Alpine Microgrid & Sub-Zero Battery System Engineering Specifications

Technical Standards for Extreme High-Altitude Photovoltaic and Hybrid Redox Storage Systems

ALPINE RENEWABLE MICROGRID ENGINEERING SPECIFICATIONS

Sub-Zero Climatic Design Criteria

Operational ambient temperature design limits: -40℉ (-40℃) to 95℉ (+35℃).
Structural wind survival rating: 125 mph (56 m/s) with 1.5 inches of radial glaze ice accretion.

Bifacial Photovoltaic Array Specifications

? Module Type: 540W N-Type TOPCon Dual-Glass Bifacial Photovoltaic Modules.
? Mounting Substructure: Hot-dipped galvanized ground mount with motorized 25°?65° tilt actuator.
? Snow-Shed Mode: Automatic 65° tilt trigger when acoustic sensors detect >2 inches snow accumulation.

Energy Storage Architecture

? Primary Base: 100 kWh Vanadium Redox Flow Battery (zero capacity degradation, non-flammable).
? Fast-Response Buffer: 120 kWh Lithium Iron Phosphate (LFP) with ground-source geothermal heating jacket.
? Inverter Control: Grid-forming bi-directional inverters with autonomous black-start microgrid controller.