### IMPRESS 2: Metrology for Air Pollutant Emissions

European Directives are setting increasingly stringent Emission Limit Values (ELVs) for key pollutants to mitigate ~400,000 premature deaths and €300 - €949 billion p.a. of costs attributable to air pollution. This project will deliver the underpinning research enabling a metrologically robust framework of documentary Standard Reference Methods to allow full enforcement.

**Economic and Societal Drivers**

- The EC recognises ~400,000 premature deaths and associated health costs of €300 - €949 billion p.a. attributable to air pollution.
- A €169 billion p.a. of the above cost is attributable to Europe's 10,000 largest polluting facilities.
- 64% of the EU's urban population is exposed to particulate matter (PM) above WHO guidelines; residential biomass boilers/space heaters are, "the most important contributors to total PM emissions in the EU."

**Directive Requirements and CEN Needs**

- A Standard Reference Method (SRM) is a European (CEN) standard produced to support a Directive that has been independently validated.
- SRMs are not voluntary, have legal meaning, and set mandatory measurement standards.

**Implementation**

- The Project Management Board (PMB) will ensure the project is delivered efficiently from a non-technical perspective.
- The work will be delivered under WP1 Conventional combustion; WP2 Biomass combustion; WP3 Flow uncertainties; WP4 Impact; WP5 Management.
- A Technical Management Board (TMB) will be created with the focused responsibility of ensuring scientific quality. The TMB will feed into and review work across 5 technical strands across the work packages maetising scientific impact.

**Beyond the State-of-the-Art**

- New measurement methods developed: SRMs for NH₃, CH₄, and HF achieving uncertainties of ≤ 0.3 mg m⁻³, ≤ 0.6 mg m⁻³ and ≤ 0.4 mg m⁻³, respectively.
- Flow studies in support of the MCP directive and determination is a novel multi-sensor in-stack approach can address current uncertainty requirements (i.e., ≤ 1.5%).
- New measurement methods developed and promulgated at CEN for SVOCs, OGC, P AHs, and PM.
- Development and validation of next generation techniques:
  - novel hyperspectral, multispecies capability to monitor biomass and other combustion sources;
  - real-time, on-line capability to apportion CO₂ emissions in co-firing plants;
  - laser based emission monitoring with associated spectroscopy for calibration.

**Stakeholder Impact**

**CEN/ISO community**
- Measurement methods and associated validation data promulgated into a set of SRMs supporting European Directives. Limitations of existing SRMs independently tested. New SRMs in stack and post-stack measurement standards.

**National Regulators & Policy Makers**
- SRMs procured to support implementation of European Directives to be enforced. SRMs providing the accuracy necessary to track impact of directives and reform policy makers on ELVs in future directives.

**Plant Operators & Stack Testing Organisations**
- Confidence that reported emissions data are comparable and of a defined quality, protecting society and reputation.

**Manufacturers of Residential Boilers and Associated Test Laboratories**
- Measurement techniques facilitating design and achieving Eco-labelling. Test data for products of a defined quality that is defensible.

**References**