



Standardization of communication between EMS and BESS systems

White paper

Flip Oude Weernink, Casper Scheltinga
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BUILD THE FUTURE

Introduction

Zero Emission construction is increasingly being adopted in the Netherlands, contributing to nitrogen reduction, climate objectives, and improved air quality. This transition relies heavily on electric powered construction equipment. However, the construction sector is not the only sector undergoing electrification; industries ranging from manufacturing to mobility are also making the transition.

This growing demand for electricity is leading to capacity constraints on the grid, resulting in congestion. Moreover, an increasing number of construction projects must be carried out emission-free in locations where no grid connection is available at all, such as nature reserves.

This transition therefore requires flexible, zero emission solutions. Battery Energy Storage Systems (BESS) play a key role: they enable construction projects to be powered without overloading the electricity grid or when no grid connection is available. However, reliable communication between Energy Management Systems (EMS) and BESS is crucial for effective deployment on emission-free construction sites.

ElaadNL is investigating how standardised communication can enhance the interoperability, safety, and scalability of BESS applications on construction sites. This whitepaper outlines the current state of play, the key bottlenecks, and a proposed direction towards a widely applicable standard.

Current Situation and Bottlenecks

Need for Standardisation

EMS providers widely recognise the need for a standard protocol but indicate that they lack the capacity to develop this themselves. BESS manufacturers perceive less immediate added value and prioritise other developments.

Resellers working with large international manufacturers encounter closed OEM protocols, which are often only accessible through complex technical and legal arrangements. National initiatives are proving insufficient; only European standardisation offers the scale and momentum required to structurally embed interoperability.

Market Experience

Integration of BESS into EMS previously took weeks, but can now be achieved within a matter of days. However, each replacement or addition of a system still requires custom integration, as no standard currently exists.

This results in higher costs and delays for end users. In addition, the deployment of BESS is becoming increasingly common on construction sites and is considered a key step within the charging hierarchy for zero emission construction (ElaadNL, 2024).

Mobile BESS: A Growing Challenge

Mobile BESS are increasingly deployed on construction sites and charging hubs, but introduce specific risks:

- Connection via powerlock cables (400A+) can lead to uncontrolled power draw, with the risk of failure of the entire charging hub.
- As mobile BESS often operate without an EMS, the ability to integrate them into a smart construction site microgrid is lacking.
- Some newer BESS are equipped with a CCS2 inlet, allowing them, similar to electric vehicles, to communicate via ISO 15118. This offers potential, but is not yet widely applicable.
- Vendor lock-in: once integration with a single provider is operational, users often become dependent on that provider, making it more difficult to work with multiple suppliers simultaneously.

A generic communication standard is therefore essential. While electric vehicles primarily “charge”, a BESS must also be capable of “discharging”, managing island grids, performing grid synchronisation, and controlling switches or generators.

Existing ISO and DIN specifications do not yet sufficiently cover these functionalities. However, the automotive sector is already developing a generic standard to enable electric vehicles to also “discharge” (V2G, ISO 15118-20). This knowledge could potentially be leveraged in the future.

Innovative Solution Approach

As OEMs are reluctant to open up their protocols, ElaadNL proposes a “plug-and-play” intermediary layer. The concept involves an embedded device (comparable to a Raspberry Pi) installed within the BESS, functioning as a protocol translator in the following way:

- Translation of internal Modbus communication into a standardised message structure
- Forwarding of status information, charging profiles, and alarm notifications
- Secure connection to external EMS systems, including network segmentation (cybersecurity)
- Support for connection and disconnection procedures at dynamic charging locations

Benefits

- Reduced complexity for BESS manufacturers and customers: one uniform interface instead of multiple portals
- Interoperability between different BESS brands
- Faster adoption of BESS in dynamic environments such as construction sites and charging hubs
- Greater independence for market participants, despite the additional investment in hardware

Recommendations

1. Develop and adopt an open BESS communication interface, based on existing standards (ISO 15118, OCPP) and extended with BESS-specific functionalities.
2. Integrate this interface into pilot projects and demonstrate its added value through real-world applications.
3. Include standardisation in procurement processes, making interoperability a mandatory requirement on construction sites.
4. Work towards European regulations to encourage manufacturers to open up their protocols.
5. Continue investing in knowledge sharing, ensuring that manufacturers, EMS providers, and end users benefit from the experience gained.

Conclusion

The energy transition on construction sites requires flexible and scalable solutions for emission-free operations. Without standardised communication between EMS and BESS, the market will remain fragmented, resulting in higher costs and reduced reliability.

A pragmatic intermediary layer solution can already deliver interoperability today, while simultaneously guiding the development of European standardisation. In doing so, we contribute not only to leadership, knowledge sharing, adoption, and societal value, but also to a future-proof energy system in which BESS form an indispensable building block.