Ricardo
Energy & Environment

MODUS: A dynamic solution for managing air quality data

Delivering Excellence Through Innovation & Technology

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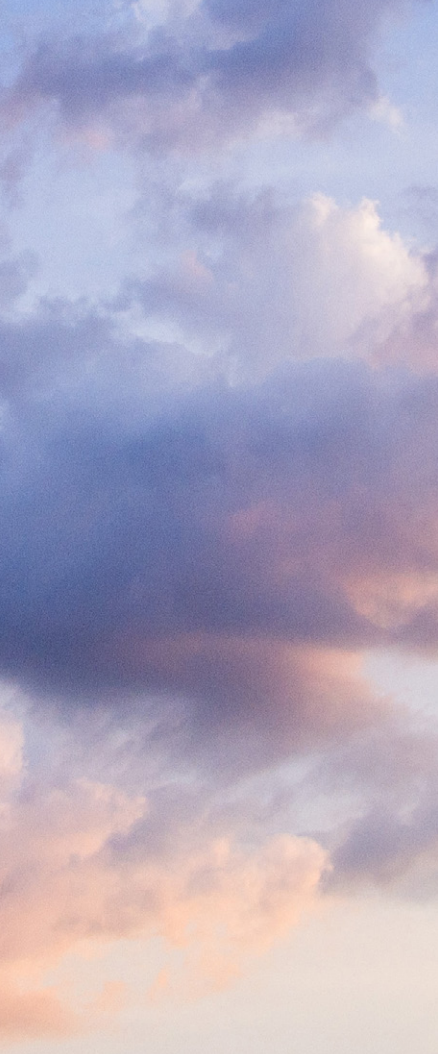
MODUS is a state-of-the-art, modular platform for robust, reliable and effective management of air quality data. The MODUS system has been developed and proven in some of world's most challenging air quality regimes. Developed by Ricardo Energy & Environment, MODUS benefits from over six decades of experience in the management and quality assurance of air quality data.



A comprehensive solution

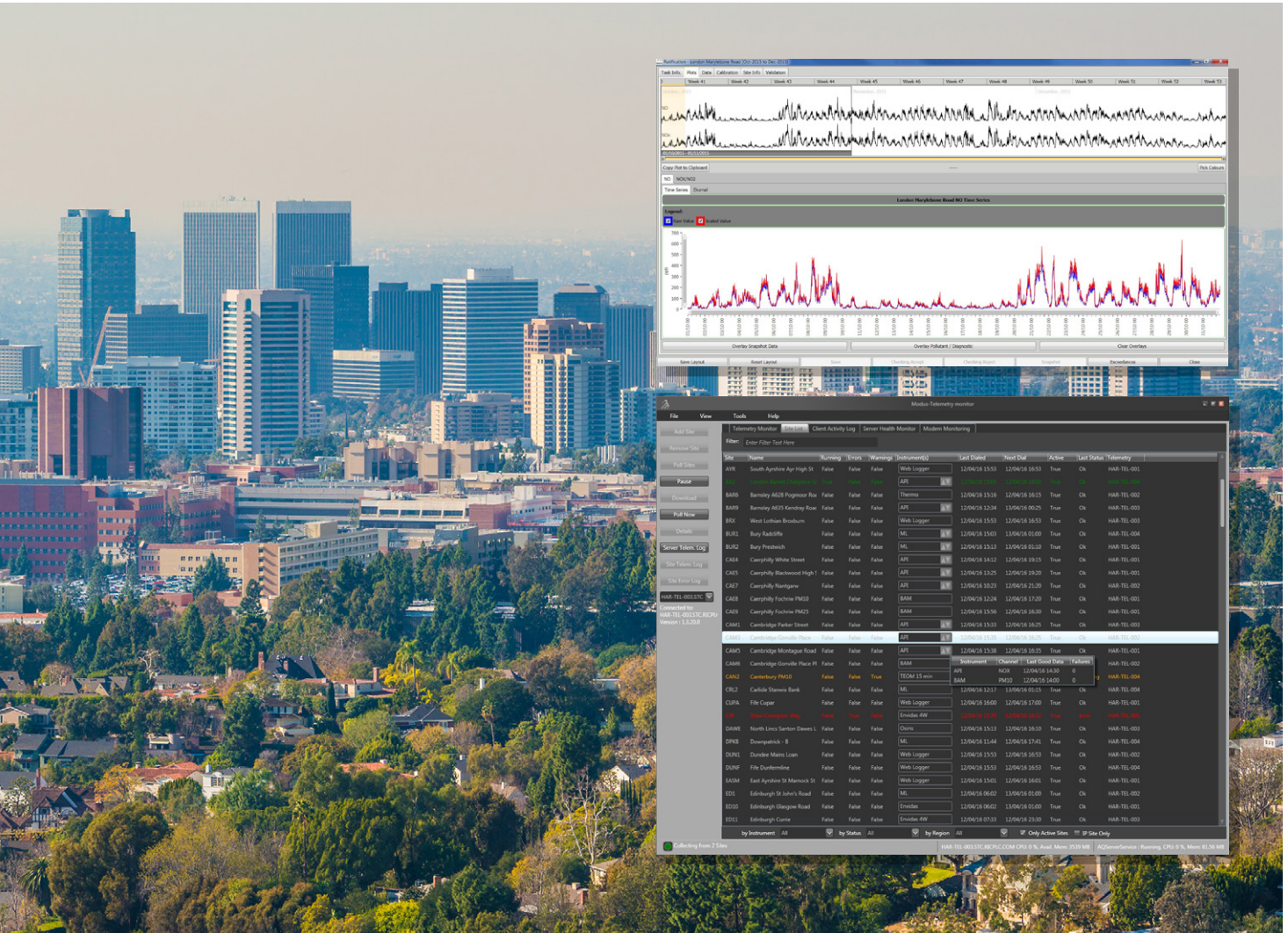
MODUS provides the air quality sector with an unrivalled suite of data management tools.

The system provides users with comprehensive workflow management tools covering all air quality data management tasks – from automatically importing data from measuring instruments in near real-time through to data scaling, validation and dissemination, including automated distribution to websites and mobile apps.

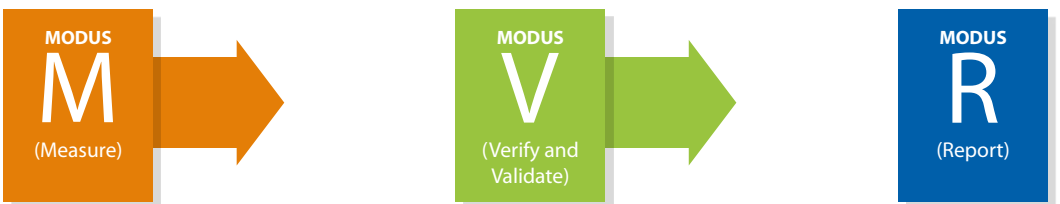
MODUS delivers powerful and user-configurable tools for data reporting, analysis and interpretation, all tailorable to the needs of specific stakeholders – be they city or board-level decision-makers, network managers or regulatory bodies.

MODUS ensures that data are available when they are required, where they are required and to defined quality standards. The system allows users to implement best practice quality assurance procedures, providing value and confidence in data – critical where air quality data are to be used to support decision-making or demonstrate regulatory compliance.

MODUS allows high volumes of data to be managed through real-time data analysis screens, custom workflows and user-configurable task-allocation options. This helps to ensure final datasets and associated analysis, reporting and interpretation are delivered to deadlines and defined quality standards, supported by a transparent audit trail.



Modules can be implemented independently or as a fully integrated package



Collect and import data
An air quality data collection and review system that is highly configurable and supports all major equipment types, monitoring sites and pollutant combinations.

Quality assurance and real-time data checking and evaluation
A powerful suite of data analysis tools that place unrivalled data verification and validation techniques within a tailorable quality assurance framework. Features include the latest visualisation and data validation techniques, workflow management, task allocation and advanced data querying capabilities.

Communicate and disseminate information across a diverse range of channels
Brings together advanced data reporting and dissemination tools in a flexible module with a high degree of user configuration.

Why MODUS?

Over 5 years of development and testing has resulted in a powerful and flexible system that meets the needs of the world's most demanding air quality managers.

MODUS is highly scalable, making it the ideal solution for local, regional and national measurement networks – capable of managing billions of data points every year from hundreds of measurement stations. Clients include the UK Government; the governments of Scotland, Wales, Northern Ireland and Gibraltar. MODUS is also used to deliver data analysis for major cities including Riyadh and London.

It is fully compliant with reporting requirements across the globe including US Environmental Protection Agency and EU regulatory regimes with the flexibility to configure the solution to meet user needs.

MODUS has been developed by Ricardo Energy & Environment, a company certificated to ISO 9001 and ISO 14001.

Key features

Universal compatibility

MODUS is designed for use with all major air quality measurement instrumentation and, critically, can be easily configured to cater for bespoke client needs. MODUS can be integrated into existing measurement networks or implemented as a standalone system.

MODUS adds significant value to equipment supplier solutions by reducing network running costs while raising the standard of data quality using proven and recognised quality assurance techniques within a transparent and auditable system. Flexible data collection options include conventional modem and internet protocols or automated email data delivery solutions.

Scalable

A modular design enables simple expansion as monitoring networks evolve.

Flexibility
Solutions can be tailored to individual client needs.

Near real-time data and system updates
Near real-time system status updates coupled with verified data uploads to websites ensures the latest high-quality data, accurately reflecting ambient levels and concentrations of air pollutants.

Prompt exceedance alerts
MODUS provides configurable concentration threshold alerts that can be sent to user-specified stakeholders via a number of methods including email, text messages (SMS) and mobile application alerts.

Regulatory compliance
MODUS can be tailored to regulatory regimes, providing reporting against a wide range of environmental quality standards, limit values, thresholds and targets.

Quality assured
MODUS uses advanced data analysis tools and functionality to support rapid checking, verification and validation of large volumes of measurement data.

Demonstrable transparency
Data changes and user activity are systematically logged providing clear and traceable audit trails, and evidence logs for use in compliance assessments.

Tailorable data collection frequencies
Data collection frequency and timing can be programmed to meet user needs with full flexibility to increase update frequencies at times of pollution episodes.

Bespoke, client-focused reporting
MODUS delivers powerful, automated reporting tailorable to suit specific stakeholder groups.

Accessibility
Validated data can be accessed through several channels including tablets and smartphones, ensuring information is accessible when it is needed, where it is needed and anywhere in the world.

Automation
Configurable workflows and alert triggers save time and resources.

Smart maintenance
Automatic system checks generate maintenance alerts, minimising system downtime and maximising data capture.

Installation

MODUS can be provided as a standalone software installation on client systems, deployed as a cloud solution or used as part of a managed service delivered by Ricardo Energy & Environment. Full system and user training is provided with all system deployments.

	MODUS M	MODUS V	MODUS R	Dedicated AQ expert account management
Standalone software	✓	✓	✓	
Managed service	✓	✓	✓	✓

MODUS comprises three core modules, each of which can be integrated into existing client measurement systems or implemented as a standalone solution as part of an existing or new air quality measurement network.

Standalone software

MODUS can be deployed as a standalone solution, tailored to your existing IT infrastructure, allowing you to maximise the benefit of any infrastructure investments you have already made.

Such an approach means that MODUS is under the direct control of your existing digital services management arrangements. This enables clients to avoid the introduction of disparate systems that are under the control of several vendors.

Ricardo's digital service experts provide the full range of training and necessary support to 'in-house' use of MODUS, so avoiding the need for additional service level agreements for new infrastructure, administration and management.

Managed service

Allow our AQ experts to manage, analyse, interpret and evaluate your data, and then produce meaningful reporting tailored to your requirements. Our managed services deliver robust, high-quality evidence bases that use recognised international quality assurance methodologies through MODUS.

Ricardo Energy & Environment's air quality monitoring team comprises over 100 air quality scientists, consultants and engineers. Our proven track record in deploying and quality assuring air quality data is second to none.

Our managed service will help you to understand the nature and extent of your air pollution challenges, delivering the high-quality evidence base that empowers you to take informed action towards achieving your air quality goals – be they meeting your regulatory obligations or establishing an ambitious air quality strategy and a lasting legacy of sustainability.

MODUS at work

Ricardo Energy & Environment has a rich track record of delivering groundbreaking air quality solutions – from the design and deployment of ambient air quality management networks to the development of informed air quality strategy and policy. Our MODUS software solution represents the culmination of over six decades of experience in a package that delivers state-of-the-art quality assurance capabilities. Our solution has been adopted by clients across the globe.

Measuring and managing air quality in Riyadh, Saudi Arabia

Issue. As a result of rapid development in its metropolitan area, the Saudi Arabian capital, Riyadh, is tackling environmental sustainability challenges that include poor air quality and associated health impacts.

Solution. To enable the ArRiyadh Development Authority to better understand how pollution is behaving in the city, and as a first stage in taking targeted steps to improve air quality, Ricardo Energy & Environment designed and developed a state-of-the-art, city-scale air quality monitoring network of 17 measurement stations with MODUS at its core. The system is providing a detailed picture of measured air quality across the capital in near real-time.

Benefits. The ArRiyadh Development Authority now has a detailed and high-quality understanding of air pollution in the city. These measurement data have supported the development of a city-scale model that is allowing detailed scenario analysis of potential pollution mitigation action.

Quality assurance and quality control services to the UK's national air quality monitoring network

Issue. The UK's national air quality monitoring network consists of over 150 air pollution measurements stations. The network provides data that are necessary to meet reporting obligations set out under European air quality directives including the need to disseminate near real-time air quality information to the public. As such, the network must deliver high-quality data that meet European standards.

Solution. Ricardo Energy & Environment has been managing all aspects of data quality assurance for the UK's national air quality monitoring network for over two decades. MODUS provides the engine for our quality assurance system helping our team to measure, check and verify data 24 hours a day, 7 days a week, 365 days a year. Final verified and validated measurement data are reported to the European Commission.

Benefits. The UK's national air quality monitoring network data are regarded as being among the highest quality in the world – the procedures that the network adopts are recognised as representing best practice internationally. The provisional and validated data are widely used by a broad range of stakeholders to support air quality modelling and studies including large-scale programmes such as the UK's Modelling of Ambient Air Quality and in the study of tropospheric ozone. The data are also used by European research agencies to advance regional understanding of air pollution.

City-level air quality management in Gibraltar

Issue. The Government of Gibraltar required an air quality management solution that ensures it meets exacting requirements of European air-quality legislation.

Solution. Working with the Gibraltar Environmental Agency, Ricardo Energy & Environment developed a comprehensive air quality management system for Gibraltar that included a combination of local air quality measurements, air quality modelling and policy development support. MODUS is the centrepiece of the measurement solution delivering high-quality data in near real-time, insightful data analysis and interpretation, and live data dissemination via a state-of-the-art website (www.gibraltarairquality.gi).

Benefits. MODUS has played an integral part in building a high-quality evidence base of air pollution in Gibraltar. The quality assured data have helped to clarify how different activities have contributed to concentrations of air pollutants, which has helped to inform the development of air quality policy for Gibraltar.

The Scottish Air Quality Database

Issue. To improve the quality of research and data analysis in evaluating Scottish air quality policies, the Scottish Government sought to create a database and web archive of reliable air quality data. The project required several key elements – data collection, quality assurance, analysis and interpretation; data management; and real-time data dissemination via a public-facing website.

Solution. Ricardo Energy & Environment developed the Scottish Air Quality Database and website, providing a comprehensive resource for information covering all aspects of air pollution in Scotland. MODUS is core to the solution, taking data from over 90 air quality measurement stations in near real-time. These data are checked, screened and verified using internationally recognised best practices within the MODUS software suite. MODUS and the website (www.scottishairquality.co.uk) provide access to all data, powerful analysis and interpretation tools, and user-configurable pollution email alerts.

Benefits. The Scottish Air Quality Database and website have enabled the Scottish Government to accurately map air quality across Scotland, forecast future concentrations, and effectively communicate air pollution information and measurements to the public in near real-time. The measured data are analysed for trends over time to assess long-term changes in pollutant concentrations, so informing the Scottish Government and the general public on the effectiveness of policy.

For more information about MODUS,
please contact one of our experts at
enquiry-ee@ricardo.com or +44 (0) 1235 753000

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