ElectricFish

Pilot Case Study:

ElectricFish's battery microgrid integrated EV charger

350^2

Black Rock City

August - Sept 2025

1. Executive Summary

Each year in Nevada's Black Rock Desert, the Burning Man event in Black Rock City emerges as a temporary large-scale community of more than 70,000 people. Built through Communal Effort, participatory creativity, and experimentation, Black Rock City is the world's largest leave-no-trace event. The nonprofit that produces Black Rock City annually, Burning Man Project published its 2030 Sustainability Roadmap in 2019. The Roadmap set three ambitious goals: Handle Waste Ecologically, Be Regenerative, and Be Carbon Negative. Transitioning to electric transportation will help Burning Man Project to achieve these targets, but it requires charging infrastructure capable of withstanding the extreme conditions of the Black Rock Desert. In August 2025, ElectricFish deployed its Generation Dory 350squared™ system with Burning Man Project to test whether its advanced energy infrastructure could survive and thrive in one of the harshest environments on Earth.

The answer was a resounding yes. Within hours of arrival, the 350squared™ was operational, charging vehicles at up to 350 kW and providing critical mobility for over eight stranded EVs, and approximately 30 sessions — including Tesla, Rivian, Cybertruck, and Chevy Bolt vehicles that otherwise could not have left the playa without an expensive tow. The system maintained over 99% uptime, despite its internal temperature reaching as high as 55 °C (131 °F) in desert conditions, and tolerated ambient lows of 10 °C (50 °F), intense sideways rain, 55 mph gust-driven dust storms — all while delivering more than 400 miles of range in a single day's sessions. For ElectricFish, Black Rock City was a laboratory, a stage, and a mirror. It taught us not just what its product can do, but what role it might play in disaster relief, community microgrids, and the future of sustainable events.

"We are very excited at the potential for this successful demonstration pilot. Off-grid fast-charging capabilities in Black Rock City can be a catalyst for a number of potential opportunities to explore innovative green energy storage and distribution models as we collectively re-imagine a fossil fuel-free Event by 2030." - **George B. Reed III, Director of Regeneration at Burning Man Project**

Table 1: Summary of pilot objectives and outcomes

Objective	Status	Results
Rapid and low cost installation	✅	5 hours, $0 install costs
Off-grid charging	✅	33 sessions delivered without grid connection
Uptime & resilience	✅	>99% uptime during storms, dust, and heat
EV interoperability	✅	Supported Rivian, Tesla Model Y, Cybertruck, Chevy Bolt
Temperature resilience	✅	Maintained safe operations from 10°C to 55°C
Community support	✅	Enabled >1,000 miles of mobility across multiple days

2. **Learnings:**

Human Factors

- Behavioral inefficiencies emerged: vehicles were left connected post-charge, blocking access for others. Enforcement of strict dwell-time policies is essential.
- Display messaging must be culturally contextualized to resonate with community norms.
- The project highlighted the importance of rigorous project management and pre-deployment role delineation, ensuring all stakeholders possessed clarity of responsibilities on arrival.
- The charger functioned as a social nexus, offering stranded drivers both energy and psychological relief.
- The installation of the fence required tough access to the cables, and hence either non-fences installations or a bigger square fence would be required for vehicles being able to pull in from both sides to charge.

Technical Factors

- Independent operation of diesel gensets necessitates automated transfer devices to prevent backfeed.
- Conventional insulation and waterproofing were insufficient against ultrafine playa dust, requiring higher-grade ingress protection
- HVAC efficiency degraded over time due to particulate accumulation, increasing parasitic loads; specialized filtration is required for desert environments.
- The EF Reef™ platform was indispensable for real-time monitoring of thermal conditions and charging sessions under volatile conditions.
- Thermal cycling of 25–30 °C (77–86 °F daily range, with lows of 10 °C / 50 °F and highs of 40 °C / 104 °F) accelerates battery degradation, necessitating derating models for such climates.
- Air-cooled chemistries performed adequately; liquid cooling would demand dust-resistant external heat exchangers.
- Satellite internet is highly robust, and works well in high winds, rainfall, and should be used for connectivity of systems with each other.
- Ground rods ensured stability and protection against faults, but removal was onerous. Future deployments require a detachable grounding system to balance safety with the Leaving No Trace principle.

Strategic Implications

- Conditions in Black Rock City approximate disaster zones, wildfire corridors, and coastal evacuation routes, suggesting strong translational value of the architecture.
- Hybridization with diesel showed that binary load profiles (~20 kW or 0) improve genset efficiency when appropriately sized.
- Coupling units with ~50 kW solar arrays could create modular distributed grids, each capable of delivering ~1,200 electric miles/day, and the software layer can help pilot a distributed grid approach.
- Early deployments could electrify localized fleets (e.g., mutant vehicles) and scale to serve critical evacuation transport in crisis scenarios.

3. Project Partners

This project was made possible in collaboration with Burning Man Project's Regeneration Department as site host and community convener, and a generator provided by United Rentals to power the ElectricFish 350Squared.

4. Pilot objectives and metrics

The Black Rock City deployment was designed as a testbed for resilience, interoperability, and community impact in one of the harshest off-grid environments on Earth. The objectives were both technical and human: to test the durability of the 350squared™ system and to validate its suitability for temporary community applications such as the Burning Man event in Black Rock City, while also examining how lessons from this deployment might inform the use of extreme-fast charging in disaster response and other emergency contexts.

Objectives

- Demonstrate rapid deployment and commissioning: Validate that the system could be shipped, installed, and made operational within hours.
- Validate off-grid and hybrid operations: Prove the ability to operate with limited generator support and solar integration opportunities, while preparing for full islanding in future iterations.
- Deliver extreme-fast charging under harsh conditions: Provide EV charging speeds equivalent to gasoline refueling, even in desert heat, dust storms, and high-load scenarios.
- Support community resilience: Enable stranded EVs to exit safely, while exploring future applications for fast charging of small / BESS powering camps and distributing stored solar energy.
- Test system resilience and thermal stability: Characterize performance across 10 °C to 55 °C, evaluate dust and storm endurance, and benchmark cooling system performance.
- Evaluate interoperability and user experience: Test compatibility with multiple EV makes/models (Rivian, Tesla, Cybertruck, Chevy Bolt) and gather insights on how users perceive and interact with short, ultra-fast charging sessions.
- Gain insights for product development: Identify design improvements (e.g., ATS switch for safe islanding, auxiliary slower chargers, improved user communication).

Key Metrics

- Deployment speed: <5 hours from delivery to first charging session.
- Charging sessions: 33 total sessions completed.
- Energy delivered: ~620 kWh across sessions, equivalent to ~2,000 miles of range.
- Peak session: 68.5 kWh delivered to a Rivian at 150 kW peak power. Max 119 kWh delivered in a single day (~400 miles).
- System uptime: >99% despite storms and dust exposure.
- Thermal stability: Maintained safe operation across 10–55 °C external temperatures, with internal cycling averaging 30 °C.
- Interoperability: Successful across Rivian, Tesla Model Y, Cybertruck, and Chevy Bolt; one failure with older Tesla Model S mitigated with fallback Level 2 charging.
- User experience: Quick initiation, intuitive operation, successful adoption even by first-time users.
- Fuel dependence: Minimal diesel generator use limited to 158.6 gallons of Diesel; majority of operation battery-driven.

5. Introduction to Technology

Figure 2: ElectricFish unit deployed at Black Rock City 2025

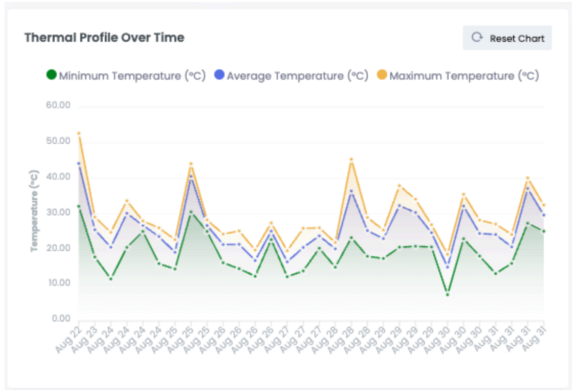

Figure 3: Temperature profile over the week at Black Rock City

4.1 The 350squared

The ElectricFish 350squared™ is a next-generation, battery-integrated ultra-fast charging system designed to operate where the grid cannot. At its core is a 400 kWh energy storage system, paired with dual 350 kW charging outputs, capable of delivering the EV equivalent of a full tank of gasoline—200 miles of range in under 10 minutes.

Unlike conventional DC fast chargers that require multi-year, high-voltage grid upgrades, the 350squared™ connects with only a 30 kW grid interconnection, allowing it to island as a self-sufficient microgrid during outages. In off-grid mode, it can both charge vehicles and backfeed critical loads, making it a reliable temporary power source or a resilience hub in emergencies.

Deployed in hours rather than months, it provides the speed and reliability of fueling infrastructure in a format that is modular, mobile, and future-proof.

This combination of extremely fast charging, load management, and islanding makes the 350squared™ uniquely suited for events and temporary communities, disaster response zones, wildfire-prone regions, coastal blackout recovery, and remote communities.

In effect, the 350squared™ brings gas-station-like refueling speeds to electric mobility, but with the added intelligence of energy storage, software optimization, and grid services. It is not just a charger, but a distributed power plant ready to support communities when and where they need it most.

Figure 4: Rivian plugged into the CCS part of the charger.

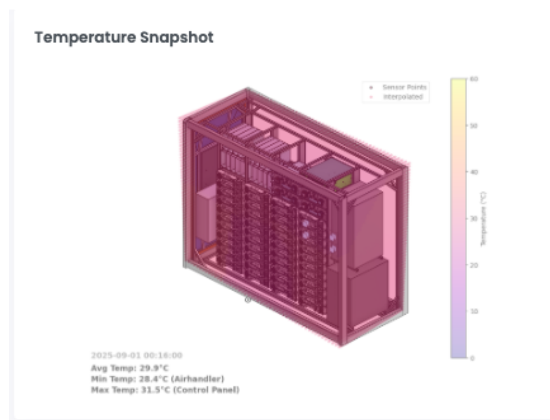

Figure 5: Snapshot of thermal profile of the system

4.2 Specs Overview

Dual 350 kW ports (CCS + NACS) → 200 miles in 10 minutes.
350 kWh usable battery → off-grid power & resilience.
Stargazer™ Optimization Engine → demand response, load balancing, and predictive charging.
REEF Data Platform → real-time monitoring of performance, renewables intake, and resilience.

Form factor → 8.2 ft × 4 ft × 7.45 ft; 9,250 lbs; deployable in <48 hours.
UL compliant → UL9540 / UL2202 compliant, OCPP 2.0 communication.

4.3 Stargazer

Stargazer™ is the intelligence layer that transforms the 350squared™ from a static energy device into a living, adaptive microgrid. It is its AI optimization engine that forecasts energy demand, manages supply, and learns continuously, ensuring the system operates with maximum efficiency and resilience while reducing its unit's battery degradation. In an off-grid environment, where there is no stable grid to lean on, Stargazer enables the unit to operate like a min utility, making decisions in real time to balance fast EV charging with community-critical energy needs.

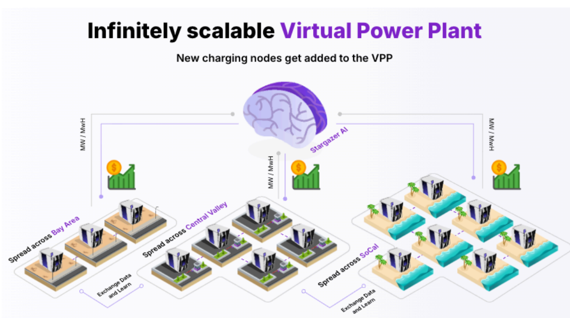

Figure 6: The software layer turns the system into a network

This intelligence is what allows the 350squared™ to charge entirely from off-grid generation sites such as solar panels, storing excess daytime generation in its 400 kWh battery and then delivering it back to vehicles or local loads at night. In disaster zones or remote communities, this capability makes the system more than an EV charger—it becomes a resilience hub, capable of powering emergency vehicles, medical equipment, and camps when the grid is absent or down. Additionally, Stargazer's degradation model recognizes that fast charging on a 40 °C day stresses batteries more than the same session in cooler weather. By shifting loads to cooler periods or activating the cooling system strategically, Stargazer extends battery life by as much as 30% while still delivering gasoline-like refueling speeds. In effect, it ensures that the promise of extreme fast charging does not come at the cost of longevity.

4.4 Reef Energy management

Reef is ElectricFish's unified analytics layer for EV charging and distributed energy built for stakeholders whom we deliver for. It pulls the whole system into view at once: charging sessions and utilization, battery state of charge and available storage, thermal behavior and component health, user interaction patterns, and energy costs and revenues.

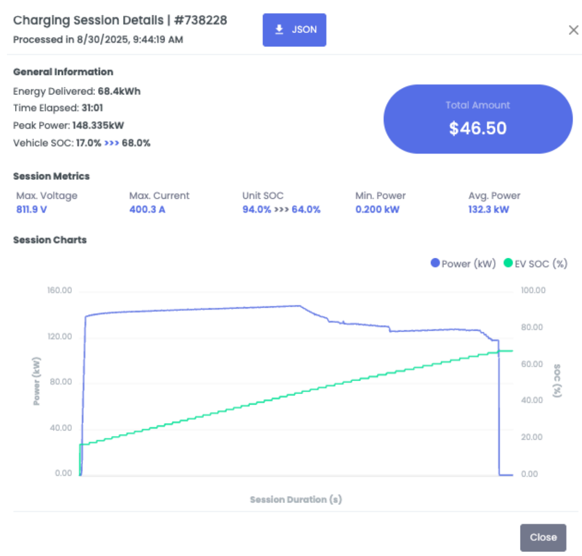

Figure 7: A typical charging session

ElectricFish's Reef dashboard provides comprehensive, real-time and longitudinal analytics and telemetry on system performance.

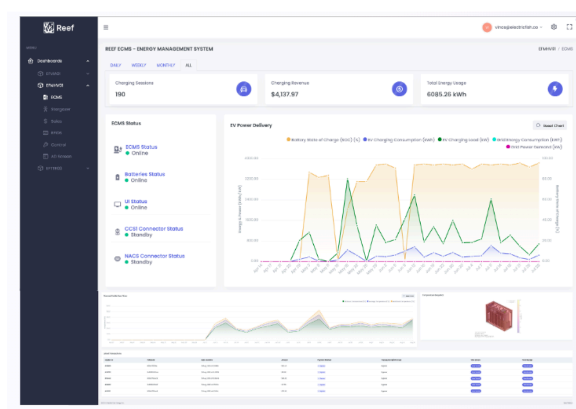

Figure 9: Reef home dashboard

5 Deployment and installation costs

	Details	Invoiced expenses
Shipping	San Carlos to Black Rock City Trucking	$5,950
	Rigging for loading (EF forklift)	$0
	Rigging for unloading (BM forklift)	$0
	Black Rock City city to San Carlos	$2,800
Rental of equipment for 9 days	Gifted to Black Rock City	$0
Insurance	Certificate of Insurance with project partners added as Named Insureds	$500
Installation	Electrical permitting and installation	$0
Maintenance	Liquid replenishing	$80.00
	Grounding rods and other upgrades	$263.94
Administrative	Travel- testing vehicles	$1,004.97
	Lodging	$575
Total		$9,351.91

Table 3: Itemized shipment, installation, and maintenance cost

6 Successes and Failures

The 350squared™ was up and running within five hours of arrival, delivering its first charge almost immediately. Over the course of the event, it completed 33 charging sessions across Rivian, Tesla Model Y, Tesla Cybertruck, and Chevy Bolt vehicles, providing more than 2,000 miles of range. The biggest single session, a Rivian, received 68.5 kWh—about 200 miles—at a peak rate of 150 kW. On its busiest days, the unit delivered over 400 miles of range in a single day's operation.

Despite extreme desert conditions, with temperatures ranging from 10 °C at night to 55 °C at midday, the system's cooling held steady, averaging around 30 °C internally. Dust storms, sudden rain, and lightning caused no leakage or operational failure, thanks to protective measures like taped seals and reinforced labeling. Users found the system intuitive, with charging sessions initiated quickly and easily. Fuel consumption from supporting diesel generators was kept minimal, underscoring the unit's efficiency.

Only one significant interoperability issue occurred, when an older Tesla Model S failed to handshake with the DC fast charger. The team mitigated this by providing fallback Level 2 charging at ~4 miles per minute, ensuring the driver could still leave the playa.

7. Conclusion

The Burning Man event in Black Rock City was the perfect backdrop for an ElectricFish deployment, and provided key learnings to fine-tune for the world's most austere environments for the future. There are 3 steps underpinning our story. Step 1 was survival, bringing a generator-backed fast charger into one of the harshest, dustiest settings on Earth, proving that this system can endure where others fail. The lesson was clear: in remote environments, success depends not only on the charger itself, but on careful integration with the power source, controls, protection systems, and operating context.

Step 2 points forward: exploring partnering with solar-powered camps to capture and store their daytime generation. Step 3 is transformation: using its 400 kWh reservoir to recharge small battery packs for other camps, distributing clean energy across Black Rock City so participants can power their art, kitchens, and lives as easily as they can fuel their vehicles.

ElectricFish's deployment with Burning Man is a blueprint for **resilient, community-scale energy systems**: fast charging when people need to move, reliable storage when the grid is absent, and shared distribution that makes clean energy practical at the edge. With civic support and rental partners, what began as a desert trial can evolve into a model for **disaster relief, community microgrids, and off-grid electrification worldwide**.

Our learnings on the playa were clear. Technically, the system is as tough as we expected: it handled extreme heat, dust, and constant demand. But we also discovered opportunities to grow. Adding an **automatic transfer switch** will allow us to island safely without backfeeding generators. Clearer user guidance—like reminding drivers that sessions are limited to 30 minutes—can smooth the experience. And recognizing subtle issues, like EV self-discharge in desert heat, points us to designing slower, auxiliary chargers for diversity of needs.

Perhaps the most profound shift was human. We saw drivers realize, many for the first time, that **owning an EV doesn't mean vulnerability in remote conditions—it can mean freedom**. We proved that charging can be as quick as fueling, even off-grid, even under the most extreme circumstances.

The playa affirmed that our product is not just infrastructure; it is culture-shaping. It showed us that with resilience, intelligence, and community, we can make electric mobility not only possible, but joyful—even in the middle of the desert.

The playa is a crucible. In it, ElectricFish proved that its technology can withstand extremes of nature, culture, and community. From stranded Teslas to solar-linked microgrids, from storms to sunrise, the 3502™ system endured—and delivered.

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