



DEVELOPMENTS IN THE CEMS MARKET



From an environmental perspective, continuous monitoring provides a better picture of process emissions because it is able to detect spikes and trends, whilst also providing emissions data during all process conditions.

Continuous Emissions Monitoring Systems (CEMS) are well established in many countries, where continuous monitoring is required for compliance with regulatory requirements. The market for CEMS in these countries is therefore relatively stable and driven by a requirement for replacement systems or new equipment for new processes, or where new regulatory requirements become applicable.

Developing countries are increasingly looking to implement environmental protection regulations and this provides a massive stimulus for the CEMS market in those territories. For example, in India, the Central Pollution Control Board (CPCB) has adopted CEMS as the preferred method for measuring industrial emissions, and has initially directed plants in 17 categories of highly polluting industries to install CEMS for monitoring and compliance with regulatory emissions limits. The parameters specified for continuous monitoring include Particulates, Hydrogen Fluoride, Ammonia, Sulphur Dioxide, NOx, Chlorine, Hydrogen Chloride, Carbon Dioxide and Carbon Monoxide. Two CEM India conferences have already taken place; providing an opportunity for networking and information exchange so that domestic industries in India and other Asian countries can determine how best to comply with the latest requirements. The next CEM India conference and exhibition will take place in New Delhi during September 2021.

Domestic regulatory requirement is obviously the main driver for the CEMS market, but continuous monitoring also provides detailed insights into the status of a process, and most operators utilise CEMS data for process optimisation – helping to manage the efficiency of a furnace for example. A further driver for CEMS exists in international organisations where environmental standards are common to all plant, irrespective of their location. This is particularly common where subsidiaries report environmental data to parent organisations in other countries.

UK still applying EU regulations?

The UK formally left the EU on 31 January 2020, but the terms

of the UK's departure include an eleven month transition period (unless extended) so the UK will be subject to EU law until 31 December 2020. The UK's negotiating position states that the agreement governing the future UK/EU relationship "should include reciprocal commitments not to weaken or reduce the level of protection afforded by environmental laws in order to encourage trade or investment." However, the EU's negotiating guidelines, published in February 2020, say there should be "a level playing field so as to uphold corresponding high levels of protection over time." It remains to be seen therefore whether the UK will apply the same emission limits and monitoring requirements as the EU, including any future updates, after 31 December 2020. Nevertheless, with both parties stating commitment to environmental protection and a willingness to reach agreement, it seems unlikely that emission limits in the UK or EU will weaken in the foreseeable future.

Industrial Emissions Directive (IED)

The IED recasts seven earlier pieces of industrial emissions legislation including Directives for integrated pollution prevention and control, large combustion plants, waste incineration, solvents emissions and titanium dioxide. The IED takes an integrated approach to controlling pollution to air, water and land, and sets standards for the most polluting industries. Larger industrial facilities undertaking specific activities are required to use Best Available Techniques (BAT) to reduce emissions. Around 50,000 installations undertaking the industrial activities listed in Annex I of the IED are required to operate in accordance with a permit.

BAT reference documents (BREFs) are used by competent authorities in Member States when issuing operating permits for the installations that represent a significant pollution potential in Europe. BREFs include BAT Conclusions that contain emission limits associated with BAT, which must not be exceeded unless agreed by the relevant competent authority.

Recent significant CEMS related updates to the IED include the publication on 17th August 2017 of the LCP (Large Combustion

Plant) BREF which set limits for the emissions to air of mercury, hydrogen chloride and hydrogen fluoride from the combustion of solid fuels in LCPs (combustion plants with a total rated thermal input equal to or greater than 50 MW). They also tighten the existing emission limits for pollutants including sulphur dioxide (SO₂) and nitrogen oxides (NO_x). The BAT conclusions in the LCP BREF also concern some processes involving the gasification of coal or other fuels, as well as the disposal or recovery of waste in larger waste co-incineration plants for non-hazardous waste.

Relevant processes will have to comply with the requirements of the BAT conclusions for LCP within 4 years i.e. 17th August 2021.

Medium Combustion Plant

The Medium Combustion Plant Directive (MCPD) applies to over 140,000 plants in the EU, and regulates emissions from the combustion of fuels in plants with a rated thermal input between 1 and 50 MW. The MCPD regulates emissions of



SICK MCS200HW

SO₂, NO_x and dust to air, and compliance will also require the monitoring of CO. Each permit's emission limit values (ELVs) are dependent on plant, fuel type and size.

The ELVs established by the MCPD apply from 20 December 2018 for new plants and 2025 or 2030 for existing plants, depending on their size. The MCPD addresses the potential need for Member States to apply stricter emission limit values in areas where this can improve local air quality in a cost-effective way.

Responding to the requirements of the MCPD, ENVEA Group has developed a new generation of eco-designed, ultra-compact and cost effective NDIR (non-dispersive infrared) CEMS, offering high precision and a fast response time. The monitor requires only limited maintenance, and allows simultaneous measurement of NO_x, SO₂, CO, O₂, residual H₂O, and optionally Greenhouse Gases. Particulates can be monitored independently, with the use of advanced electrodynamic device. Insensitive to T° variations in the range +5° to +40°C (no air conditioning required), this new generation of CEMS is compatible with any type of drying technology (gas cooler, permeation, dilution etc.). Other key features include remote communication, and AMS control functionalities such as integrated sampling control, automatic zero and span gas injection, external pump control, and system alarms display.

Waste Incineration

Following a review of the BREF for Waste Incineration, BAT conclusions were published in the Official Journal of the EU on 3 December 2019. This included new emissions, monitoring and efficiency standards that will help national authorities to lower the environmental impact of waste incineration. The BAT conclusions provide national authorities with a sound technical basis to set permit conditions for industrial installations.

Waste management is part of the EU's transition towards a circular economy and is based on a 'waste hierarchy' which establishes the order of priority when shaping waste policy and managing waste operations.

Christoph Becker from ABB Automation says: "None of the manufacturers of multi-component hot/wet CEMS has yet launched a new product that meets all the requirements of the WI BATC, 2019. Consequently, it will be necessary for suppliers to recertify their CEMS. In addition, some products may have to be technically improved.

"Nevertheless, the BATC WI requirements will be enforced in 2023, so any applicable WI processes will need to take this into account in the meantime." Christoph believes that process operators should give this matter careful consideration, adding: "ABB's ACF5000 extractive FTIR CEMS is already very well prepared to meet the future requirements. In fact, this CEMS already monitors ELVs in the ranges specified in the new BATC for WI."

BAT-associated emission levels have been set for mercury and other metals, nitrogen oxides, ammonia, hydrogen chloride, hydrogen fluoride, sulphur dioxide, volatile organic compounds, polychlorinated dioxins and furans, and dioxin-like polychlorinated biphenyls. There have also been changes to emissions monitoring requirements, in particular regarding the continuous measurement of mercury and the long-term sampling of polychlorinated dioxins and furans.

Gasmet offers two mercury CEMS; the CMM and the new CMM AutoQAL. The CMM AutoQAL is a certified Continuous Mercury Monitoring system with an automatic and integrated QAL3 validation tool. Gasmet says the CMM AutoQAL saves time and cost, and is the only TÜV and MCERTS EN 15267 certified solution (MCERTS pending) with an automatic and integrated QAL3 validation tool. Having a certified test gas generator with the ability to conduct both Hg⁰ and HgCl₂ checks, means that an external gas generator for QAL3 operations is no longer necessary.

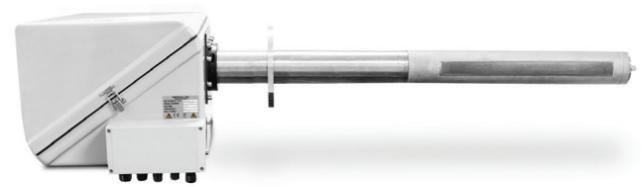
Gasmet is also offering the GT90 Dioxin+ which is an MCERTS certified system for the long-term monitoring of dioxin emissions in conformity with EN1948-1 and EN15267. The system monitors hazardous organic compounds in industrial and domestic waste incineration plants. In addition to dioxins, it is capable of measuring furans and other persistent organic pollutants (POPs) such as polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs).



Gasmet CMM AutoQAL

Other CEMS developments

Recent innovations include the launch of SICK's MCS200HW which follows international standards such as 2010/75 / EU, EN15267 or EN14181 as well as US EPA, Part 75, for plants requiring a permit. The MCS200HW is a hot/wet extractive multi-component analyser for the continuous monitoring of up to 12 measurement components in the flue gases of industrial combustion plants. It features an innovative 12-inch touchscreen display with a task-oriented operator wizard and quick access to the main functions. Plant operators are also able to quickly access the analyser and its data remotely; wherever they are in the world.



Protea In-Situ CEMS

Protea supplies both extractive and in-situ CEMS. The atmosFIR extractive CEMS are built around the company's FTIR technology, which is MCERTS approved for simultaneous multigas analysis. A standard gas suite of NO, NO₂, N₂O, SO₂, NH₃, HCl, CH₄, O₂, CO₂ and H₂O is provided, with the lowest range NO_x measurement of any FTIR-based CEM. The technology allows further gases to be added easily using the company's software, without a requirement for further hardware. Protea's in-situ (IR or UV) CEMS are flange mounted to the emissions point, which removes the need for often costly and high-maintenance sample handling components.

Protea will be launching a comprehensive emissions reporting package for use with their full CEMS product range in 2020. "The provision of the reporting software alongside the full CEM system will ensure a fully configured and compliant emissions package of hardware plus software from us, giving a single supplier and support contact for our customers," says MD Andy Toy. "Both the CEM and the reporting software are provided with full remote diagnostics capability; which is hugely beneficial at times or in locations when on-site access is not always possible."

Protea's CEMS are routinely employed by industrial process operators in compliance with their regulatory requirements. However, MD Andy Toy says: "The supply of equipment and services for the monitoring of emissions from marine vessels is a growing part of our business."

According to the International Maritime Organisation (IMO) MARPOL convention for the prevention of pollution from ships, from 1st January 2020 the sulphur content of fuel oil used by ships shall not exceed 0.50% - which is 80% lower than the previous limit. "This will undoubtedly lower SO₂ emissions," comments Andy Toy. "However, ship operators may not be able to source low sulphur fuels, and fuels may become mixed onboard. In addition, some ships are equipped with emission scrubbers so they should be able to continue to use fuels with higher sulphur content. Our robust, certified monitors enable marine vessels to ensure that they operate their scrubbers effectively and that all vessels are able to demonstrate compliance with emissions regulations."

Summary

It is clear that CEMS manufacturers are continually investing in new technology; to meet changing regulatory needs; to improve monitoring, and to make it easier and less costly to undertake. However, when comparing offers, potential CEMS customers should be wary of placing too much weight on initial instrument price. CEMS still present significant ongoing costs for service, calibration and maintenance, so, as well as checking compliance with present and future regulations, prospective CEMS users should also evaluate operational costs as part of a lifetime cost comparison.

Given the effects of the COVID-19 outbreak, it also seems logical for CEMS users to ensure that their real-time data can also be accessed remotely.



ABB ACF5000

Marcus Pattison, Publisher • Oak Court Business Centre, Sandridge Park, Porters Wood, St. Albans, Hertfordshire AL3 6PH, ENGLAND
• Tel: +44 (0) 1727 858840 • Email: info@ilmexhibitions.com • Facsimile: +44 (0) 1727 840310 • Web: www.ilmexhibitions.com



