



## Message from the BIPM Director



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### Measurements and the global energy challenge

The availability of energy from many different sources is vital for our lives today. The well-being of industry, commerce and the maintenance of our quality of life depend on safe, secure, sustainable and affordable energy.

The challenge of meeting the ever-increasing demand for energy, whilst controlling costs and minimizing damage to the Earth, is leading to the development of new sources of energy and greater efficiency in its use. This progress is only possible because providers and users of energy can have access to a globally recognized basis for the measurement of energy in its many different forms.

For example, measurements provide the basis for:

- consumers to compare prices from different energy suppliers,
- industry to evaluate the return on exploration for new energy sources, and
- researchers to validate their claims for new energy technologies.

All of these are possible because there is access around the world to a measurement system originating from the Metre Convention, and now based on the International System of Units (SI).

The measurement of energy has always been one of the central challenges that has shaped our system of base and derived units. The need to measure temperature, electricity and light is motivated by the need to quantify sources of energy and has led to the development of the kelvin, the ampere and the candela, all of which are base units in the SI.

The first methods for measuring temperature, electricity and light were developed in the nineteenth century to meet the needs of an industrial revolution powered by coal and gas. Nowadays the challenge of measuring new forms of energy continues to inspire research in metrology. For example, national metrology institutes around the world are working to develop new methods:

- to ensure that the efficiency of solar photovoltaic technologies is measured accurately,
- to improve the lifetime and performance of the materials used in wind and wave power systems,
- to validate new approaches to reducing emissions from power stations, and
- to underpin the complex commercial transactions taking place in modern electricity grids.

This research involves collaboration between institutes in different countries and the results feed in to and strengthen the existing infrastructure for the international recognition of measurements. In this way the metrology community contributes to the world-wide efforts to meet the global energy challenge.