

# Energy Management

- Establish energy targets and optimize energy consumption across multiple assets, units, areas, and plants
- Easily aggregate and make valuable information visible to key stakeholders
- Reveal new savings opportunities down to individual energy consumers



## Introduction

To better manage site energy consumption and costs, organizations need an accurate way to visualize where and how energy is being consumed. Once there is a clear picture, this information can be analyzed in order to take immediate action on over-consumption events, identify and prioritize energy saving projects, and track improvement over time.

Improving energy conservation can require a cultural shift that starts from the top and permeates down through the organization. All site personnel can affect the energy footprint, so a consistent way to measure, track, and highlight good or bad energy performance is critical to achieving energy optimization goals.

Initial questions that must be addressed include:

Are the right measurements present? Can the underlying data be trusted? Is it current? Is it accurate? Most organizations do a good job measuring at the boundary limits of their site, but often there is little detail about what is happening inside the plant as to which processes are causing energy usage to go up or down.

Emerson’s Energy Management automates the process of mapping and managing energy consumption across a site as it is being consumed. Real-time alerts, dashboards, and emails notify decision-makers when energy consumption is above the expected amounts so that actions may be taken to drive down energy costs.

Energy Management empowers key stakeholders in an organization to:

- Reduce total energy costs by 5%–10%.
- Establish, track and maintain real and achievable targets for energy reduction.
- Implement a positive corporate social responsibility program towards energy and emissions reduction.

Emerson’s Energy Management integrates seamlessly with current site control, SCADA and/or enterprise systems, allowing implementation of the solution in a straight forward and cost-effective manner.

Emerson can also provide the means to obtain needed energy measurements by specifying and delivering best-in-class wired or wireless devices. With wireless technology, the cost of measurement implementation can be reduced by two thirds, allowing any missing flow, pressure, and/or temperature instruments to be brought back to the monitoring system cost-effectively.

## Benefits

**Reduce Energy Cost.** With Emerson's Energy Management a site can take active control of energy use. By knowing the energy over-consumption events in advance, a plant's highest variable costs of operation can change into a managed expense.

**Obtain a real-time view of energy consumption.** A real-time view means having information to make decisions that can immediately make a positive impact on the organization's bottom line.

**Monitor equipment/unit performance.** Know in advance when equipment is beginning to deteriorate (e.g. incomplete boiler combustion) and drawing more energy than optimal by comparing actual use to consumption targets measured dynamically.

**Identify common root causes.** Reduce problem to cycle resolution time by identifying the exact root cause of detected energy efficiency.

**Create automatic notifications.** Alerts allow action to be taken quickly when there is an energy over-consumption event, such that the negative impact can be limited.

### At the executive level:

**Turn energy into a managed expense.** Understand the impact of energy on profitability and integrate production plans with energy procurement.

**Forecast revenue, expenses, and profits with more accuracy.** Use historical energy consumption data to predict and manage future consumption.

**Take proactive steps towards energy management and corporate social responsibility.** Reduce site impact on the environment by minimizing energy.

## Feature Description

Emerson's Energy Management is built to receive energy measurement data and present it in a way that enables impactful decisions to be made quickly, without wasting time on data manipulation and complex calculations. The current state of site energy consumption can be easily understood, and a simple roadmap can be accessed that highlights trouble spots. Energy Management is rich in components that allow smarter real-time energy decisions to be made for a site:

- Meets requirements to monitor, target, and report per the ISO 50001 energy standard.
- Flexible and scalable – scale to multiple levels of plant hierarchy for organizing energy use.
- Provides automatic roll-up of energy data to units, areas, and sites in the hierarchy.
- Dynamic targeting approach that considers changing process scenarios and operating modes to provide accurate and real-time calculations for target energy for each energy consuming asset.
- Creates automatic notifications and event logs for each over-consumption event for user review and action.
- Powerful analytical reports that provides critical insights about a site's energy consumption.
- Aggregates data from multiple data sources such as PLC, DCS, data historians or third-party databases.
- Modern and intuitive web-based graphical interface that displays energy KPIs, abnormal conditions, and root causes.
- Uses site process historical data and Emerson's first-principal models to derive target energy equations.

## Energy KPI Calculations

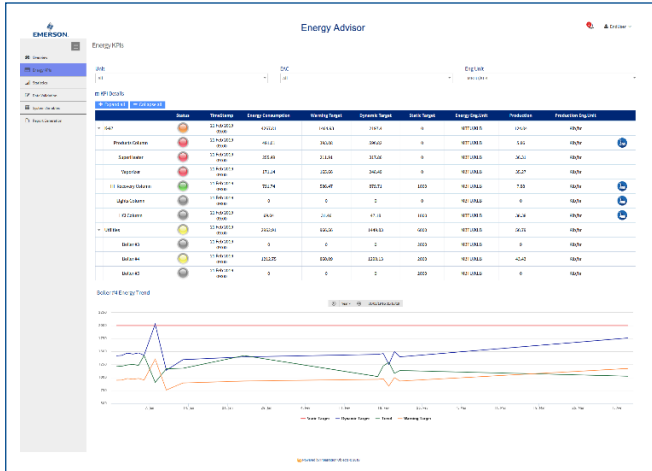
Using statistics, calculations, and temporal reasoning Energy Management calculates energy consumption at different levels of the plant hierarchy. These KPIs can be aggregated right from an asset level to an enterprise level.

**Energy Consumption** – Total value of energy consumed by an asset.

**Energy Costs** – Aggregated cost of the energy consumed by the asset.

**Energy Savings** – Energy savings achieved as a result of monitoring energy consumption.

**Opportunity Loss** – Energy savings lost as a result of energy over-consumption.



## Energy Consumption Monitoring

Consumption monitoring calculations allows users to identify and log all the over-consumption events and root causes for energy over-consumption. From this data, energy managers can create reports indicating the most frequent and costly reasons of energy excursions. Energy Management provides alerts of energy over-consumption using an intuitive web-based dashboard. It also informs the users the true root cause of the over-consumption event. Such root cause analysis is critical for developing strategies to address key energy difficulties that are having the largest impact on the organization’s bottom line. It also provides Standard Equipment energy consumption models that utilize an Emerson-proprietary, semi-empirical approach. These models are based on known process relationships, which are then adapted to individual instances of the equipment type. The necessary input parameters for the Emerson Standard Equipment models are predefined. The outputs include predicted energy use, like fuel consumption on a boiler, as well as other KPIs such as boiler efficiency or produced steam cost. There are Standard Equipment models for boilers, fired heaters, heat exchangers, compressors, steam turbines, and steam headers.

## Dynamic Energy Target Calculation

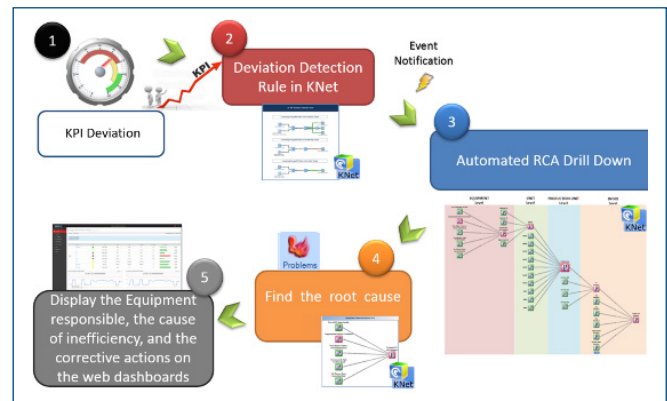
An essential part of any Energy Management Information System is monitoring energy use against a target. The simplest target is a constant value, usually based upon an allocation or budgeted amount. More useful targets are ones that are dynamic and change with process conditions. Using predictive analytics, it estimates dynamic energy targets based on changing process conditions such as asset availability, operating modes, process scenarios etc. This allows for more realistic energy over-consumption estimations and elimination of any false alarms. An intuitive web-based dashboard allows

the user to either define static energy targets or set the limits for the percentage deviations from the baseline energy consumption model.

Setting targets and being able to record the information that proves that these goals are being met is an important requirement of the ISO 50001 standard.

## Root Cause Analysis

Energy Management compares energy key performance indicators against their dynamic targets and identifies deviations. Once a deviation is detected, its root cause analysis feature identifies and pin-points the equipment or the root cause responsible for the deviation. Built graphically, the root cause analysis modules can propagate through the root causes of multiple levels of plant hierarchy and employ cause and effect knowledge. Test and corrective actions are also provided to the users to fix the issue.



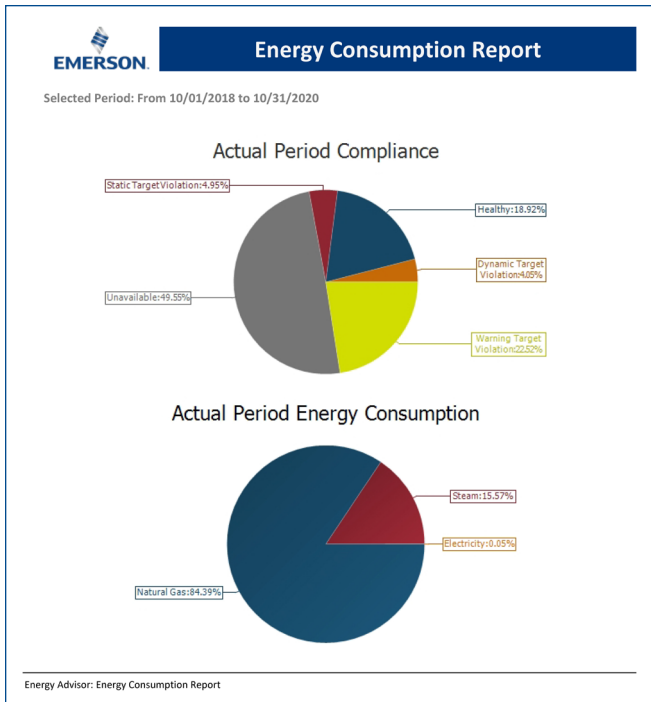
## Energy Reports

Energy Management provides critical energy reports on demand to multiple users through a web-based interface or on a scheduled frequency (printed and/or stored in a file).

Additional custom reports may be provided at the time of initial configuration or developed later using standard tools.

The following are available as standard reports:

- CuSum** – cumulative sum of savings against target.
- Energy Cost** – real-time cost of each energy stream aggregated to the selected hierarchy level.
- Energy Consumption Report** – total use for an energy stream plotted with target for same energy.
- Energy Over-Consumption Report** – a report of all energy over-consumption events and associated root causes.



- Data Validation dashboard that displays the result of the automatic data validation of the sensors that is performed. The dashboard not only provides the details of the deviating sensors such as deviation type but also provides a statistical report on top deviating sensors.
- System Variables dashboard that allows the user to enter the cost of the energy streams and manage energy target settings. The user could either set static energy targets or define the percentage deviation of energy targets to be monitored for every energy asset type using dynamic targeting technique.

## User Interface

The primary user interface is a web-based dashboard. The user view has a similar look and feel at each level of the dashboard, with more detail added as the user drills down into the specific assets.

### Key Features

- An overview dashboard providing all energy KPIs, filterable at every level of the plant hierarchy, with their overall status, active alerts and display of trends.
- A statistical dashboard that provides information on the most active root causes leading to energy over-consumption from the asset level to the site level. The dashboard also provides relevant statistical information on energy costs incurred as a result of energy over-consumption.

## Ordering Information

Emerson’s Energy Management is licensed by the amount of energy specific data consumed by the asset. There is a foundation license which includes the base function that is used by all energy consuming asset models. See the Plantweb Optics Analytics product data sheet to get more details on the part numbers and licensing information.

## Requirements & Recommendations

Operating System Requirements	Windows 7 Windows 2008 Windows 2008 R2	Windows 8, 8.1 or 10 Windows 2012 Windows 2012 R2
Processor	3 GHz Pentium (higher recommended)	3 GHz Pentium (higher recommended)
RAM	4 GB	8 GB
Disk Space	10 GB	10 GB

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