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Update on a global study measuring methane emissions from Liquid Natural Gas facilities

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Methane is a potent greenhouse gas and the primary component of natural gas (NG). There has been a significant increase in the production and use of NG in recent years, partly due to the perceived environmental benefits associated with NG in comparison to other fossil fuels. One of the growing elements in the global market for NG is the role of liquefied natural gas (LNG). LNG provides a means for global trade in NG, with gas being liquified close to production sites, shipped internationally as LNG and imported and fed into national gas infrastructure at regassification plants. LNG use has increased in recent years and in 2019 approximately 482.4 Gm3 was traded, making the sixth consecutive year of market growth.

As part of the 2015 United Nations Climate Change Conference, COP 21, the Environmental Defence Fund along with industrial partners pledged to better quantify the oil and gas industry's contribution to global methane emissions across the value chain. From this a series of peer-reviewed scientific studies to quantify methane emissions in the oil and gas sector were commissioned in collaboration with the Climate and Clean Air Coalition, the Oil and Gas Climate Initiative and European Commission. As part of this wider study, the National Physical Laboratory (NPL) is undertaking a programme of measurements to quantify the methane emissions from key stages of the LNG supply chain using a variety of measurement techniques, including the Differential Absorption Lidar (DIAL) facility designed and operated by NPL.

DIAL is a powerful technique that can be used to track and quantify plumes emitted from complex emission sources including LNG plants. By using Lidar, the DIAL technique can make remote range-resolved single-ended measurements of the actual distribution of target gases in the atmosphere, with no disruption to normal site operational activities. It provides 3D mapping of emission concentrations and quantification of emission rates for a wide range of target gases, including methane.

Within this study an initial selection and prioritisation of sites was made based on a number of criteria. The measurement approach has been to quantify the emissions from the sites over a period of weeks, determining emissions from the key functional elements of the sites. Data has therefore been obtained for total site emissions and related to the different processes on the sites. Throughput data from the sites has also been collected to enable comparisons between the emissions.

This talk will describe the objectives and scope of the project and the methodology used to characterise the sites by their functional elements. The benefits in comparing data with this level of granularity will be discussed. The DIAL measurements were conducted using a methodology which is the basis for a draft standard method for fugitive monitoring currently being developed by CEN in Europe. The method, performance characteristics and validation data will be described. A summary of the current status of the field measurements and a discussion on the results obtained so far will be given. Future work and expected outcomes will be discussed.