



UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

Bureau
International des
Poids et
Mesures



Powering Mongolia's Grid through Metrology: Extending Electrical Standards via International Collaboration

A joint capacity building effort between MASM, the Ministry of Energy, NPTGC, and PTB to build national standards for high current and high voltage

*Mongolian Agency for Standard and Metrology (MASM)
Mongolia (MN)*



The Challenge

Mongolian Law of Metrology mandates a metrology system to develop the economy and protect public interests, aligning with the UN's Sustainable Development Goals to expand access to affordable, clean energy while supporting sustainable national grid infrastructure. Previously, the lack of national standards for high voltage and current meant the grid lacked the necessary metrological traceability to the SI for global recognition and technical reliability.

The specific gap was the absence of national standards for high currents and high voltages. The economy needed a way to reliably measure these quantities to ensure grid reliability. Without accurate high-voltage measurements, the country faced potential technical barriers in electricity import and export activities and lacked recognized industrial capabilities.

The Solution

A joint project involving the Mongolian Agency for Standard and Metrology (MASM), the Ministry of Energy, the National Power Transmission Grid Company (NPTGC), and Germany's Physikalisch Technische Bundesanstalt (PTB) focused on capacity building. The activity transformed the NPTGC laboratory into a Designated Institute (DI) and provided expertise in electrical metrology for high-current and high-voltage applications. MASM provided training on metrology, uncertainty, and international standards and documents, while PTB provided physical reference standards for high-voltage transformers, measurement setup, and technical advice. This ensured that Mongolian electrical measurements are aligned with the CIPM MRA and are part of a globally recognized metrological framework.

The evidence includes the technical requirements NPTGC has met for DI status, such as standards for equipment and personnel training. Data quality was ensured through MASM's training on uncertainty estimation and the translation of international calibration procedures using PTB reference standards.

A Quantifiable Impact

The primary improvement is the creation of national standards for high current (10 kA) and high voltage (220 kV). This significantly extends the baseline, as MASM previously supported only up to 1000 V and 100 A. The process of national designation for this institute is currently underway. This will ensure the traceability and accuracy of high-current and high-voltage measurements—thereby supporting grid reliability. Furthermore, there is an essential need to officially register with the BIPM and achieve international mutual recognition of Mongolia's

high-voltage measurement results. This will have significant benefits in electricity import and export activities by reducing costs and facilitating trade.

This case supports the enforcement of Mongolian law on the national metrology system. It demonstrates how international cooperation and inter-agency collaboration can modernize a national energy sector. The institutional lesson is the effectiveness of the "Designated Institute" model in meeting evolving industrial needs.

Acknowledgements. This case study is based on a previous Metrology Asia Pacific case study.¹

POC: Ariuntungalag Ariuntungalag, ariuntungalag@masm.gov.mn

¹ Powering Mongolia's grid through metrology. <https://metrologyasiapacific.com/metrology-resources/powering-mongolias-grid-through-metrology/>