



DIGITAL ENERGY INSIGHTS

Key takeaways from the webinar

From idea to impact: how Digital Energy Challenge laureates are driving the mini-grid revolution in Africa

⚡ Mini-grids are widely recognized as a **cornerstone** for delivering clean, reliable, and affordable energy. However, their **profitability** and **large-scale deployment** continue to face major systemic challenges.

👥 In October 2025, during the **Digital Energy Insights** webinar, three **Digital Energy Challenge laureates**—key players in Africa’s mini-grid transformation—shared their experience and vision for the sector: **Liam Murphy (Vittoria Technology)**, **Nicolas Saincy (Nanoé)**, and **Patrick Agese (PAM Africa)**.

🚀 Technological innovations, new business models, and operational barriers: this synthesis highlights the **key insights** from their discussions and sheds light on the **practical levers** needed to accelerate deployment and improve the profitability of mini-grids across the African continent.

⚙️ 1. Showcasing innovative solutions

Each laureate presented an innovative solution addressing a **critical challenge** in the mini-grid sector.

Nanoé – Meshed nano-grids for isolated communities 🏠

Nanoé, a Franco-Malagasy social enterprise, targets rural villages that are too small to qualify for traditional AC mini-grids, which represent more than **80% of Madagascar’s population**.

Technical solution

Nanoé deploys two complementary systems:

- **NanoGrids**: collective solar systems serving up to six neighboring households;
- **DC Mesh Grids**: direct-current (DC) meshed networks interconnecting several NanoGrids within the same village, enabling **energy sharing, modularity, and flexibility**.

Business model

Nanoé operates as a utility, selling energy as a service (*Energy as a Service*) through a prepaid (*pay-as-you-go*) system rather than selling equipment. This model makes the service more **affordable** and better **aligned with users' real needs**.

Impact

With more than **100 employees** and approximately **15,000 connections**, Nanoé demonstrates the viability of an electrification model for the hardest-to-reach communities.

Vittoria Technology – Breaking the “battery barrier”

Vittoria Technology, a South Africa–based social enterprise, addresses one of the most significant financial barriers facing mini-grids: the **cost of energy storage**.

The challenge

Batteries account for roughly **one third of a mini-grid project's capital expenditure (CapEx)**, creating a substantial “battery barrier” for developers.

The solution

The **Battery Bank Africa** platform provides storage as a service (*Storage as a Service*).

Leasing model

Instead of purchasing batteries, mini-grid operators lease them, converting a major upfront investment into a **monthly operating expense (OpEx)**.

Digital platform

Vittoria Technology has developed an online platform to streamline the entire process, including **credit risk assessment**, **system sizing**, and **contracting**.

Market reach

The solution is active in **Sierra Leone, Uganda, Kenya, Rwanda, the Democratic Republic of Congo, and South Africa**, serving not only mini-grids but also **clinics, schools**, and other decentralized energy projects.

PAM Africa – AI for mini-grid profitability

PAM Africa, an energy-enabling ecosystem based in Nigeria, starts from the observation that most African mini-grids are not profitable due to **significant operational challenges**.

The problem

Low asset utilization, variable customer revenues, payment collection difficulties, and reliance on costly batteries or diesel generators.

The solution

Pam AI is an AI-driven software platform designed to improve both **system efficiency** and **payment recovery**.

Key functionalities

- **Dynamic pricing**: AI analyzes users' ability to pay, weather conditions, and seasonality to generate tariffs that optimize demand management;
- **Grid balancing**: the platform aligns production with demand, reducing the need to oversize batteries or rely on backup generators.

Pilot results

- Asset utilization increased from **60% to 90%**;
- **15% reduction** in battery usage;
- **95% payment collection rate**;
- No diesel generator required.

2. Lessons learned and operational challenges as entrepreneurs

The speakers candidly shared the **obstacles they face** and the **key success factors** behind their entrepreneurial journeys.

The main challenge: “missing middle” financing

The most frequently cited challenge was financing, with a clear **gap between early-stage grants and large-scale investments**.

- **Exclusion from standard funding schemes:** innovative solutions such as those developed by Nanoé—positioned between solar home systems and traditional AC mini-grids—are often excluded from major financing programs;
- **Administrative burden:** companies are forced to stack multiple small grants (between **€100,000 and €500,000**), creating heavy administrative workloads and slowing growth;
- **The financing gap:** **Liam Murphy (Vittoria Technology)** highlighted the difficulty of raising intermediate amounts (e.g. **€500,000**)—too large for typical grants, yet too small to attract major venture capital funds.

Regulatory and operational challenges

- **Outdated regulatory frameworks:** regulations struggle to keep pace with innovation. Nanoé was excluded from certain support programs due to its DC technology and service-based model, requiring more than **seven years of regulatory dialogue** in Madagascar;
- **User and developer adoption:** **Patrick Agese (PAM Africa)** observed initial resistance from mini-grid developers, which led PAM Africa to build its own mini-grid to test its solution. End-user adoption also remains a challenge, particularly where smartphone ownership is limited;
- **Delays and human resources:** delivery delays, contract signing, fund disbursement, and the recruitment of skilled staff aligned with a social mission are recurrent challenges.

Key success factors

- **Simplification and adaptability:** for PAM Africa, simplifying the offering was critical to adoption, as was recognizing that the solution could also apply to national grids;
- **Commercial validation:** for Vittoria Technology, signing its first commercial leasing contracts in Kenya—without subsidies—was a decisive milestone validating its business model;
- **Local–global balance:** Nanoé considers its greatest success to be maintaining a strong on-the-ground presence in rural Madagascar while conducting R&D and fundraising activities in Europe.



3. Future outlook for the mini-grid sector

The discussions highlighted several **structuring trends** shaping the future of the sector.

Market evolution and new business models

- **Results-based financing (RBF)**: an increasing trend consists of linking funding to achieved results (e.g. number of connections), encouraging developers to optimize both costs and impact;
- **Towards energy as a service**: **Nicolas Saincy (Nanoé)** emphasized the need to move away from per-kWh sales—poorly suited to renewable energy cost structures—towards subscription-based models guaranteeing a defined energy allocation;
- **Ecosystem specialization**: **Liam Murphy (Vittoria Technology)** anticipates greater specialization, with mini-grid developers focusing on electricity distribution while relying on specialized partners for financing, storage, and operations.

The role of digitalization, data, and AI

- **AI as an optimization tool**: **Patrick Agese (PAM Africa)** advocates for pragmatic, lightweight AI models with operating costs aligned with mini-grid revenues;
- **The data challenge**: mini-grids operate as “islands,” making large-scale data collection and aggregation difficult;
- **Credibility and transparency**: digitalization can help restore trust—particularly for carbon credits—by providing reliable measurement, reporting, and verification (MRV) data.

The strategic importance of partnerships and community

All speakers emphasized the **critical value of the Digital Energy Community**:

- **A space for collaboration**, enabling experience sharing, alignment between field realities and macro-level analysis, and the creation of strategic partnerships;
- **Tailored technical assistance**, a highly valued feature of the Digital Energy Challenge, allowing laureates to mobilize the exact expertise they need (e.g. fundraising support).

