

Real-World Case Study: 1MWh Solar Storage with Novec 1230 in Coastal Salt-Spray

2025-11-19 09:28

Contents

- [The Silent Threat to Coastal Energy Storage](#)
- [Beyond Corrosion: A Multi-Layered Problem](#)
- [A Coastal Case Study: The Florida Project](#)
- [Why Novec 1230 Was the Right Choice](#)
- [The Critical Link: Thermal Management & System Design](#)
- [Practical Advice for Your Coastal Deployment](#)

The Silent Threat to Coastal Energy Storage

Honestly, when most people think about deploying battery storage, they focus on the big-ticket items: cell chemistry, inverter efficiency, or upfront capital cost. And those are crucial. But after two decades on sites from the North Sea to the Gulf of Mexico, I've learned that the most persistent, insidious challenges often come from the environment itself. Especially near the coast.

If you're planning a solar-plus-storage project in a coastal area C think Florida, California, the Mediterranean, or the North Sea coast C you're not just dealing with high humidity. You're dealing with a constant, fine mist of salt spray. This isn't just about surface rust; it's a full-spectrum assault on your system's reliability, safety, and ultimately, your return on investment. The [National Renewable Energy Laboratory \(NREL\)](#) has highlighted how environmental factors can significantly impact BESS performance and lifespan, and salt spray sits right at the top of that list for coastal sites.

Beyond Corrosion: A Multi-Layered Problem

Let's break down what salt spray really does. First, the obvious: accelerated corrosion. Electrical connections, busbars, enclosure frames C they all degrade faster. This increases resistance, creates hot spots, and can lead to catastrophic failures. I've seen connection points that looked fine during commissioning fail a thermal scan after just 18 months in a salty environment.

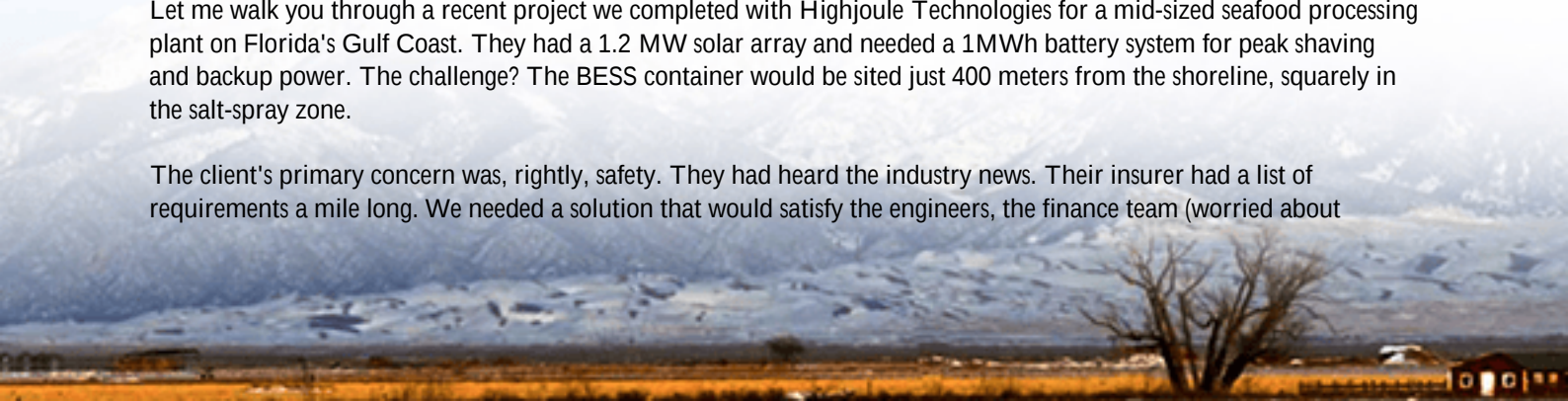
But the second, less-discussed issue is salt creep. These microscopic salt crystals migrate everywhere. They can bridge isolation gaps on PCBs, interfere with sensor readings, and, most critically, compromise the sensitive detection systems of your fire suppression system. If your smoke or heat detectors are coated in a conductive salt film, you risk either false alarms or, worse, a failure to alarm when needed. This directly challenges compliance with safety standards like UL 9540 and NFPA 855, which demand fail-safe protection.

The third layer is the fire suppression dilemma itself. Traditional water-based or even some clean agent systems can be problematic. Water on lithium-ion battery fires is a complex issue, and in a corrosive environment, any residual moisture from suppression can exacerbate corrosion long after the event is over. You need a system that's effective, leaves no residue, and is itself immune to the environment.

A Coastal Case Study: The Florida Project

Let me walk you through a recent project we completed with Highjoule Technologies for a mid-sized seafood processing plant on Florida's Gulf Coast. They had a 1.2 MW solar array and needed a 1MWh battery system for peak shaving and backup power. The challenge? The BESS container would be sited just 400 meters from the shoreline, squarely in the salt-spray zone.

The client's primary concern was, rightly, safety. They had heard the industry news. Their insurer had a list of requirements a mile long. We needed a solution that would satisfy the engineers, the finance team (worried about



LCOE - Levelized Cost of Energy), and the risk managers.

Our design started with the enclosure: a specially coated, corrosion-resistant container with positive pressure filtration to keep salt-laden air out. But we knew the heart of the safety case was the fire suppression system. After evaluating several options against the specific threat profile C lithium-ion thermal runaway in a corrosive environment C we specified a dedicated Novec 1230 fluid-based system for the battery racks.



Why Novec 1230 Was the Right Choice

Novec 1230 isn't a new magic bullet, but for this environment, its properties were perfect. First, it's a clean agent. It extinguishes fire primarily by removing heat, without leaving any residue. That means no secondary damage to the untouched battery modules or electrical components from the suppressant itself. After a discharge, you're not left with a corrosive slurry mixing with salt deposits; you ventilate the space and you can assess the damage cleanly.

Second, its design concentration is safe for occupied spaces, which matters for maintenance crews. But for me, the key onsite advantage was its stability. The fluid is non-conductive and doesn't react with the salt. We could be confident that the system's pipes, nozzles, and pressure vessels wouldn't degrade from the inside out due to the ambient conditions. It's a sealed, reliable system that sits there passively until you absolutely need it C and then it works.

Integrating it, we paired it with very early warning VESDA (aspirating smoke detection) systems, placed strategically to avoid salt buildup, and thermal cameras for a dual-layer detection approach. This multi-layered safety design was a major factor in getting swift approval from the local AHJ (Authority Having Jurisdiction) and a favorable rating from the insurer.

The Critical Link: Thermal Management & System Design

Now, a critical insight from the field: your fire suppression system cannot work in isolation. It's your last line of defense. Your first line is impeccable thermal management. In a salty, humid environment, managing the C-rate C the rate at which you charge and discharge the battery C becomes even more critical. Pushing a high C-rate generates more heat. If your cooling system is fighting against clogged filters from salt and is working overtime, efficiency drops and thermal

stress on cells increases.

For the Florida project, we oversized the HVAC system with corrosion-resistant coils and used a lower, more conservative C-rate for daily cycling. This slightly reduced the instantaneous power draw but dramatically increased the system's resilience and projected lifespan. When you calculate the LCOE, that longer lifespan and reduced maintenance cost from avoiding thermal stress and corrosion often outweighs the marginal benefit of a more aggressive cycling strategy. It's about sustainable performance, not just peak output.

Practical Advice for Your Coastal Deployment

So, what's the takeaway if you're evaluating a similar project? Based on this and other deployments, here's my advice:

- **Treat Salt Spray as a Design Driver, Not an Afterthought:** Specify IP56 or higher enclosures, corrosion-resistant materials (e.g., stainless steel for key fittings), and positive pressure with proper filtration from day one.
- **Choose a Fire Suppression System for the Environment:** Look for clean agents that are non-corrosive, leave no residue, and are compatible with your BESS's internal materials. Novec 1230 proved excellent in this case, but the principle is selecting for the hazard.
- **Integrate Detection and Suppression Holistically:** Ensure your detection (smoke, heat, gas) is as hardened against the environment as your suppression hardware. Plan for easy access for inspection and cleaning.
- **Derate for Durability:** Consider a more conservative C-rate and oversize your thermal management system. The marginal loss in peak throughput is cheap insurance for long-term reliability and safety.
- **Partner with Experience:** Work with a provider like Highjoule who has the deployment history to understand these interactions. It's not just about supplying a UL 9540-certified system; it's about knowing how that system behaves in the real world, year after year, in your specific micro-climate.

The goal isn't just to install a BESS. It's to install confidence. In a coastal salt-spray environment, that confidence is built on recognizing the unique threats and engineering every layer C from the container seal to the final fire suppression discharge C to work in harmony against them. Got a project in a challenging environment you'd like to brainstorm about? Sometimes the best insights come from a conversation about what can go wrong, long before we ever break ground.

Author: James Zhang

20+ years agricultural energy storage engineer / Highjoule CTO

URL: <https://justenergy.co.za/articles/real-world-case-study-of-novec-1230-fire-suppression-1mwh-solar-storage-for-coastal-salt-spray-environments>

