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## Measurements and Light

As we begin our preparations for World Metrology Day, 2015 and as we consider this year's theme, *Measurements and Light*, I think about how this current theme is very closely related to those of previous World Metrology Days:

- light is important in everyday life (the theme for 2013);
- workplace and street lighting benefit both our health and our safety (the themes for 2006 and 2012 respectively); and
- with the increasing economic growth in many areas of our planet, the demand for more light and therefore more electricity certainly creates a global energy challenge (the theme for 2014).

We live in a highly visual world. Each day we see the sun rising, providing the essential requirements for life itself. Each day a large percentage of the world is able to simply flip a switch and turn on an electric light.

However, a recent article in the Washington Post identified a significant challenge: "The rate of growth in global electrification is slower than the rate of growth of the population". A report from the IEA and the World Bank states: "With regard to universal access, business as usual would leave 12 percent ... of the world's population in 2030 without electricity...".

Without a significant increase in spending or a new direction to solve the problem, this will not change. To compound this issue the UN is also trying to address climate change at the same time – and prevent global temperatures from rising by more than 2 °C. To satisfy both goals, nations around the world would need to improve their energy efficiency and bolster the amount of clean energy they produce and use. This will require

- more measurements to understand and improve the efficiency of electrical appliances,
- an increase in the amount of clean energy produced and consumed, and
- additional international standards that apply directly to this area.

Light can behave either as a wave or a particle, or sometimes as both. This is quite remarkable. Also, as metrologists, we think of light as something that is measured, but we also use it to make measurements, again quite remarkable.

The speed of light in vacuum, commonly denoted  $c$ , is a universal physical constant which is important in many areas of physics. Its defined value is exactly 299 792 458 m/s, as the SI metre is defined from this constant. Distance, speed, temperature, the composition and contaminants in our food and environment, common measurements to legal metrology, can all be measured using various forms of light.

It is with these initial thoughts that I continue to consider with great wonder the phenomenon which we enjoy every day as light. The legal metrology community is pleased to join with UNESCO in marking the *International Year of Light* and I wish you immeasurable happiness and a very bright future.