



GridForm

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Newsletter #1

Metrology for efficient grid-forming converters to stabilize future power grids

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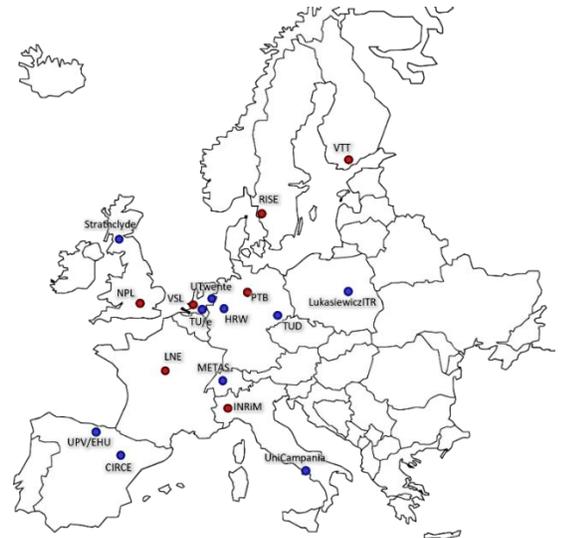
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About the Project

The European Union aims for a clean, secure energy supply and infrastructure. Increasing renewable electricity generation has cut greenhouse gas emissions but reduced grid inertia, risking frequency instability. Grid-forming (GFM) converters connecting renewable generation and energy storage to the grid can offset this loss and improve frequency stability. To ensure these converters deliver the performance that system operators expect, the [GridForm project](#) (24GRD08) is building the metrological infrastructure needed to evaluate GFM behavior with confidence. This includes:

- Developing traceable testing methods and measurement algorithms
- Designing modular laboratory testbeds capable of reproducing realistic, highly dynamic grid conditions
- Creating on-site measurement methodologies for real-world validation at operational facilities.
- Advancing efficiency measurement methods to determine converter losses under dynamic conditions



Creating Impact

– By Sharmistha Bhattacharyya (TU/e)

You can find information about the partners, the project's objectives, as well as the expected results and impact by downloading the [Publishable summary](#). To stay up to date with the latest developments, please visit the project website: gridform.eu and join our [discussion group](#) in LinkedIn.

Mark your calendars! Our M18 meeting will take place in person at PTB in Braunschweig, Germany, 27-29 October 2026. The event will also feature a dedicated **Stakeholder Workshop on October 28th** on designing testbeds for the performance evaluation of GFM converters.



Development of testbeds

– By Florian Schilling (PTB)

In Work Package 1, led by the Physikalisch-Technische Bundesanstalt (PTB), the focus is on the evaluation of existing requirements and the development of testing methods for the traceable performance assessment of GFM converters.

The developed test environments enable the reproducible emulation of various grid scenarios, thereby providing a basis for the investigation of different functionalities of GFM converters under well-defined operating conditions. This includes the analysis of power-frequency behavior to verify the implemented measurement and control strategies of the converters and to quantitatively assess their contribution to grid stabilization.

On-site Measurement Campaigns

–By Alf-Peter Elg (RISE)

Plans for on-site measurements are progressing, using both conventional and normalized-time power-measurement methods. A low-voltage facility in Finland, which operates a flow battery in island mode, has agreed to support the project. In preparation for the on-site tests, methods for assessing various GFM operating modes—such as frequency control, power quality, voltage stabilization, and black start—are being developed using LV testbeds.

The project will also test the technology at the medium-voltage level, at a potential site in the Netherlands. In this location, the balancing of fluctuating power production from renewable energy sources is investigated. Operators of offshore wind farms in the UK have also been contacted.

For transmission grid applications of GFM, discussions are in progress with two operators in Germany at the 400 kV level. One of these operators applies GFM in STATCOMs for voltage and impedance control. The other uses GFM in HVDC converters for power transmission across Germany, specifically in the SuedLink and ULTRANET projects.

Efficiency measurement –By Luiz Felipe A. Silveira (TU/e & University of Twente)

Work Package 3 has focused on establishing the foundations for reliable efficiency measurements of grid-forming converters. The team performed a targeted literature review, examining existing methods and their limitations for dynamic, high-bandwidth efficiency assessment. Building on this, work is underway to define the key measurands and uncertainty requirements needed to achieve accuracy better than 5% in loss-power determination. In parallel, the group is generating synthetic test signals that mimic realistic converter behavior across bandwidths up to 5 kHz, supporting the validation of future measurement algorithms.

Update on the requirements and test protocols

– By Stefano Lodetti (NPL)

The project began with a landscaping exercise of all existing technical specifications for GFM technology led by the National Physical Laboratory (NPL). This gathered the available requirements from system operators, regulators, standards bodies and research groups to create a list of current GFM expectations. These diverse requirements were then condensed into a clear set of high-level functionalities across voltage support, frequency support, power quality improvement, and advanced functionalities.

These high-level functions have informed the development of preliminary laboratory test protocols designed to assess the hardware behavior expected of GFM units. At the same time, modular testbeds have been set up across Europe to put these protocols into practice and refine them through laboratory implementation.

The forthcoming hardware testing phase will feed directly into improving the protocols, helping to identify gaps between system-level specifications and what can realistically be assessed at unit level. This feedback loop ensures the protocols evolve toward practical, robust and industry-relevant procedures. The aim is not simply to design tests, but to specify the measurement requirements that ensure GFM performance can be assessed with confidence.

Future work will focus on defining measurands, their accuracy and bandwidth requirements, and the development of measurement algorithms capable of working under real grid conditions. These algorithms will be validated first with synthetic data and then within the operational testbeds.

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