



IMEKO

International Measurement Confederation

Technical
Committee

TC20

Measurements of Energy and Related Quantities

Energy Metrology: Advances and Challenges in the Scope of the Metre Convention

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(<http://www.imeko.org/index.php/tc20-homepage>)

Founded in 1958, IMEKO is a non-governmental federation of 42 Member Organizations individually concerned with the advancement of measurement technology. Its fundamental objectives are the promotion of international interchange of scientific and technical information - in the field of measurement and instrumentation, and - the enhancement of international cooperation among scientists and engineers from research and industry..

IMEKO TC20 was founded in 1999 with the title "Measurement Techniques for the Construction Industry". It existed until 2010. In May 2010, IMEKO TC20 was re-established as the TC "Energy Measurement" with its new objective of providing an international forum of effective collaboration in Energy Measurement and energy-related metrology. The newest name is "Measurements of Energy and Related Quantities". It is the aim of the new IMEKO TC20 to bring the latest developments and achievements in measurement and traceability of all kinds of energy, energy efficiency as well as of related physical quantities and relevant substance properties to the IMEKO community, to facilitate the necessary cutting-edge research, addressing respective industrial needs and to make the results public.

Rationale:

The establishment of a sustainable energy supply, efficient generation, transmission and consumption/utilization form one of the grand challenges and technological mega trends of today and the decades to come. Both, research/development and field measurements for new and renewable energy sources, for transmission and distribution through smart energy grids (including HVDC grids), for (future) large-scale energy storage as well as for new energy saving solutions are significantly lacking in appropriate measurement technologies, future strategies, standards and traceability schemes. These energy-specific measurements are usually not covered by the measurement-quantity oriented IMEKO TCs. Fields of activity: 1. Measurement in energy generation; 2. Measurement and standards for energy transmission and storage; 3. Measurement for energy savings, metering and billing.

The Metre Convention, celebrating its 150th anniversary in 2025, laid the groundwork for international metrology by establishing the International System of Units (SI). This framework ensures uniformity and accuracy in measurements across various fields. The Technical Committee 20 (TC20) of Imeko, focused on energy and related quantities, plays a pivotal role in developing standardized methodologies for measuring energy from diverse sources such as biofuels, natural gas, and biogas.

Advances in Energy Measurement: Biofuels, Natural Gas and Biogas and Emerging Energy Sources: Innovations in gas chromatography systems have enabled precise quantification of energy content and detection of impurities, enhancing energy efficiency and environmental compliance. Real-time monitoring of gas composition and flow rates has further improved measurement accuracy; The measurement of hydrogen and ammonia poses challenges related to production, storage, transportation, and environmental impact, requiring advanced metrological approaches and efficient catalysts.

Challenges in Energy Metrology: Measurement Accuracy, International Harmonization and Dynamic Energy Sector : Ensuring consistent and precise measurements across different energy sources, such as biofuels, requires standardized protocols and reference materials. Aligning metrological standards and regulations internationally is complex, necessitating continuous collaboration and knowledge exchange. As new technologies and energy sources emerge, metrology must adapt, requiring ongoing research and development to create new measurement techniques and update existing standards.

Role of TC20 and the Metre Convention: TC20's efforts are aligned with the Metre Convention's principles, promoting research, developing technical standards, and facilitating international collaboration. This ensures that measurements of energy and related quantities are accurate, reliable, and globally comparable. In summary, the field of energy metrology has seen remarkable advances in the measurement of biofuels, natural gas, and biogas. However, challenges such as measurement accuracy, international harmonization, and the precise measurement of carrier gases like ammonia persist. The collaborative efforts of TC20, grounded in the Metre Convention's principles, continue to drive progress in this vital area, ensuring accurate and reliable energy measurements for the future..

