

NFE x NESL PAC2026 Pre-workshop checkin

Date: 15 September 2026

Participants: Glenn Algie (NESL), Aaron Tushabe, Hillary Arinda, Dansturn Kimbowa, Dismas Friday

Purpose: Prepare the NFE team for the Street EMS hands-on workshop in Nairobi and identify areas for continued NFE-NESL collaboration.

1. Nairobi workshop preparation

Glenn is already in Nairobi and brought roughly **US\$2,000 worth of equipment**, including **15 Street EMS boards, SSR boards, leakage sensors and one cabinet**. Two additional cabinets will need to be sourced locally. The preferred cabinet size is approximately **400 × 300 × 200 mm**, with plastic preferred because it is easier to drill.

The tentative workshop structure is:

- **Monday:** approximately six hours of technical material, discussion and completion of EMS boards.
- **Tuesday:** cabinet assembly.
- Glenn will discuss with Jude whether approximately **half the equipment should be pre-assembled** and the remainder assembled hands-on. His preference is to retain a substantial hands-on component because it improves learning.
- One cabinet and roughly seven EMS boards may therefore be assembled beforehand as reference units, while the remainder are built during the workshop.

The NFE team should all be in Nairobi by Saturday. Aaron is travelling Wednesday, Hillary is flying later in the week, while Dansturn and Dismas are travelling by bus.

2. Street EMS architecture

Glenn has now published the **Street EMS hardware publicly on GitHub**, including the schematic and Gerber files. The hardware uses the **CERN strongly reciprocal open hardware licence**, although NESL is open to negotiating licensing arrangements where companies want to commercially manufacture or integrate the hardware at scale.

A major objective of the Nairobi workshop is to move beyond demonstration and eventually **deploy Street EMS on a live feeder**.

The Street EMS includes an expansion architecture based on a **2×20 SPI connector**, supporting several interchangeable modules. CircuitSetup six-channel metering boards can be stacked, potentially allowing a Street EMS to meter **up to 18 channels**.

3. Intelligent feeder / autonomous feeder concept

A significant part of Glenn's vision is moving intelligence from a centrally managed mini-grid down to the **feeder level**.

NESL is experimenting with a low-cost **Waveshare ESP32-P4 compute module**, costing roughly US\$16, installed once per feeder. This would act as a policy or supervisory controller across approximately 10–15 Street EMS units.

The feeder controller could communicate with:

- the mini-grid's DERs;
- Street EMS units;
- household batteries and inverters;
- locally installed PV/micro-inverters;
- leakage and power-quality sensors.

The long-term concept is an **autonomous feeder** capable of understanding generation, storage and demand across a community and making local energy-management decisions.

This closely overlaps with NFE's interest in distributed energy management and community-owned microgrids.

4. DTM EMS and power-quality monitoring

NESL has developed a **Distribution Transformer Monitor EMS (DTM EMS)** using a Ditronix EPEM module built around the ATM90E36 metering chipset.

The device monitors areas such as:

- harmonics;
- phase and neutral conditions;
- leakage;
- power quality; and
- feeder-level energy flows.

Unlike the Street EMS hardware, the DTM EMS software is currently **closed source/licensable**.

Glenn plans to have **Robert Burke of wmac.cloud in New Zealand** test the DTM EMS alongside Robert's existing DTM equipment. Robert has reportedly deployed over **5,000 transformer monitoring devices**, giving NESL a useful benchmark for accuracy and performance.

Glenn is willing to make the DTM EMS software available to NFE under an appropriate commercial/licensing relationship.

5. Leakage detection and electrical safety

NESL is integrating **IVY Metering AC/DC leakage sensors**, originally designed for EV charging applications. These sensors communicate over Modbus and require 12 V DC.

The ESP32-P4 prototype interface can display leakage and neutral imbalance data in real time.

This capability could become important for NFE deployments where feeder safety, grounding quality and equipment protection need to be monitored continuously.

6. EV charging opportunity

NFE raised its interest in eventually incorporating **EV charging/e-mobility** into the Street EMS architecture.

Glenn has already developed an EV charging software stack for wmac.cloud. It will not be released publicly, but he is willing to provide NFE access **under licence**.

Even if physical EV charging hardware is not available during the Nairobi workshop, the NFE team would like to understand the architecture and integration model.

7. Meter calibration and certification

Aaron raised the need to understand how Street EMS metering could eventually meet **UNBS/KEBS or utility-grade certification requirements**.

Calibration emerged as an important area for further collaboration.

The proposed architecture includes:

- a three-phase reference power supply;
- calibration of each Street EMS/CircuitSetup metering module;
- calibration data stored digitally;
- a globally unique QR code for each EMS and power-supply combination; and
- an open calibration-data repository.

Glenn believes properly calibrated systems could achieve **better than approximately 0.5% measurement accuracy**.

Glenn currently has a working three-phase power-supply design but does not want to personally take responsibility for formally publishing/certifying the high-voltage section because of the safety implications.

Dansturn, who has high-voltage experience, offered to review and potentially help take technical ownership of this aspect.

8. Proposed code challenges

Several development projects were proposed for the workshop and subsequent collaboration:

1. **DLMS/COSEM support for Street EMS**, potentially in collaboration with SteamaCo.
2. **ESP32-P4 compute-only expansion board** for feeder-level policy/control.
3. **Factory test harness** using Raspberry Pi or ESP32 hardware with automated Python-based tests.
4. **Automated calibration rig** for Street EMS boards and three-phase power supplies, including QR-code generation and calibration-data storage.
5. **Open-source three-phase sensing power supply**, with a properly engineered and certified reference design.

Glenn's broader goal is to use the workshop to identify people willing to own or contribute to each challenge rather than trying to complete everything during the event.

9. Related ecosystem opportunities

The week following the workshop, **EnAccess/A2EI activities are scheduled for 29 September-2 October**, with an emphasis on the emerging **OpenAMI** standard.

Glenn also sees value in allowing Street EMS installations to work with either **OpenAMI** or **DLMS/COSEM**, rather than forcing users into one communications architecture.

Glenn offered to facilitate introductions or calls with several relevant technical collaborators, particularly:

Dave Williams — Ditronix: power-quality and measurement hardware, open source and STEM interests.

Robert Burke — wmac.cloud: extensive real-world distribution-transformer monitoring experience in New Zealand.

There may also be an opportunity to engage the designer behind the CircuitSetup metering hardware.

Decisions / Agreements

The team agreed that Aaron's existing Street EMS cabinet from Uganda should be brought to Nairobi as an additional workshop unit.

Cabinet assembly should remain part of the hands-on workshop where possible, with Glenn confirming the final arrangement with Jude. The NFE team will regroup by **Saturday or Sunday at the latest** to determine whether any pre-workshop assembly is required.

Questions and coordination between now and the workshop will continue through **Element**.

Aaron also proposed establishing a more systematic post-workshop collaboration cadence, such as a **30-minute call every two months**, which Glenn supported.

Action Items

Owner	Action	Target
Glenn	Send detailed equipment/tools inventory to NFE	15 Sep evening / 16 Sep morning
Glenn	Share Street EMS GitHub repository on Element	Before workshop
Glenn	Confirm whether a step drill is already available	Before team travels
Glenn	Share latest Street EMS one-line diagram	Before workshop
Glenn	Confirm pre-assembled vs hands-on build split with Jude	Once Jude arrives
Glenn	Share the three-phase sensing power-supply schematic	Before/during workshop
Glenn	Arrange introduction/Zoom with Dave Williams of Ditronix	Workshop period
Glenn	Arrange introduction/Zoom with Robert Burke of wmac.cloud	Workshop period
NFE team	Bring Phillips and slotted screwdrivers	Travel
NFE team	Bring a step drill bit if available	Travel
NFE team	Bring Aaron's Street EMS cabinet from Uganda	Travel
NFE team	Bring spare three-phase PSU PCB and/or SSR board	Travel

Owner	Action	Target
NFE team	Source two additional ~400 × 300 × 200 mm cabinets in Nairobi	Before Tuesday
Dansturn	Review three-phase power-supply schematic and support HV design/safety review	Workshop
Aaron	Discuss UNBS/KEBS certification, meter calibration and utility-grade approval pathway with Glenn	Workshop
NFE + Glenn	Explore EV-charging code/licensing opportunity	Workshop/follow-up
NFE + NESL	Identify which proposed code challenges NFE can own or contribute to	Workshop
Aaron + Glenn	Establish recurring ~30-minute collaboration check-in every other month	Post-workshop
All	Regroup and decide whether pre-assembly is needed	Sat 19 / Sun 20 Sep

Most important NFE opportunities coming out of the discussion

For NFE, I would prioritize **three threads during the Nairobi workshop**: getting Street EMS running on an actual feeder or realistic NFE configuration; taking a meaningful role in the **calibration/certification + three-phase sensing work**; and understanding how the **ESP32-P4 feeder controller, DTM EMS and Street EMS could fit into NFE's broader Microgrid OS architecture**.

The EV charging work is also strategically relevant, but I would treat that as an adjacent opportunity rather than letting it distract the team from getting the core feeder, metering and calibration architecture working first.

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