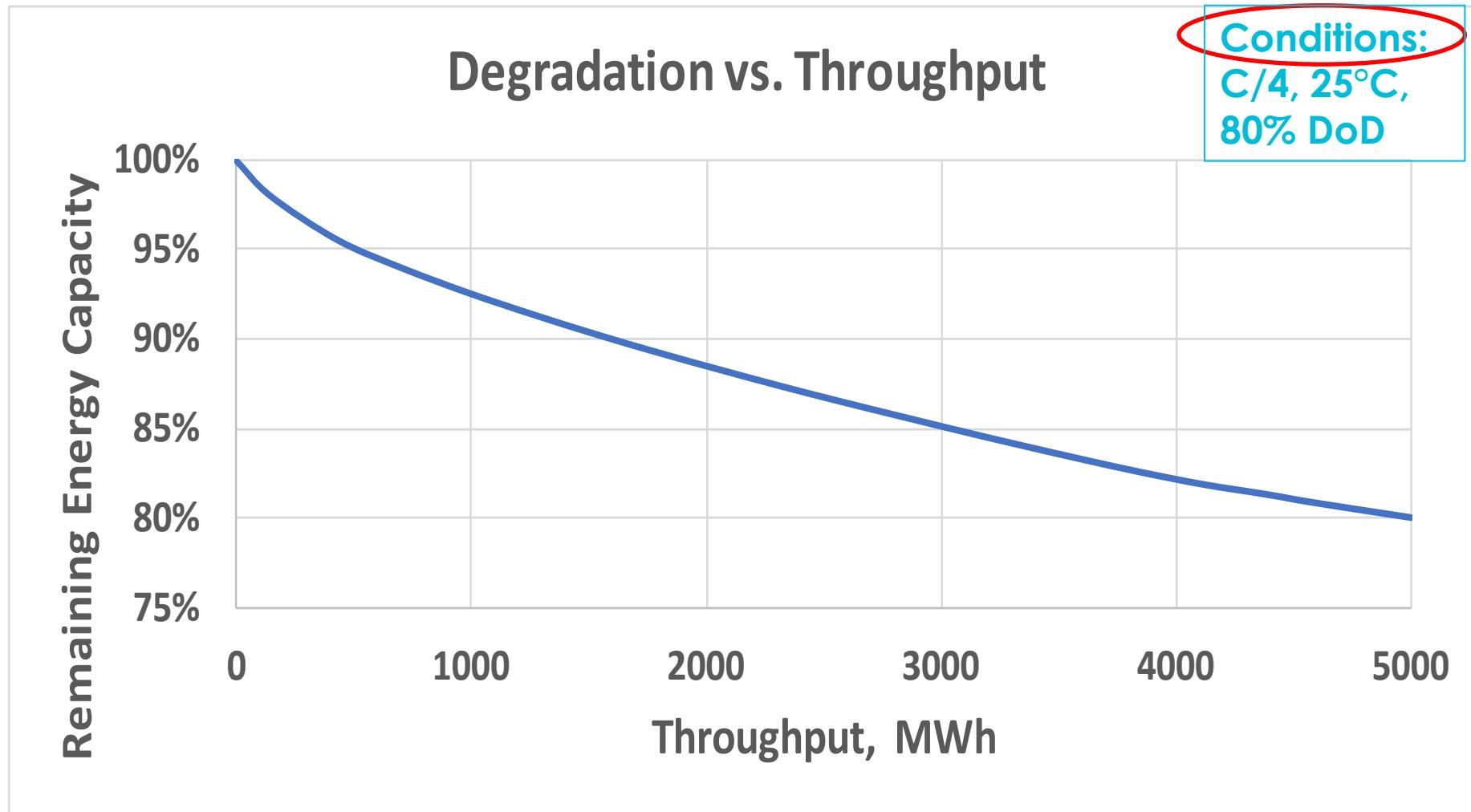


Heater  
w/Auxiliary  
Power Unit



Controls &  
Accessories

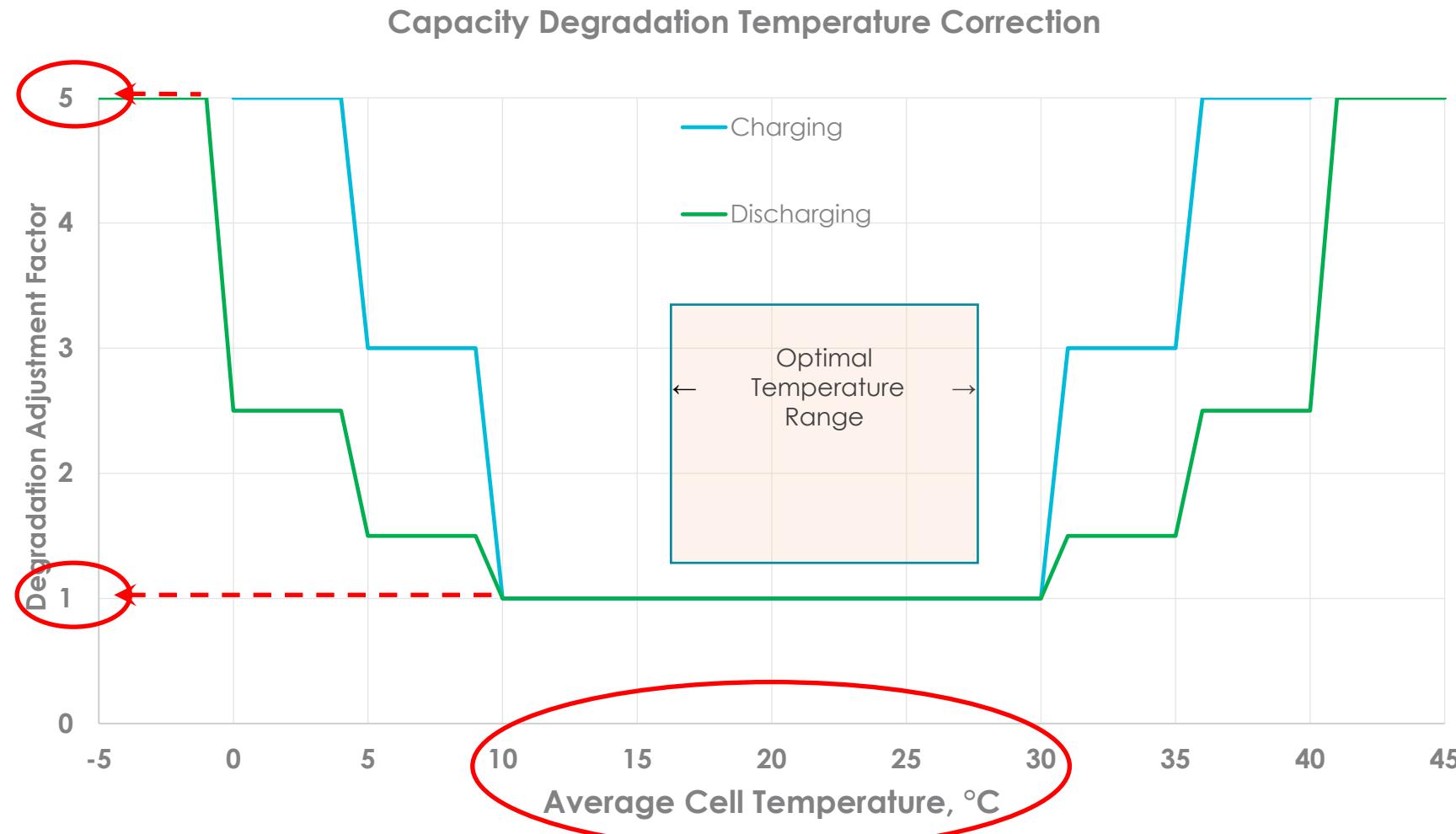
# Li-Ion BESS Performance Under Scrutiny



Infocast Energy Storage Webinar Presentation, 8/11/20  
Ned West, PE, Southern Co.



# Li-Ion BESS Performance Driven By Temperature



Infocast Energy Storage Webinar Presentation, 8/11/20  
Ned West, PE, Southern Co.



# The Need for Robust Thermal Management Systems (TMS), Not Just BMS

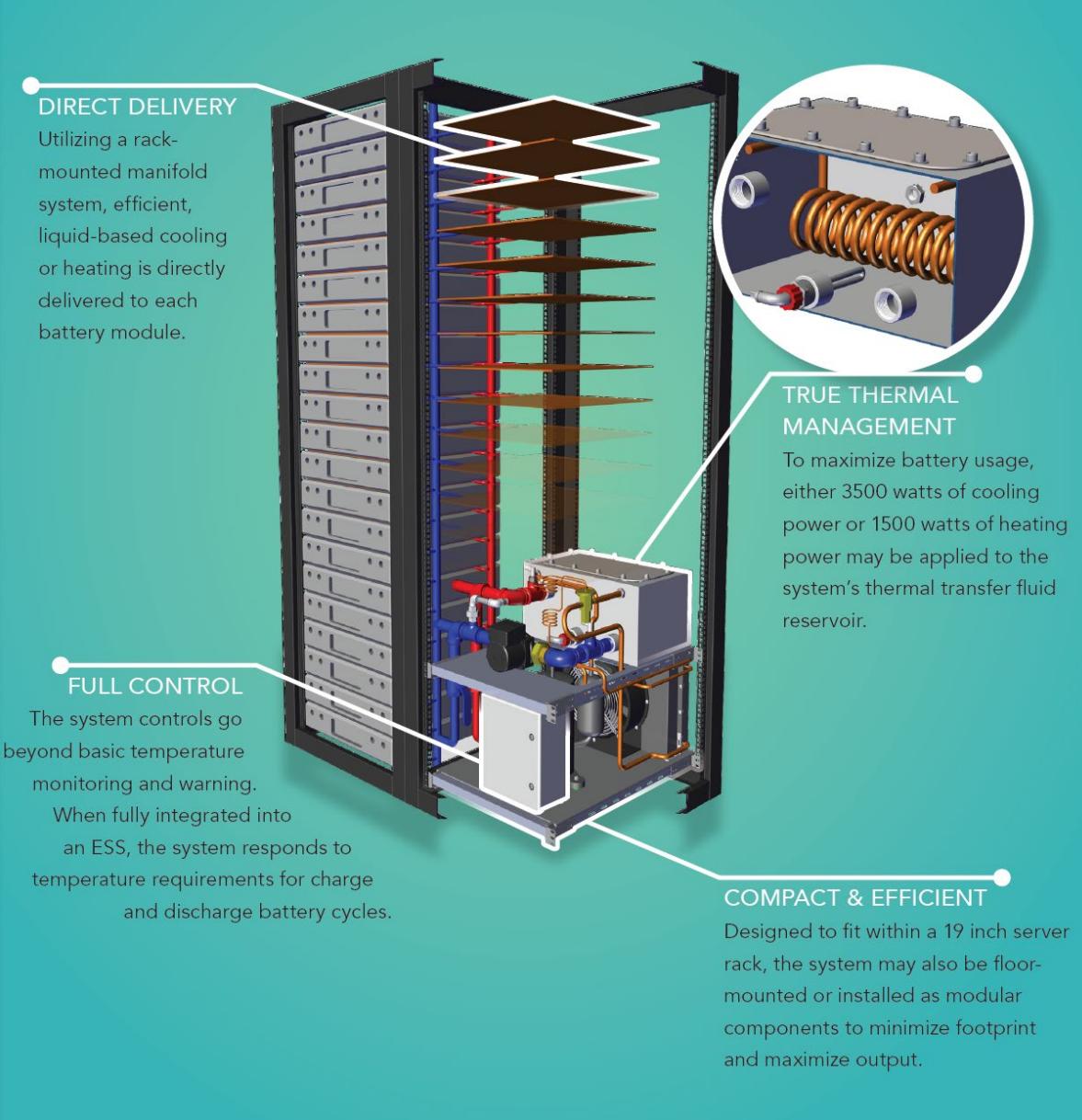
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Russ Weed, CleanTech Strategies

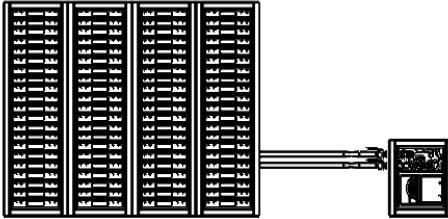
2019 ESS Safety & Reliability Forum - US DOE Energy Storage Systems Program  
March 7, 2019



# Liquid TMS Should Be The Standard for Li-ion ESS

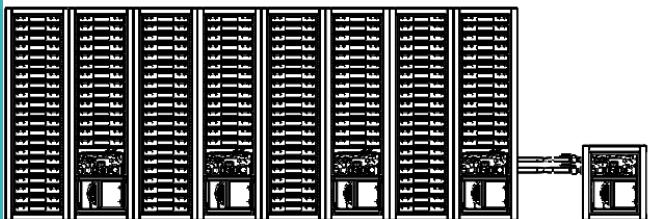


# Liquid TMS Should Be The Standard for Li-ion ESS



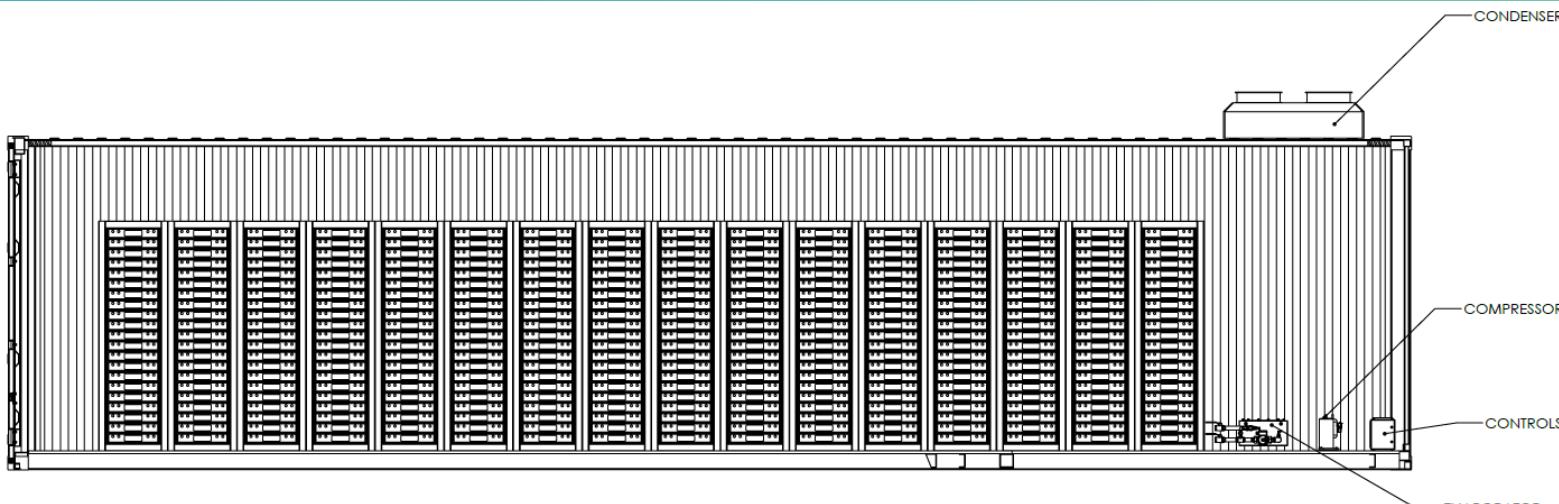
## CO-LOCATED CONFIGURATION

TMS System can be located anywhere within enclosure or equipment room for installation flexibility.



## REDUNDANT SYSTEM CONFIGURATION

Spare TMS System is plumbed into the entire rack. Electronic valves and controls can detect faults, isolate malfunctioning systems, and substitute stand by units, with no service call.

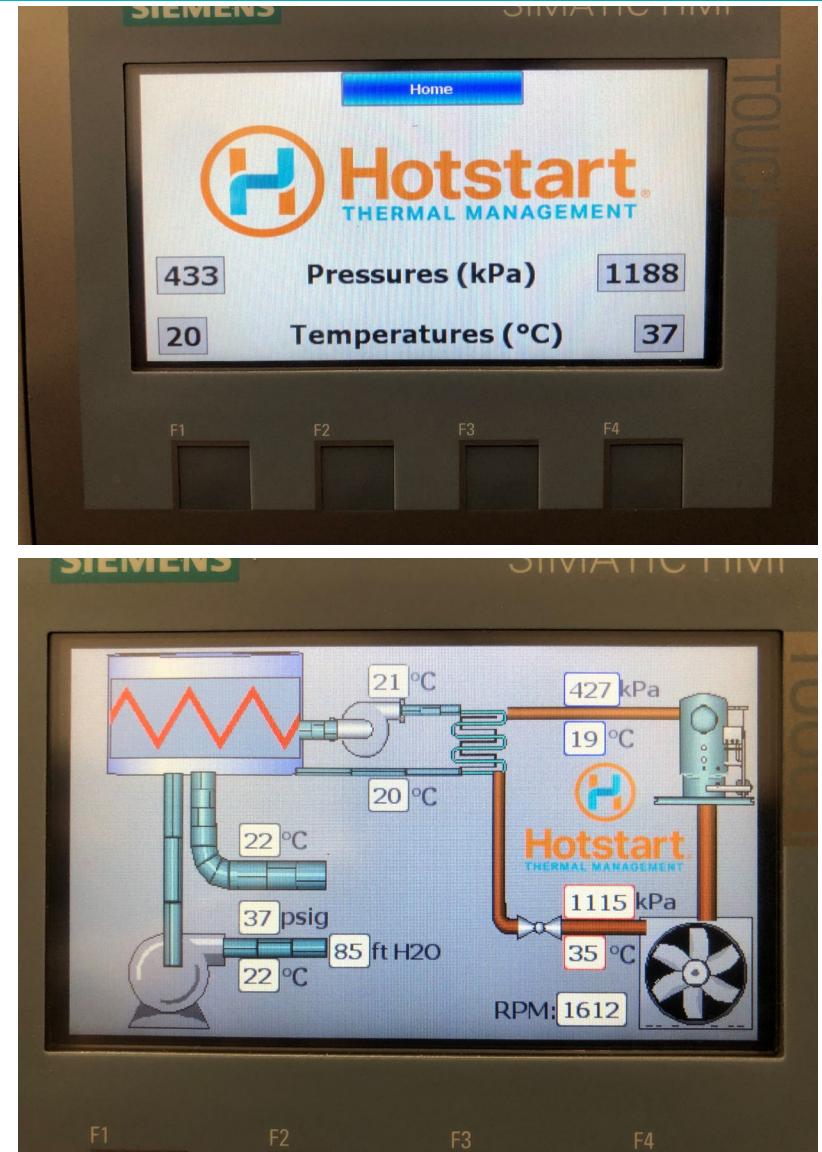


## MODULAR SYSTEM CONFIGURATION

TMS System can be installed with individual components located anywhere in enclosure or equipment room for maximum installation flexibility. We will work with your engineers to provide custom mounting, wiring, and plumbing solutions that can be designed to fit wherever you have free space.



# Hotstart TMS Prototype – Sept. 2020





# Hotstart TMS Product – Feb. 2022

## Chillers & Controls

- **C&I (350kWh BESS)**  
4kW cooling  
2.5kW heating  
Integration with BMS  
Condensation control
- **Utility/IPP (2MWh BESS)**  
In engineering



## Cold Plates & Racks, Fluid Distribution System



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## DESIGNING FOR THE FUTURE

“It’s an exciting time to make the world a better place as we help customers with their energy transition, energy storage, and energy efficiency.”

—Terry Judge, CEO

