

EXECUTIVE SUMMARY

This white paper outlines the complete repowering of solar PV systems across seven dialysis clinics in Northern Alabama and southern Tennessee. The project was initiated by Fresenius Medical Care to address early failure issues with previously installed Lead Solar LS700 microinverters. Each site has been upgraded with NEP BDM800-GR microinverters, arranged within Global RAIS®' proprietary Redundant Inverter Bus (RIB) 3-phase architecture. The upgrades provide improved performance visibility, greater system uptime, and long-term durability with a 25-year warranty. The repowering process was executed without disrupting clinical operations and serves as a technical model for solar retrofit in critical infrastructure.

Technical Overview: Solar Microinverter Repowering at Northern Alabama Dialysis Clinics

In Q1 2025, Fresenius Medical Care completed a comprehensive repowering of rooftop solar arrays at seven dialysis clinics across Northern Alabama. This project involved replacing all Lead Solar LS700 microinverters—previously installed between 2015 and 2019—with NEP BDM800-GR 208V microinverters. The retrofit was driven by early component failures due to water intrusion and the exit of the original manufacturer from the market.

System Design and Equipment Summary

The original installations utilized LS700 microinverters integrated into a Redundant Inverter Bus (RIB) from TenK Solar. Spectrum Solar LLC d/b/a Global RAIS® purchased the IP and related assets of TenK Solar in 2019. These RIBs experienced high failure rates under normal rooftop conditions and Global RAIS® worked with Northern Electric Power (NEP) to develop a new microinverter to replace the Lead Solar equipment used in the original installation.

Redundant Inverter Bus (RIB) Architecture

As part of the repowering design, Global RAIS® deployed its patented Redundant Inverter Bus (RIB) architecture. Each of the 36 RIBs integrated 12 NEP BDM800-GR microinverters wired in parallel on a shared DC bus. This configuration enables shared inversion among inverters, improving efficiency and reliability by reducing the operational duty cycle of individual units.

The RIB functions as a distributed AC output system, where microinverters draw from a common DC source and operate independently based on load requirements. This design eliminates single points of failure and provides intelligent load balancing across all inverter components. Additionally, the modular nature of RIBs allows scalable deployment—multiple RIBs can be configured to match a wide range of PV system capacities.

Locations and System Size Information

All sites used non-penetrating; ballasted racking systems mounted on the clinic facility rooftops. As part of the repowering, every inverter was replaced, and monitoring infrastructure was updated to support NEP's power-line communication (PLC) with module-level visibility for real-time reporting.

Clinic Location	AC Capacity	# TenK Modules	# NEP Inverters
Elk River (Fayetteville, TN)	21.6 kW	82	36
Scottsboro, AL	36.0 kW	120	60
Albertville, AL	36.0 kW	120	60
Cullman, AL	25.2 kW	66	42
Lakeview (Arab, AL	31.5 kW	102	54
Chase (Huntsville, AL)	37.8 kW	120	60
Endeavor (Huntsville, AL)	27.0 kW	96	48

Monitoring & Performance Improvements

Each NEP BDM800-GR microinverter communicates with a gateway that uses a PLC-based communications protocol for module-level performance tracking. The upgrade allows for real-time diagnostics, enhancing O&M capabilities while minimizing truck rolls. All units carry a 25-year manufacturer warranty, significantly extending the expected operational life of the system.

Installation and Coordination

The repowering effort was conducted with no disruption to clinical operations. Global RAIS® (Spectrum Solar LLC) managed site coordination, while Thomas Electric of Huntsville served as the licensed electrical contractor. The project was internally funded by Fresenius Medical Care in collaboration with the clinic owner, Dr. Todd Broome.

"When we first evaluated the repowering options, safety and reliability were paramount. The low-voltage TenK architecture provided by Global RAIS® delivered a uniquely resilient solution. With no high-voltage DC present on the roof and a fully distributed, redundant inverter design, we have confidence knowing our clinics are supported by one of the safest and most robust solar platforms available. This system is ideally suited for the needs of critical-care environments like ours."

— Dr. Todd Broome, Clinic Owner

Industry Collaboration

Global RAIS® selected Northern Electric Power (NEP) to co-develop a new microinverter for both new installations and retrofit projects due to NEP's established reputation for producing high-quality, reliable, and efficient solar microinverters. NEP's microinverters boast efficiency ratings between 95.5% and 96.5%, aligning with industry leaders and ensuring optimal energy conversion for solar installations. Additionally, NEP offers a straightforward 25-year warranty, reflecting their confidence in product durability and providing long-term assurance to customers. The company's commitment to responsive technical support further enhances their appeal as a development partner. These factors collectively make NEP an ideal collaborator for Global RAIS® in advancing microinverter technology for diverse solar energy applications.

"Partnering with Global RAIS® on this project and others represents the kind of strategic deployment NEP was built for. We're proud that our BDM800-GR microinverters are helping deliver reliable, resilient power to critical-care environments in Alabama."

— Ed Heacox, CEO of Northern Electric Power (NEP)

Conclusion

This repowering project demonstrates a model for upgrading legacy PV systems with durable, smart-enabled hardware. The outcome is increased array uptime, streamlined maintenance, and improved visibility into distributed generation assets that support essential healthcare services.



Easy swap out and replace



Newly repowered NEP BDM800 Redundant Inverter Bus (RIB)

Clinic Profiles and Site Imagery

FMC PV & ENERGY MONITORING PROJECTS – 2018



FMC Elk River – Fayetteville, Tennessee

33 KW DC PV installation – December 18, 2015
Array Commission date – December 28, 2015

10 Stations
6 days a week with 2 shifts

Elk River Clinic



FMC Scottsboro Clinic – Scottsboro, Alabama

66 KW DC PV installation – November 5, 2018
Array Commission date – November 10, 2018

22 Stations
6 days a week with 2 shifts

Scottsboro Clinic



FMC Endeavor Clinic – Albertville, Alabama

45 KW DC PV installation – October 10, 2018
Array Commission date – October 23, 2018

16 Stations
7 days a week – 2 shifts
Tues, Thurs, Sun evening 7p - 3A

Endeavor Clinic



FMC Albertville Clinic – Albertville, Alabama

70 KW DC PV installation – November 20, 2018
Array Commission date – December 7, 2018

15 Stations
6 days a week, 2 shifts

Albertville Clinic

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Energy & Storage Solutions

FMC PV & ENERGY MONITORING PROJECTS – 2019

Lakeview Clinic



FMC Lakeview – Arab, Alabama

62 KW DC PV installation
March 2019

20 Stations
6 days a week, 2 shifts

Chase Clinic



FMC Chase – Huntsville, Alabama

61 KW DC PV installation
March 2019

25 Stations
6 days a week, 2 shifts
3rd shift MWF ends at 11P

Cullman Clinic



FMC Cullman – Cullman , Alabama

34 KW DC PV installation
February 2019

10 Stations
3 days a week, 1 shift

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