



## BESS Enclosure Design for Extreme Cold Environments

### FEATURES:

#### Triple Layer Insulation Panel

Structure protection layer, barrier film layer, and heat-sealing layer are combined in less than 5mm for a superior R-value insulation, up to R66, reducing the thermal conductivity and stabilizing the cabinet environment.

#### Multi-level Temperature Monitoring

Battery cell level, string level and system level temperature data are closely monitored by the PLC, automated to control the HVAC system and achieve the best system performance.

#### Enhanced HVAC Unit

Battery energy storage units have flexible HVAC sizes to provide heating and cooling capacities based on project requirements.

#### Optional Heating Unit

There is provision for additional heater for extreme weather condition projects, where the PLC communicates with the heater directly to maintain minimum power consumption.

### BACKGROUND:

Remote locations are characterized by a lack of reliable electrical transmission grid and often frigid temperature conditions. It is especially true in the Canadian North and there are frequent inquiries for systems for low temperature applications of  $-50^{\circ}\text{C}$  and below.

### CHALLENGES:

BESS operation in such extreme cold conditions requires huge power consumption from the HVAC unit and regularly requires mid-operation intervention to protect the BESS.

### TROES' SOLUTION:

TROES has developed battery energy storage solution employing triple layer insulation panels for enclosures, supplemented by multi-level temperature monitoring that minimizes HVAC and BESS operation costs in extreme cold conditions. The on-board PLC monitors the enclosure environment to carefully adjust the fan speed, HVAC unit load and heater power rate to maintain the optimal temperature for every battery cell. In addition, NEMA 3R equivalent storage unit keeps the precious battery packs clean and dry.