

Second IMPRESS newsletter

Introduction

This is the second newsletter of the EMRP project “Metrology to underpin future regulation of industrial emissions” (IMPRESS), which aims to improve the technical possibilities to monitor emissions of pollutants to air to ensure compliance with EU directives and national legislation. This is key to enforcing emission limits and thereby enabling their reduction and control.

Industry needs to measure and report emissions for regulatory purposes including assessing stack emissions against concentration limit values, reporting annual mass emissions, and determining emissions of GHGs from area sources. In June 2014 a 3 Mio € project started within the European Metrology Research Programme for a three year period to investigate industrial emission measurements. It encompasses a multitude of national metrology institutes (NMI), universities and other stakeholders. Collaborators are welcome to link themselves to the project.

New project contributors

At the beginning of 2015 two new partner institutions and one collaborator joined the project. The Chalmers University of Technology and the Delft University of Technology contribute to the project as REGs.

TU Delft will develop methods for efficient analysis of high-dimensional uncertain spaces, for quantifying uncertainty in inflow boundary conditions and for parameterizing uncertain boundary conditions. Chalmers University will further develop a mobile optical technique (the solar occultation flux method) for measurements of fugitive emissions of Volatile Organic Hydrocarbons (VOCs). This spectroscopic technique is based on infrared absorption measurements using the sun as the light source. A measurement protocol will be developed and tested in field trials together with other partners in the IMPRESS project.”

HLUG (Hessisches Landesamt für Umwelt und Geologie) became a collaborator of the project. They cooperate with PTB, NPL and VSL regarding the analysis of emissions monitoring industrial performance in proficiency testing schemes.

Research highlights

Using proficiency testing schemes to assess EU capability for monitoring decreased emissions from stacks and flues

A key mechanism for ensuring that accredited organisations continue to meet measurement requirements in carrying out European standards in emissions monitoring from stacks and flues is national proficiency testing schemes. However, whilst such exercises at a national level are

important, in order to understand if the community / standards are keeping pace with the need to monitor lower levels of pollutants a more international view is needed. To this end the IMPRESS project has compiled a database of anonymised proficiency testing data from several member states. The aim is to collectively analyse these data in order to provide evidence of where proficiency / standards are keeping pace with increasing challenging measurement requirements and / or where work is needed by the community to develop new techniques / methods. This will support the investigation of the emission monitoring capabilities of European industry compared to emissions limits set into force by legislation.

Infrared (IR) gasfind cameras

Infrared (IR) gasfind cameras are considered a promising technique for detection and quantification of industrial fugitive volatile organic compounds (VOCs) emissions. However, a major disadvantage of the IR camera is that it can currently only demonstrate the presence of a gas. It provides no quantitative information of the gas concentration or emissions rates. Such quantitative data are crucial in order to gain information on VOC emissions emitted by refineries, chemical plants and storage facilities for refinery products. An objective of IMPRESS is to develop a mathematical model that quantifies VOC emission from IR cameras images. DCMR and VSL performed a literature review on IR cameras and found that the most important factors influencing the camera response include the temperature difference between the VOC and ambient air ΔT , the flow rate of the leak, the viewing distance between the camera and the emission source, and the wind speed. ExxonMobil Research Qatar Ltd. and Providence Photonics LLC have developed a portable device (QL100) which is claimed to quantify emission rates of VOC leaks. The literature about this device is currently limited, but the QL100 seems to report the emission rate directly in the field or in the laboratory by entering the ambient air temperature and the viewing distance between the leak and camera. Despite the limited testing under different conditions, the QL100 is apparently a promising device for quantifying VOC leaks. Another promising method to predict gas emissions rates based on IR camera outputs is provided by Safitri et al. (Journal of Loss Prevention in the Process Industries 24 (2011) 138-145). This method estimates gas emission rates very well for relative small leaks, such as fugitive VOC emissions.

Standardisation activities

The IMPRESS project has contributed to the following CEN working groups by providing funding for convenorship and / or leadership of various sub-tasks:

- CEN / TC264 / WG16 Reference measurement methods for NO_x, SO₂, O₂, CO and water vapour emissions, 11th / 12th Sep 2014, ISPRA, Rome
- CEN TC264 / WG36 Measurement of stack gas emissions using FTIR instruments, 1st / 2nd July 2014, AFNOR, Paris, and 13th / 14th Jan 2015, VDI, Dusseldorf
- CEN / TC264 / WG9 Quality assurance of automated measuring systems, 12th / 13th December 2014, CEN, Brussels, and 13th / 14th April 2015, CEN, Brussels
- CEN / TC264 / WG38 Determination of fugitive VOC emission, 17th / 18th Sep 2014, CEN, Brussels, 28th / 29th Jan 2015, CEN, Brussels, and 16th / 17th April 2015, CEN, Brussels

Dissemination activities

Early work under IMPRESS has been disseminated at the following fora:

Invited plenary at the 8th International Conference and Exhibition on Air Quality and Emissions (AQE 2015), 22nd – 23rd April 2015, Telford, UK.

Measurement and Calculation of Stack Flow Rate for Mass Emissions Reporting Purposes.

Oral presentation, Gas Detection and Modelling of Plumes and Leaks, 61st GASG Colloquium, Bristol, UK, 26th March 2015.

Environmental Monitoring using Differential Absorption LIDAR (DIAL) Spectroscopy.

Oral presentation, Environmental Science / Physics Department, Manchester University, UK, 18th February 2015.

The Application of Differential Absorption Lidar (DIAL) for Pollutant and Green House Gas Emissions Monitoring.

Workshop, Air Council of Houston and Galveston, USA, January 2015.

The Application of Differential Absorption Lidar (DIAL) for Pollutant Emissions Monitoring.

Contact and further information

Every 6 months a newsletter of the project will be distributed. Please forward this newsletter to your colleagues. They can send an email to any of the project's representatives with subject “register IMPRESS newsletter” to register for this 6-monthly newsletter.

Additional information on IMPRESS and the partners can be found on the project homepage <http://projects.npl.co.uk/impres/>.

The IMPRESS project is carried out by the following partners / institutions:

NPL Management Limited (**NPL**), United Kingdom / Contact: Rod.Robinson/at/npl.co.uk

VSL B.V. (**VSL**), The Netherlands / Contact: evuelban/at/vsl.nl

Physikalisch-Technische Bundesanstalt (**PTB**), Germany / Contact: olav.werhahn/at/ptb.de

Český metrologický institut Brno (**CMII**), Czech Republic / Contact: jgersl/at/cmi.cz

Justervesenet (**JV**), Norway / Contact: gkv/at/justervesenet.no

Environmental Protection Agency (**DCMR**), The Netherlands / Contact: john.korsman/at/dcmr.nl

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