BOOTCAMP INSIGHTS

KEY TAKEAWAYS FROM THE ROUNDTABLE:

DIGITALISATION & STATIONARY STORAGE: TOWARDS SMART, LOW-CARBON MINI-GRIDS IN SUB-SAHARAN AFRICA

This panel, moderated by **Mehdi Benaissa (AFD)**, brought together **Léandre Berwa (SLS Energy, 2023 laureate)**, **Elhadji Tamsir Diop (Senelec)**, **Emile Fulcheri (Stima Mobility Ltd, 2025 laureate)** and **Liam Murphy (Vittoria Technology, 2022 laureate)**.

Together, they explored how **digitalisation**, **data**, **energy storage** and **new battery models** are now enabling the development of **more reliable, more sustainable mini-grids**, better integrated into **national decarbonisation strategies**.

1. DATA MAKES MINI-GRIDS TRULY CONTROLLABLE

Mini-grids have long been operated with **limited visibility**: approximate system status, delayed interventions, and failures that were endured rather than anticipated. **Digitalisation is radically changing this reality.**

Thanks to **Battery Management Systems (BMS)**, **IoT sensors**, and **telemetry** (temperature, voltage, current, **State of Charge – SoC**, and **State of Health – SoH**), operators can now:

- **monitor asset health in real time**,
- **detect anomalies before they become critical**,
- shift from **corrective maintenance to predictive maintenance**.

This level of granularity makes it possible to work at the **cell or module level**, identify the

weak link within a battery pack, and act in a targeted way—rather than replacing entire systems.

🔑 **Key message**

Data is transforming mini-grids from constrained systems into truly managed and optimised infrastructures.

2. SECOND-LIFE BATTERIES: TECHNICAL CREDIBILITY AND LOCAL VALUE CREATION

Second-life batteries represent a major opportunity for mini-grids, provided they are integrated with **rigour and robust processes**. The panel highlighted that their viability relies прежде all on **data**.

Traceability (usage history, number of cycles, thermal conditions), **module-by-module testing**, and **continuous digital monitoring** make it possible to:

- accurately **assess remaining performance**,
- **adapt warranties** to real mini-grid use cases,
- **reduce technical risk** for both operators and financiers.

Beyond the technical dimension, second-life batteries also enable the development of a **local value chain**: collection, diagnostics, refurbishing, integration, maintenance, and software-based supervision.

They therefore contribute to a **circular economy**, reducing pressure on critical raw materials while creating **skilled local jobs**.

🔑 **Key message**

Second-life batteries are **not a low-cost shortcut**, but a **credible and scalable solution**—provided they are supported by **data and engineering excellence**.

3. ELECTRIC MOBILITY AND STATIONARY STORAGE: A CRUCIAL TRANSFER OF EXPERIENCE

Electric mobility players have built significant expertise in **battery management**, as they operate under demanding conditions: heat, fast charging, deep discharges, and intensive usage.

Data collected from **Battery Management Systems (BMS)**, transmitted to the cloud and analysed through algorithms (sometimes **AI-assisted**), makes it possible to:

- precisely **identify degradation drivers**,
- **adjust usage patterns** (charging profiles, power levels, depth of discharge),
- **reduce cost per cycle**, a key indicator of economic viability.

These insights are **directly transferable to stationary storage**, particularly for **mini-grids operating in harsh environmental conditions**.

🔑 **Key message**

Experience gained in **electric mobility** is accelerating the **maturity and reliability of stationary energy storage**.

4. STORAGE AS A PILLAR OF DECARBONIZATION AND GRID STABILITY

In countries such as **Senegal**, the growing integration of **solar and wind power** makes energy storage essential. It is no longer just about storing energy, but about delivering **real grid services**.

Storage notably enables:

- **load shifting** (storing solar energy during the day and releasing it in the evening),
- **smoothing photovoltaic production** in response to cloud cover,
- **frequency regulation**, thanks to very fast response to supply–demand imbalances,
- **black start capability**, i.e. the ability to restart a grid after a blackout without relying on an external source (thermal plant or upstream grid).

To fully play this role, storage systems must be **connected to supervision and dispatching systems**, allowing them to be operated in coordination with the entire power system.

🔑 **Key message**

Storage is **not just a complement to renewables**, but a **core asset for grid stability and resilience**.

5. DATA, PROFITABILITY, AND FINANCING: WHY ANALYTICS ARE A GAME CHANGER

Digitalisation has a direct impact on project economics. By leveraging data:

- **OPEX are reduced** through predictive maintenance and fewer unexpected failures,
- **initial system sizing is more accurate**, avoiding costly over- or under-dimensioning,
- **system expansions** can be decided based on real usage data rather than conservative assumptions.

For **investors and financiers**, these data provide **objective proof of project viability**: battery health trajectories, predictable performance, and better control of technical risks. This significantly improves **project bankability** and facilitates access to financing.

🔑 **Key message**

Data reduces uncertainty — and that is exactly what financiers are looking for.

6. TECHNOLOGICAL CHOICES: CHEMISTRY, BMS AND SYSTEM INTEGRATION

For **stationary energy storage**, **LFP (Lithium Iron Phosphate)** chemistry is increasingly becoming the standard thanks to:

- its **higher thermal stability**,
- its **long cycle life**,
- its **higher safety level** compared to other lithium chemistries.

However, performance does not rely on chemistry alone. The **Battery Management System (BMS)** plays a **critical role**: cell balancing, protection mechanisms, data collection, and interface with supervision systems.

In addition, **battery pack design** (mechanical, thermal and electrical integration) and **supplier quality** (after-sales support, warranties, long-term assistance) are key determinants of real-world durability.

🔑 **Key message**

A reliable mini-grid relies as much on **system engineering** as on **battery technology itself**.

7. OPERATIONAL INTEGRATION: NETWORK-WIDE MONITORING AND CONTROL

Once deployed, **energy storage units cannot operate in isolation**. They must be integrated into **supervision systems** and, where relevant, connected to the **national dispatching centre**.

In practical terms, this enables operators to:

- **monitor power, energy, cycles and operating constraints in real time**,
- **optimise operation** to preserve battery lifetime,
- **anticipate future needs** (capacity expansion, grid reinforcement),
- **align mini-grids with overall power system objectives**.

🔑 **Key message**

Without **supervision and coordinated control**, storage can only deliver **part of its potential value**.

GENERAL CONCLUSION

This panel highlights a major shift: **energy storage and digitalisation are no longer optional technologies**, but **core building blocks of African power systems**.

Three key takeaways clearly emerge:

- **Data is the foundation**: it improves reliability, extends asset lifetime, and enhances the profitability of mini-grids.
- **Storage is a systemic lever**: it supports renewable integration, grid stability, and overall energy resilience.
- **Engineering and operations matter as much as technology**: governance, supervision, and grid integration ultimately determine real-world impact.

In short: **better control leads to better investment, better operations, and deeper decarbonisation**.

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