



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services



Solutions

Energy management solutions

Giving you the power to reduce your energy usage

What are energy management solutions?

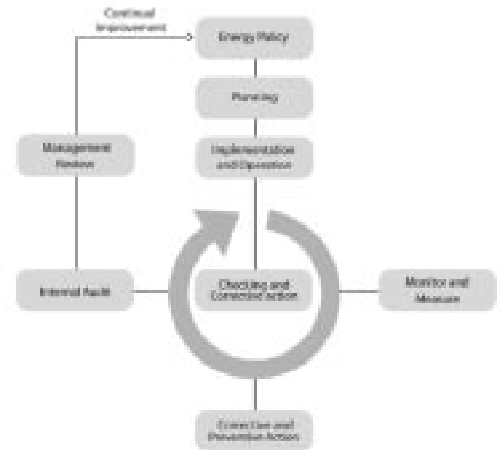
Energy management solutions provide the tools you need to measure, collect and analyse utility consumption data, giving you the knowledge to make significant energy savings.

In its simplest format, energy management starts with the installation of appropriate instrumentation to measure the usage of utilities within a process. The next step is to introduce a means of automatically collecting that data at regular time intervals. The final phase is to relay this information into data analysis software that highlights patterns of energy usage, allowing you to set energy efficiency targets and identify areas of energy wastage.

As energy prices continue to rise, the process industries face an ongoing challenge to remain competitive. There is also increasing pressure to accept the burden of corporate responsibility by saving energy and reducing carbon emissions in line with environmental regulations and EU targets.

Endress+Hauser can help you save money by enhancing the performance of key on-site installations such as boilers, compressors, pasteurisers, ovens, chillers, sterilisers, kilns and furnaces. Our packaged energy management solutions are fully scalable and upgradable, allowing you to expand your system in line with your changing needs.

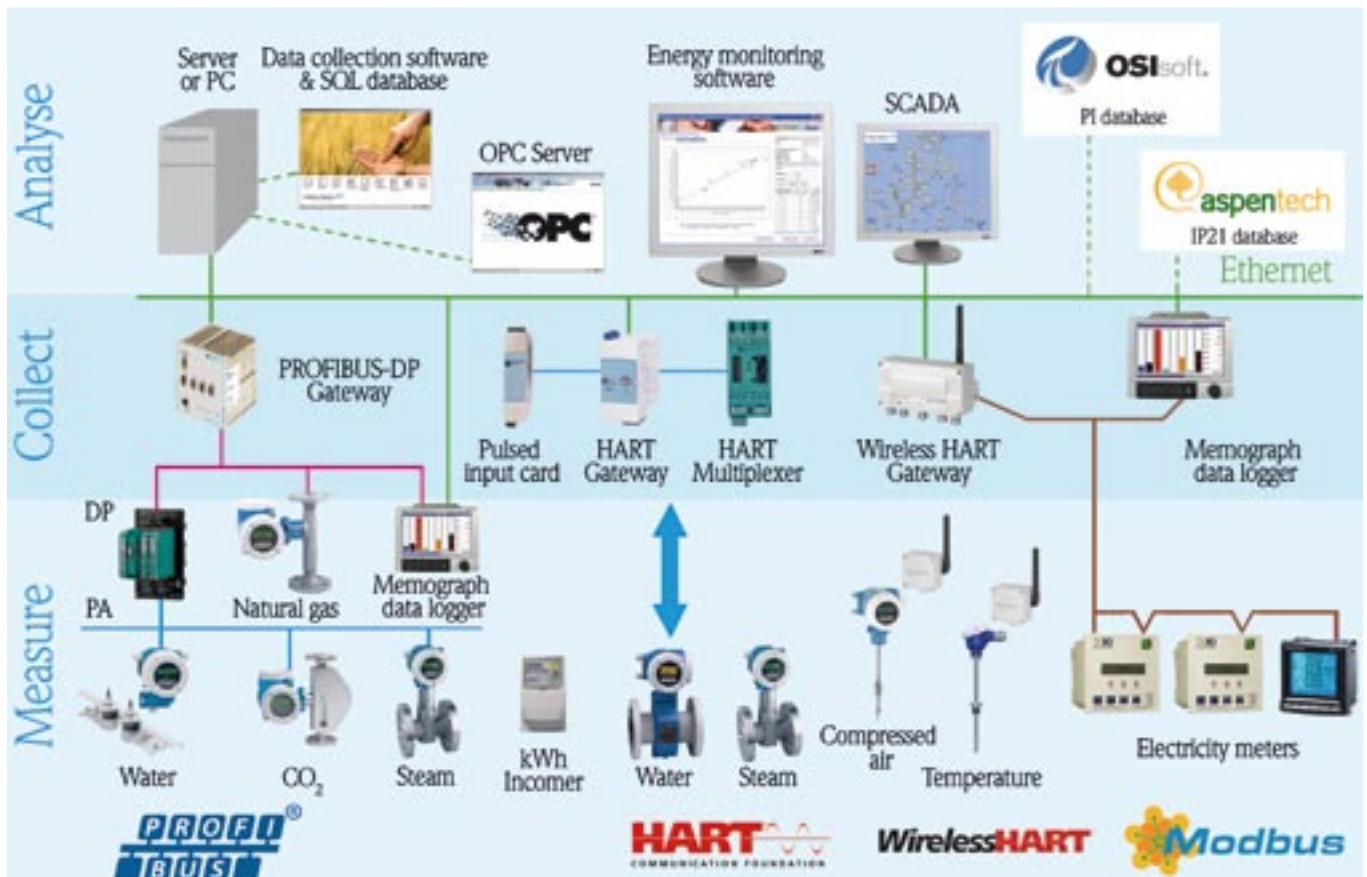
Advances in affordable remote automatic data collection devices and web-enabled software solutions have made it easier than ever to implement an energy monitoring and targeting programme. With the opportunity to reduce energy costs by up to 15%, most installations see a return on investment within just two years.



BS EN 16001 / ISO 50001

PDCA (plan, do, check, act) methodology employed in many ISO management systems

Components of an energy management system



Seeking out energy saving opportunities

When it comes to energy usage, most plant operators have the same objectives:

- To understand and make visible all energy distribution across the site
- To identify waste and reduce the base load
- To benchmark efficiency of all key items of plant and set performance targets
- To achieve early detection of poor performance
- To provide support for decision making
- To offer effective energy reporting
- To use analytical tools to find patterns in data revealing opportunities for energy saving

The added bonus is that as well as helping the environment, when you achieve these objectives you will also reduce your energy costs.



Endress+Hauser will provide you with a ready-made energy management solution that is ideal for your plant. We offer you a complete cost effective solution, all from one source:

- Reliable measuring points
- Intelligent devices for data recording and data transfer
- Made-to-measure software packages for analysing and evaluating measured energy data
- Audits and surveys to help you make the most of the energy data

Only with targeted energy monitoring can energy consumption and plant efficiency be assessed objectively and energy saving measures initiated.

The benefits are clear:

- Reduction in energy consumption (typically 5 to 15% is possible)
- Recording energy consumption with calibrated meters (required by EN 16001 and ISO 14001)
- Less time wasted on manual reading of measured values
- Reliable triggering of warning messages or exception reports
- Energy data to quantify opportunities, justify projects and measure return on investment

Did you know?

- Automatic monitoring and targeting can be used to lower the energy consumption of a plant by 5 to 15%
- More than a quarter of the UK's carbon emissions come from industry*
- Energy costs are forecast to rise by 26% by 2020**
- UK industry is wasting almost £7 million a day on poor energy efficiency*
- The Carbon Trust estimates that UK businesses could collectively save nearly £2.5 billion a year simply by implementing cost effective energy efficiency measures*

* Source: The Carbon Trust

** Source: Department of Energy and Climate Change, Annual Energy Statement, July 2010



It all begins with reliable repeatable measurement

Energy analysis is only as good as the data input. Selection of the right utility meter, its installation and the correct flow measurement units enable accurate energy analysis. Endress+Hauser will help you to select the right instrument for each application on your site.

Vortex



Vortex meters are extremely robust and immune to vibration, water hammer and temperature shocks, making them ideal steam or high pressure hot water (HPHW) meters. Some designs can provide mass flow, energy, temperature and specific enthalpy all from a single 2-wire instrument.



Prowirl

Differential Pressure (DP)



DP flowmeters are one of the oldest and most versatile measuring techniques. Averaging pitot tubes can provide cost effective solutions in large pipes with limited straight pipe lengths. Useful for compressed air, stack emissions or solving any utility flow problem.



Deltatop

Thermal



Thermal mass meters are suitable for a wide range of gases. Since pressure loss is negligible and turndown extremely high, the technique is ideal for natural gas at very low pressure and compressed air in large pipes flowing at low velocity.

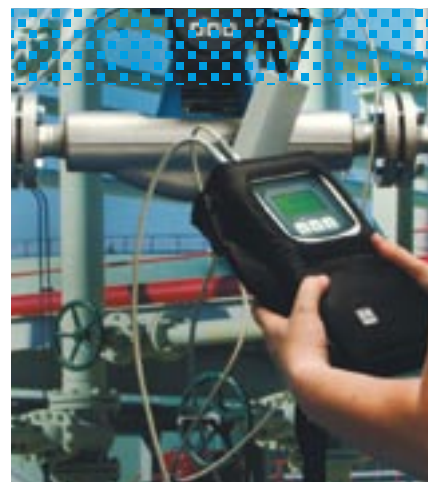


t-mass

In-situ verification of utility meters



A common electronics platform for all Endress+Hauser utility meters makes advanced diagnostics and verification of all meters possible. This is especially important for steam meters where removal and re-calibration is impractical. By performing in-situ verification of meters, both the sensor and electronics are tested and verified for correct performance. Documentation is then created to support the calibration protocol and create an audit trail.



Coriolis



Coriolis meters are very accurate and versatile devices capable of metering mass flow of liquids, gases and even steam. They are multi-variable devices that, in addition to mass flow, can provide temperature, density and viscosity measurements. Typical applications include oil flow and viscosity control to burners, CO₂ and natural gas metering.



Promass

Electromagnetic



Electromagnetic flowmeters provide volume flows of electrically conductive liquids. They offer flow measurement with negligible pressure loss and very wide flow range. They offer a cost-effective solution to water and effluent flows.



Promag

Ultrasonic



Ultrasonic Time of Flight meters provide an accurate method of metering liquids and are particularly cost-effective for flows in large pipes. Clamp-on sensors significantly reduce installation costs and can be strapped onto existing piping without disrupting the process.



Prosonic Flow

Electricity metering

Endress+Hauser provides a wide range of electricity meters and current transformers, including retrofit clamp-on current transformers. Our range includes simple low-cost kWh meters with pulse output to multi-function meters providing a wide range of parameters including kWh, power factor, volts and amps using Modbus communication.



© Socomec



© Socomec



Image courtesy of Northern Design Ltd.



Intelligent data collection

Real-time and interval data

Automatic data acquisition

Effective acquisition and secure data transfer is of paramount importance when implementing an energy monitoring system. Endress+Hauser makes available a wide range of hardware components and associated software to suit both real-time and interval data applications.

This means that measurements can be automatically queried and data either stored securely or imported into energy analysis software packages.

Memograph M

Whether you require real-time or interval data, Memograph M meets your requirements every time. Utilising a large graphical display it can be configured to measure and collect all types of inputs including simple pulses and analogue values. When configured as a Modbus master, the Memograph M will collect data from multiple electricity meters or HART

compatible utility meters connected through a WirelessHART gateway.

Whilst aM&T software packages require interval data, the functionality of Memograph M opens up other opportunities. Process measurements and operational events can be monitored in real-time, allowing plant performance and efficiencies to be calculated and confirmed.



Engcal RH33



Memograph M RSG40



Ecograph T RSG30



Field Data Manager (FDM) software

Used in conjunction with automatic data loggers such as the Memograph M, Field Data Manager software provides a powerful interface between plant data and automated visualisation and analysis.

Having automatically accessed data stored in the loggers, it produces export files in a format suitable for importing directly into the eSight aM&T energy analysis software. In parallel, data is written and securely stored in a local or central database such as Microsoft® SQL. The data can be accessed by any number of FDM packages, each set up to produce regular reports configured to suit each individual application. Would you like to display compressed air values or boiler pressures, temperatures and flow rates in real-time? FDM software is an ideal tool to help you monitor and fine tune your process plant control systems.

Fieldgate: scalable interval data collection

Our family of Fieldgates ensure secure data transfer between field devices and higher level energy monitoring packages at all times.

Where collection of energy proportional pulses are required, Fieldgate is the perfect partner. Connection to the field devices

can be either direct or via dedicated input modules, simplifying future expansion and keeping costs to a minimum.

Data can be transferred by using the Data Access Scheduler software described below or by email directly from the Fieldgate. Whether connected to a GSM network or a local area Ethernet network (directly or via WiFi), applying Fieldgate couldn't be simpler. Configured using a web browser, commissioning is simple, straightforward and requires no additional tools.

Fieldgate Data Access (DA) Scheduler software

The Fieldgate Data Access Scheduler software application provides automated interval data collection from Endress+Hauser Fieldgate systems.

Installed as a service on a local server and configured to access each Fieldgate system at predetermined times, it reads the current values and presents the data in a standard format for automatic import into aM&T energy analysis software. Data can also be exported in a number of other formats for use in standard software data analysis packages such as Microsoft® Office.



Secure data transfer using Endress+Hauser gateways





Evaluate energy data, highlight potential savings eSight® does it all!



In order to obtain maximum benefit from your measurement and data collection efforts, you need to be able to visualise it and evaluate it.

eSight is web-based energy monitoring software that gives access to the entire monitoring system in your plant from any PC or laptop via an intranet or internet connection. In addition, the software will analyse the measurement data and create energy reports to highlight where energy savings can be made.

- Fully web-based software solution
- Worldwide or local usage via intranet or internet
- Simple operation
- Easy-to-use interface with drop-down menus
- Automatic data import from data loggers, SCADA systems, production systems or building management systems
- Modular software design that is easily customised
- Highly scalable systems available with any number of channels, from 25 up to several thousand

Energy analysis

Perform broad analysis of energy data including electricity analysis and metering tables.

Specific energy consumption (SEC) is used to determine the unit cost of production, steam or compressed air and the performance can be benchmarked against similar processes in similar industries.



A regression analysis defines the relationship between energy consumed and the activity that requires it and is used to set performance targets.



A CUSUM (cumulative sum control chart) analysis provides information on current energy performance and enables return on investment to be calculated.

Financial analysis

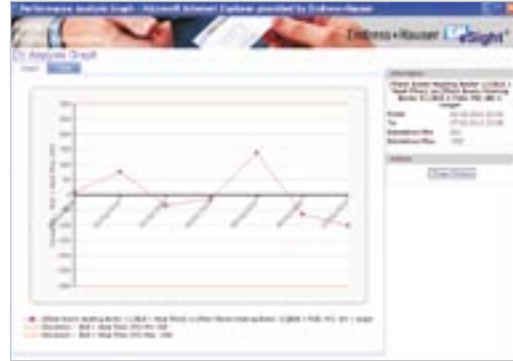
Manage supplier contracts, create and monitor budgets and analyse energy in terms of cost.

Import historical tariff information for retrospective analysis. Input budget information for performance analysis.



Deviation analysis

Once an energy efficiency target has been set, deviation analysis coupled with exception reporting will monitor performance and generate email alerts when target bands have been exceeded.



Dashboards

Bring together essential energy information on a single page. Up to four screens may be viewed at once with automatic updates every minute.



Other available modules include:

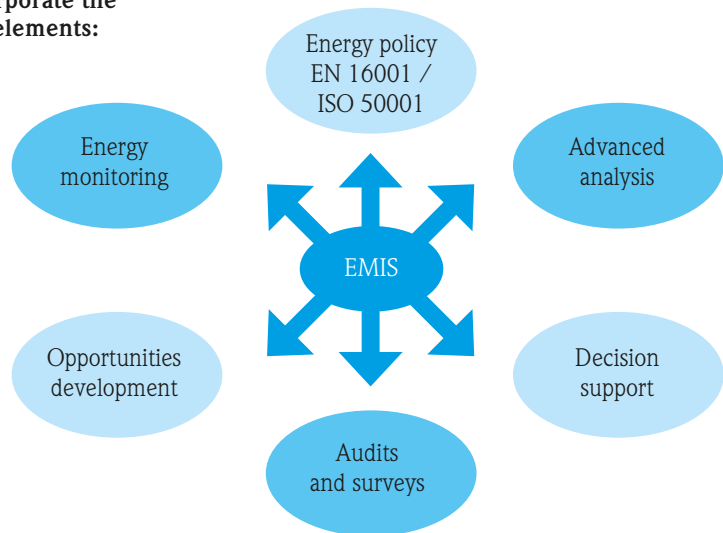
- **Exception reporting**
Automatic energy alarms distributed by eSight report, email or SMS.
- **Calculated meters**
Calculate plant efficiency, compare sub-meters with a main meter or aggregated data.
- **Data exchange**
Allows the import and export of data in a large variety of formats.
- **Benchmarking**
Create benchmarking reports based on government or user-defined standards.
- **Invoice validation**
Validate invoices manually or automatically in bulk, using automatically input files.
- **Bill verification**
Compare bill values against collected meter data in graphical format to verify utility bills and identify anomalies.

Consultancy that transforms data into real savings

Data is not knowledge.
 Knowledge comes from identifying the patterns in data.

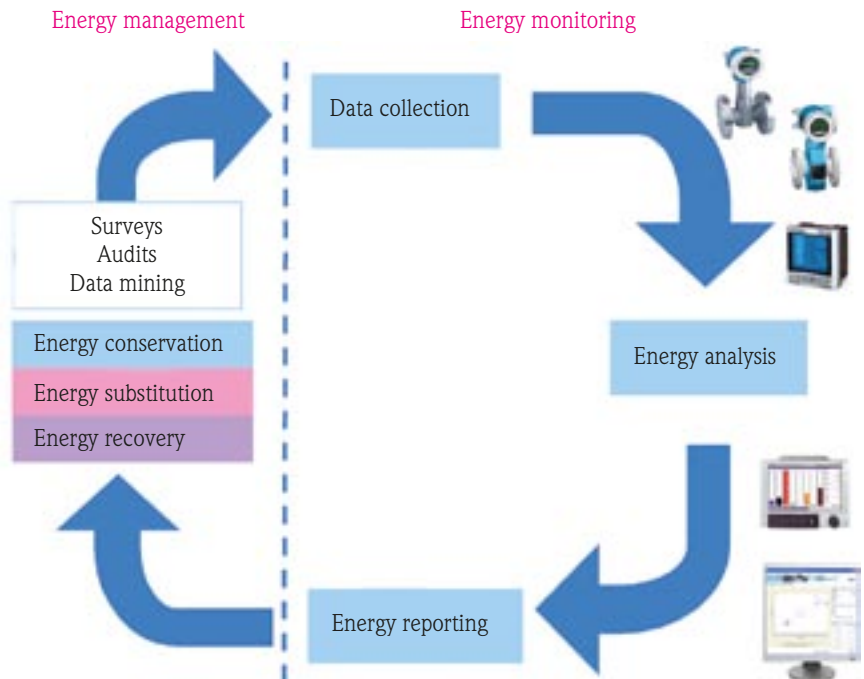
Data collection, energy analysis and reporting are only part of the energy management story. Having identified the need to put in place the system to measure and quantify energy usage, you then need to identify how to reduce consumption and carbon emissions. Furthermore, you will want to develop meaningful targets and monitor the effectiveness of your actions. Endress+Hauser can help you develop Energy Management Information Systems (EMIS) to ensure that you maximise energy and carbon savings whilst ensuring your return on investment.

EMIS incorporate the following elements:



Our consultancy solutions include:

- **Audits**
 Evaluate plant and process performance. These identify opportunities to reduce energy costs and associated carbon emissions and include preparation of the business case for future investment and support for implementation.
- **Energy management support**
 Ensure effective use is made of energy data to achieve savings through analysis, training and workshops.
- **Advanced analysis solutions for energy and carbon management**
 Employ data mining solutions to find patterns in data and help to explain variable performance. Understanding the drivers of energy and process efficiency provides opportunities to save energy and money.



The energy and carbon management cycle



Energy monitoring project delivery

How will the project be managed?

While the correct hardware and software selection forms the basis of any energy monitoring system, it is equally important to consider how the project will be implemented. In almost all cases, care must be taken to avoid interruption to existing site utilities, which would impact on plant production. Utilities such as water, air, gas, electricity and steam may only be shut down at specific times and usually only for short periods - so effective planning is essential.

The following elements form the building blocks of any energy project:

Site survey and design

By the time an order is placed you would expect all bases to be covered – the reality is usually very different. In many projects existing utility meters require interfacing with the new data collection system and, although standard signals and protocols are adopted in all Endress+Hauser data collection units, care must be taken to ensure compatibility. The site survey is an opportunity to gather all information required to confirm the system design and address any unforeseen issues. Endress+Hauser has developed site survey templates that ensure all relevant information is collected and made available to our design engineers.

Where should you install new utility meters? The most convenient place isn't always the best and making a reliable measurement is paramount. If necessary, Endress+Hauser will produce an isometric installation drawing that will guide the installation contractor to fit meters in the correct physical locations.

Using information gathered during the site survey, the data collection panels are designed, built and tested by Endress+Hauser in-house. The panels can usually be pre-configured using the data gathered during the site survey, thus reducing on-site commissioning time.

Project management and planning

You may be considering applying an energy monitoring system on a single site or alternatively your business may consist of multiple locations that require connection to a central

monitoring system? Perhaps the eSight software will run on a hosted system or discussions with your site IT department may be required? Endress+Hauser will assign a project manager to take responsibility for successfully delivering your project in a timely manner and within budget.

On-site services

Endress+Hauser will either arrange for system installation or alternatively provide supervision of your preferred site installation contractors. We will ensure that any local, national and international standards are adhered to.

Our experienced project commissioning engineers will be deployed to commission the system in line with the agreed delivery plan. As experts in both utility measurement and data collection, you can be assured that the project will run smoothly.

If your project requires local software installation, this will be carried out in conjunction with your site IT personnel. Whether you choose a local or hosted software option, we will ensure data is reliably transferred and available with the eSight package.

Software services and training

Comprehensive training packages covering utility measurements, data collection and the administration and use of eSight can be provided as required. These will be tailored to your needs and carried out at a suitable location. On-going life cycle management, meter calibration and system support is also available.



Our Centres of Competence

Global hubs of industry and application expertise

Endress+Hauser has created a worldwide network of Centres of Competence, each of which acts as the ultimate authority for the Group in their chosen field of expertise. There are 10 Endress+Hauser Centres of Competence worldwide, each specialising in one or two particular industries or applications.

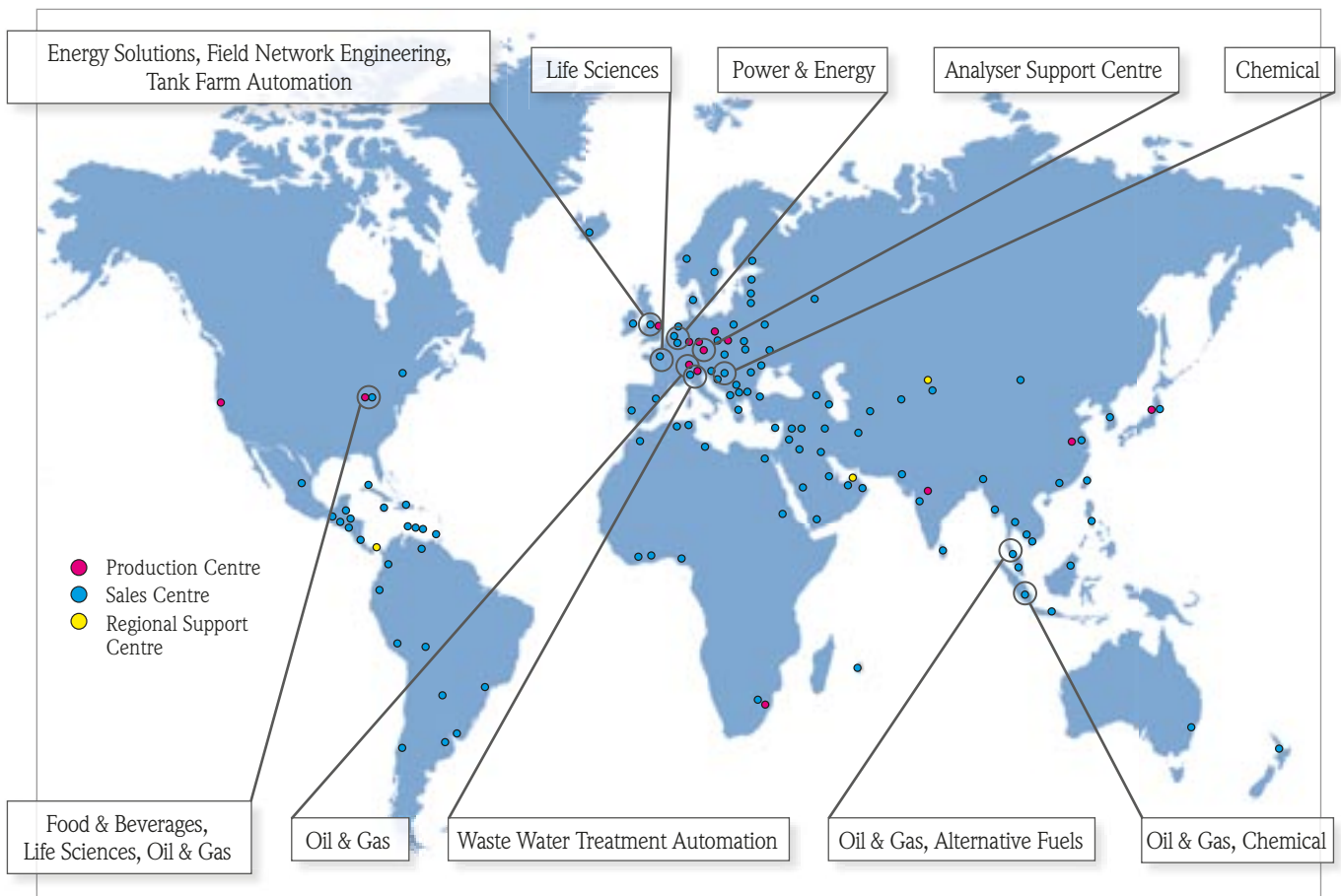
In addition to expertly delivering the field-based, application-based and automation-based solutions detailed on the back of this brochure, Endress+Hauser in the UK is the Group's Centre of Competence for:

- Field network engineering
- Energy management solutions
- Tank farm automation

We therefore have the best resources and specialists on hand at our Manchester headquarters to expertly implement each element of an energy management solutions project. Our services range from consultancy and complementary services through to entire project management.

Our focused nature allows projects to be delivered faster and more efficiently, providing the highest standards at all stages, from project execution to after-sales service and support. Furthermore, Endress+Hauser in the UK is locally audited to ISO 9001 and accredited for the supply of intelligent automation systems.

Centres of Competence: dedicated support



At Endress+Hauser we consider our people to be one of our strongest assets. Based in Manchester, our loyal and committed staff members are highly trained to provide the best level of technical expertise and customer service in the process automation industry. Our team of project eng



Our experts include:



Project managers to execute projects on time, on budget, safely, to your satisfaction, all in accordance with Endress+Hauser procedures and quality standards.



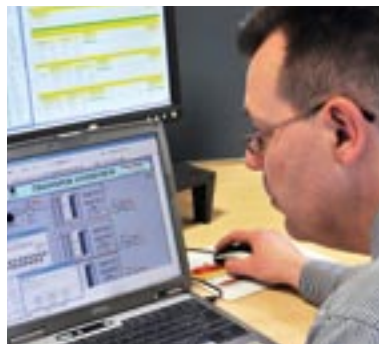
Project engineers who will design, test and commission engineered solutions that are specifically tailored to improve your automation and business processes.



Design engineers and panel builders who work together to design, build and test the panels and enclosures that house our process automation equipment and networking components.



System engineers who fully understand your process automation requirements and can translate these into system designs that completely meet your needs.



Software engineers with vast knowledge and experience of the most popular automation and control platforms used in the process industries.



Commissioning engineers who are fully trained and accredited to commission your projects safely and efficiently on-site, throughout all industries.



Harmonised engineering processes

At Endress+Hauser we appreciate that when you embark on a new project you need assurance that it will progress with minimum risk. That's why we have clear and defined project procedures that are followed by Endress+Hauser teams across the world.

Known as Standard 201, our project process has been designed to improve communication and collaboration, the quality of project results and, most importantly, customer satisfaction. From the very start, project resources are assigned to ensure that the right people are involved at the right time, utilising flexible project teams that have clearly defined responsibilities.

At the outset of a project an experienced project manager is appointed to take ultimate responsibility for decisions, risk and quality management. Then, at critical points in the project, additional risk management resources

are introduced. Following a methodical process and involving the whole project team, the risk management process has four steps:

1. Risk identification
2. Risk analysis
3. Risk response planning (mitigation)
4. Risk monitoring and control

The system also utilises a Quality Gate system, in which a verification checklist is agreed for each stage of the project. Fulfilment of each action on the checklist must be confirmed by the project manager before the project moves to the next phase.

Endress+Hauser reduces your risk:

- Our company is characterised by its highly stable, experienced workforce, who are true experts in their field.
- We follow harmonised standards that are used by Endress+Hauser worldwide.
- We have the flexibility to adapt our services to enhance your business processes.
- We offer a high level of collaboration and communication of information, enabling you to concentrate on your core business.

Our project delivery methodologies are standardised throughout the Endress+Hauser Group, enabling us to deliver guaranteed quality from concept to completion, with reduced risk to you.

In addition to this, our engineers follow audited procedures that allow us to meet ISO 9001 standard project delivery of intelligent automation solutions.

Our accreditations include:

- **ISO 9001:2008** Quality Management System for the design, manufacture, supply, service, maintenance, repair, calibration, supply of spares, associated equipment, accessories, project management of measurement instrumentation, automation instrumentation and intelligent automation systems for the process industries.

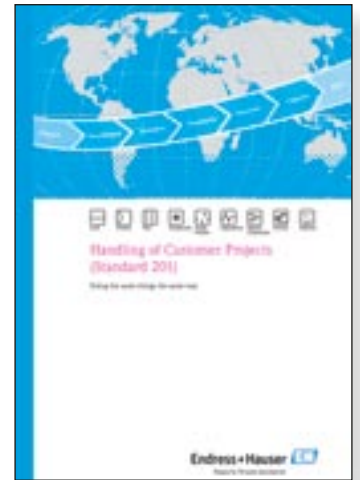
- **OHSAS 18001** international occupational health and safety management system, embracing BS8800, AS/NZ 4801 and NSAI SR 320.

- **ISO 14001:2004** certification in recognition of our Environmental Management System.

- Endress+Hauser Ltd is one of the first engineering companies in the UK to be awarded **EN 16001:2009** certification in recognition of our Energy Management System.

The benefits to you:

- Harmonised processes to deal with Endress+Hauser in project business
- Clear communication and reliability
- We do the same things the same way, every time



A common process results in better quality project delivery.



ISO 9001:2008



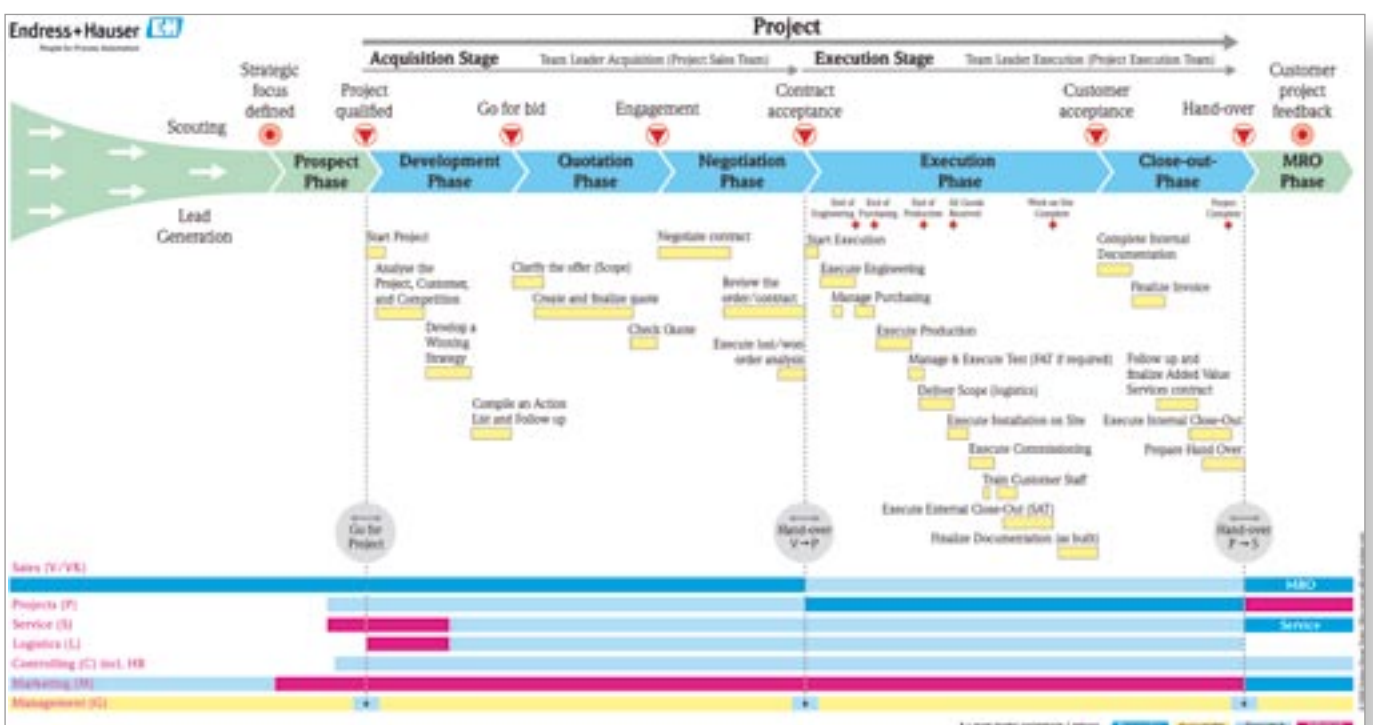
OHSAS 18001



ISO 14001:2004



EN 16001:2009



Our universal project delivery overview clearly assigns responsibility for each stage of the project.

Process solutions from Endress+Hauser



All of the solutions offered by Endress+Hauser have been designed to improve the operational efficiency of your plant, streamline logistical processes and have a proven return on investment.

Our range of field and application-based solutions are repeatable, tested and packaged. They are configured to

meet your needs, the demands of your defined project and the requirements of your industry - and they are immediately deliverable. Where there is no packaged solution, we can design tailor-made engineering systems to provide the ideal process automation for your specific requirements.

Field-based solutions	Application-based solutions	Automation-based solutions
<p>Field devices and network design, installation and commissioning services including multi-vendor device configuration and asset management.</p> <ul style="list-style-type: none"> ■ Plant asset management ■ Field network engineering 	<p>Repeatable, configurable, packaged solutions.</p> <ul style="list-style-type: none"> ■ Tank farm automation <ul style="list-style-type: none"> - Tank contents monitoring - High accuracy tank gauging - Overfill protection - Pump and valve control ■ Energy solutions <ul style="list-style-type: none"> - Automatic monitoring and targeting - Energy management ■ Inventory control ■ Control panel and analyser solutions 	<p>Programmable PLC/SCADA based automation solutions.</p> <ul style="list-style-type: none"> ■ Process automation <ul style="list-style-type: none"> - Intelligent automation solutions specifically designed to solve your process automation requirements

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People for Process Automation