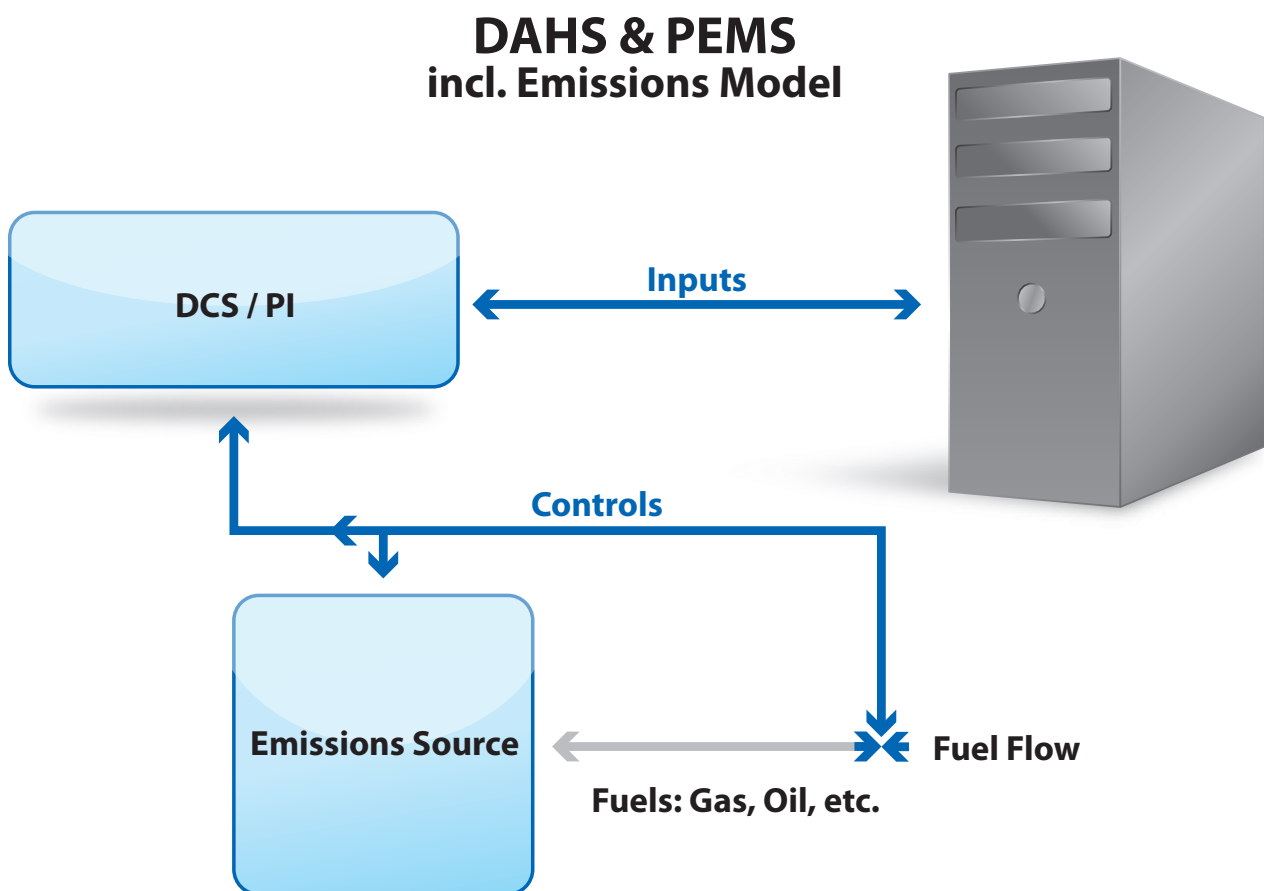


# dataCEMS

a Multi-discipline Mathematical Modeling (MdM<sup>2</sup>)

Predictive Emission Monitoring System (PEMS)



## PEMS in a Nutshell

Predictive Emission Monitoring (PEM) represents a novel and cost-effective approach for continuous monitoring of source emissions as alternative to Continuous Emission Monitoring Systems (CEMS). In order to be accepted as full compliance solution, PEM needs to be strictly in line with applicable regulations for source monitoring.

PEM Systems (PEMS) are software-based. Consequently, they do not need gas analyzers and associated hardware like sample conditioning or shelters. Interfaced with plant control systems, PEMS utilize process inputs to offer continuous, real-time monitoring of pollutants, e.g. NO<sub>x</sub>, SO<sub>2</sub>, CO, HC or diluents like O<sub>2</sub> and CO<sub>2</sub>. PEMS are generally suitable for all gas- and oil-fired emission sources in lieu of Continuous Emission Monitoring Systems (CEMS), providing equal accuracy and data quality. The models are built with quality assured emissions training data along with paired, time-synchronized data of process parameters with correlation to emissions.

PEMS are frequently packaged with Data Acquisition and Handling Systems (DAHS) to result in self-sufficient compliance solutions. Applications exist for utilities, petrochemical, chemical, steel and other industrial plants or municipal sites. PEMS offer significant cost benefits with lower capital expenditures as well as much lower operational and maintenance cost than CEMS. PEMS and DAHS require for operation very little or no plant manpower.

To become a certifiable, accepted equivalent to CEMS, however, PEMS need to be based on a sound regulatory framework and has to obey the requirements of a demonstrable, stringent quality assurance scheme. U.S. Environmental Protection Agency (EPA) has stipulated the Performance Specification (PS) 16 within 40 CFR Part 60 or Subpart E of 40 CFR Part 75 to certify PEMS as alternative monitoring method in lieu of CEMS. Europe is presently drafting a standard within CEN/TC 264 - Air quality that considers the relevant European norms EN 14181 and EN 15267.

At present, PEMS is mainly applied in countries following U.S. EPA regulations, because these standards are in place for some years already and demonstration programs have been executed. Consequently, the technology already gained significant interest not only in the U.S. but in the Middle East and Asia. PEMS installations exist as stand-alone compliance solutions or as part of an integrated environmental monitoring approach capable to address multiple sources in one plant. One prerequisite is seamless integration of PEMS and DAHS and integration in plant-wide IT and communication networks. An additional benefit is that a PEMS is a viable diagnostic tool to lower emissions and improve combustion efficiency.

PEMS is used at multiple plant sites, particularly in the U.S., but also in the Middle East and partly in Asia. In Europe PEMS so far is common in selected countries.