ZVEI:
Automation

High-tech environmental and climate protection:

The versatile contribution of process automation to improving energy efficiency

IMPRINT

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Published by:
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Design:
NEEDCOM GmbH
www.needcom.de

Printed by:
Frotscher Druck GmbH
www.frotscher-druck.de

1st issue, June 2009

„ZVEI established the „Energy Intelligence Initiative" (EnQ) in 2008. With this initiative, ZVEI provides comprehensive information to the public, policy-makers, media and professional decision-makers on the potential of energy-efficient technologies. The association also hopes to improve political conditions for the implementation of energy-efficient electrotechnical and electronic products, systems and solutions. The EnQ's main communication tools for the initiative are ZVEI's „White Paper on Energy Efficiency Generating, Distributing and Using Energy Intelligently", the EnQ magazine published three times annually and the Internet site www.en-q.de.

CONTENTS

I „Energy efficiency - the name of our game“

The topic of energy efficiency has come to dominate the field of industry. This is set to continue into the future as a result of political requirements and concern about the environment and climate. The opportunity to gain cost and competitive advantages through the more efficient use of energy will also ensure that the topic does not lose its importance. Although efforts have been made in the area of energy efficiency in the past, there is still significant room for improvement in the various industrial sectors.

Studies show that, from the energy source to the consumer, up to 80% of the energy currently used in the various production, transmission and conversion stages can be lost. Any examination of this problem cannot be restricted to the more efficient use of energy. A more integrated approach that incorporates the use of state-of-the-art technology, in particular, is necessary. Energy efficiency is a part of energy intelligence. The intelligent use of energy means getting the most out of the primary energy used. It combines clever energy savings with improved ease-of-use and sustained cost savings.

Energy use today

Source: ABB Group, ZVEI

Process automation is an important area of industry. It accounts for nearly one tenth of the revenue from the electronics industry. Devices and systems used for the intelligent measurement, regulation and control of production processes can make a major contribution to improved energy efficiency and intelligence. In addition to the manufacturing industry, the process industries, in particular, represent a great potential for cost savings at 15% on average (see the diagram on page 5). Up to 70% of energy can be saved in individual cases. This is confirmed by user experience.

Using modern process automation solutions, companies in Germany can save a total of approx. 50 billion kWh energy equivalent per annum from electricity and primary energy sources such as coal, oil and gas (approx. 10 billion kWh electricity and also primary energy sources, which translates to approx. 40 billion kWh of electricity). Primary energy sources account for approx 80% of energy consumption. A single energy-intensive company within the metal, chemical or cement industry can quickly save a few million euro annually in electricity, gas, steam and compressed air costs. The use of modern process automation can help Germany's process industries to make additional savings of four billion euro per year in energy costs in their production plants. This reduces production costs for companies using energy in the medium and long term, improves their competitiveness and creates and maintains domestic jobs. In view of these benefits, the process automation sector can certainly claim that „Energy efficiency is the name of our game“. Process automation can help save a total of at least 20 million tonnes CO_2 equivalent in electricity and primary energy annually. This translates to 11% of CO_2 emissions in the industrial sector. Process automation also helps to anticipate the risk of serious pollution and environmental disasters and to prevent them (e.g. leaks in pipelines). This potential to avoid CO_2 is massive but is also difficult to assess.

Additional savings thanks to process automation (Germany)

- 15 % energy in production plants on average
- 50 billion kWh energy equivalent p.a.
- 4 billion euro p. a. in energy costs
- 20 million tonnes CO_2 equivalent p.a. from electricity and primary energy

INFO

What is process automation?
Process automation refers to the measurement, control and regulation of production processes (such as heating, cooling, vaporization, condensation etc. of substances) using measuring and analytical devices, computer technology and software engineering. It helps sectors such as the chemical, pharmaceutical, oil and gas, paper, cement and metal industries to operate efficiently, cleanly and safely.

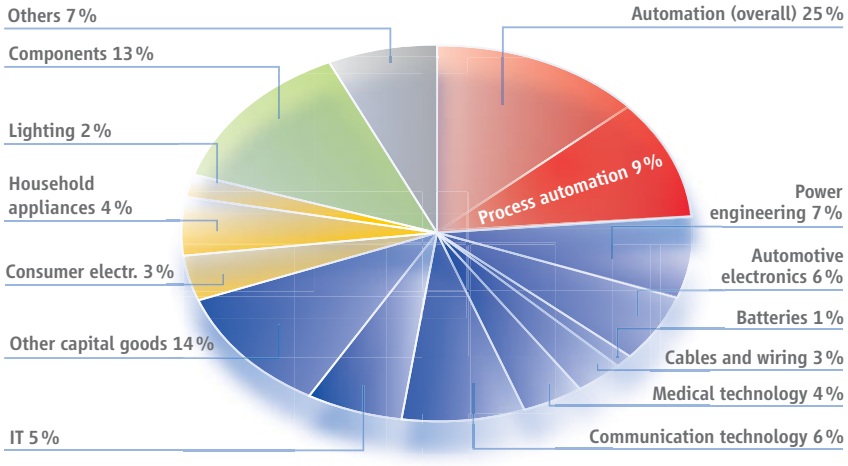
Automation in Germany:
233,784 employed,
revenue 45.8 billion euro (2008)

Process automation in Germany:
87,330 employed,
revenue 16.6 billion euro (2008)

User industries of process automation in Germany:
3 million employed,
revenue 652.5 billion euro (2008)

Electronics industry in Germany:
827,000 employed,
revenue 182 billion euro (2008)

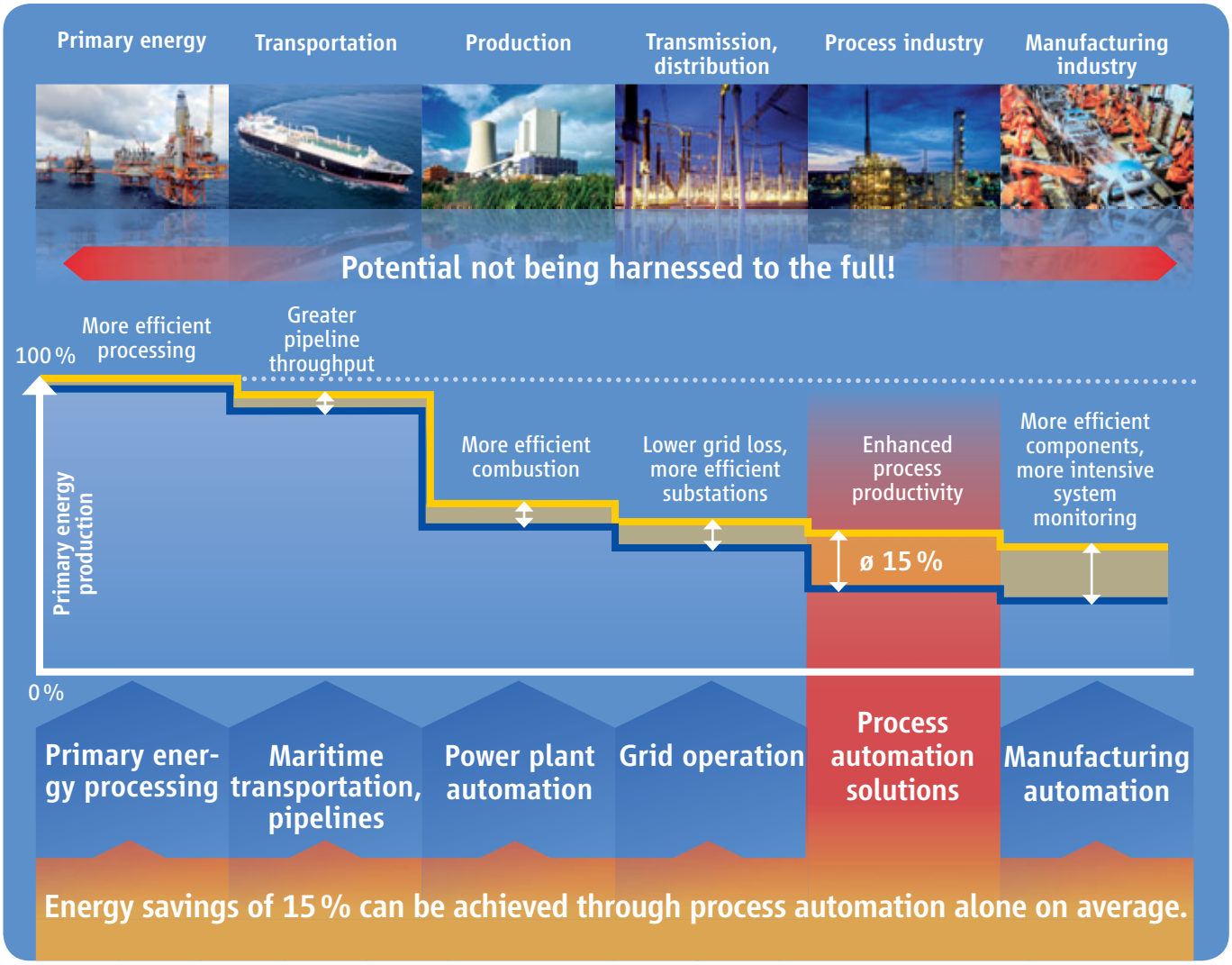
Process automation accounts for nearly one tenth of the revenue from the electronics industry (2008), Germany's second largest industrial sector



Share of revenue within the electronics industry

Source: ZVEI economy and statistics 2008

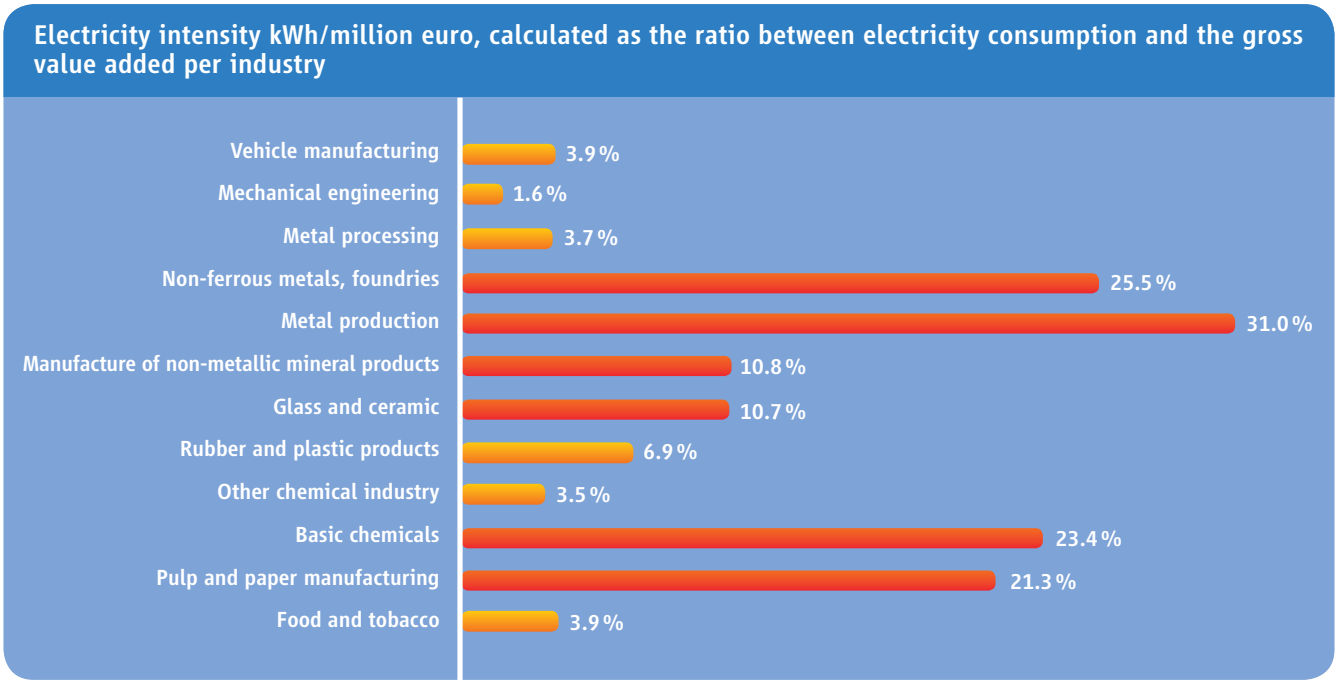
Process automation is central to energy efficiency and energy intelligence



Source: ZVEI, ABB Group

Output without measures
Output with measures

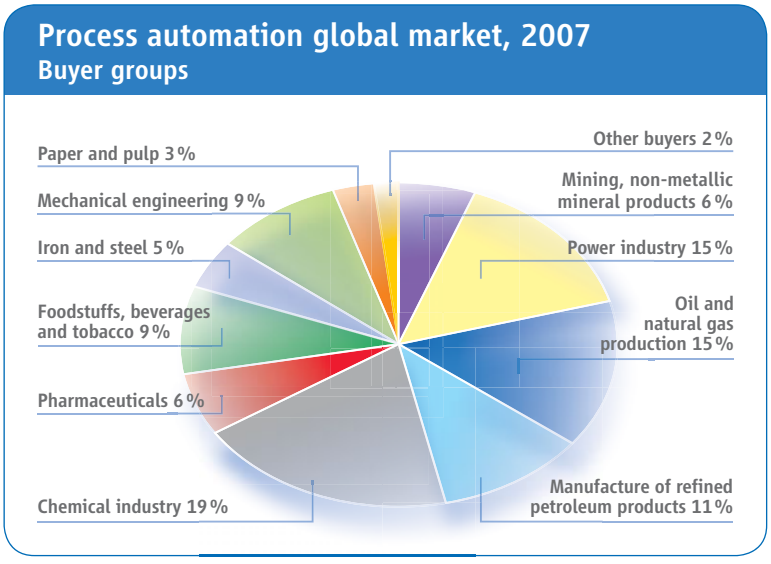
Energy intensity of different industrial sectors taking the example of electricity intensity



Source: Hamburg Institute of International Economics, Institute of Economic Structures Research, 2007

The metal, cement, basic chemicals and paper and pulp industries are all extremely energy-intensive. For example, in the chemical industry, large quantities of substances are heated or cooled, vaporized or ground. The relative size of the industry, particularly in Germany, is a factor here in addition to energy intensity. The intelligent use of energy becomes a critical factor in a company's economic success and environmental protection activities. Energy costs account for approx. 20% of the production costs in complex chemical plants. In the metal industries, (steel, copper, aluminum), energy costs are up 50% of production costs in some cases.

Massive energy savings can be achieved through the consistent use of new process automation products, systems and solutions. All production-related processes and procedures must be configured in a way that optimizes energy use in order to harness this potential. The technical capabilities already exist but must be put to better use. Intelligent process automation applications and solutions often operate in the shadows and are underestimated in many cases. However, they draw on the function of a control center to ensure intelligent energy processes and production steps. The control centers provide the critical background information for successful energy management within companies. The measuring and analytical devices, and computer programs used not only show how a plant works but also simulate various operating states. In this way, the correct strategy can be identified to make optimum use of energy in plant operation. The software used is also adaptive; it can shorten reaction times, predict trends and optimize maintenance intervals.



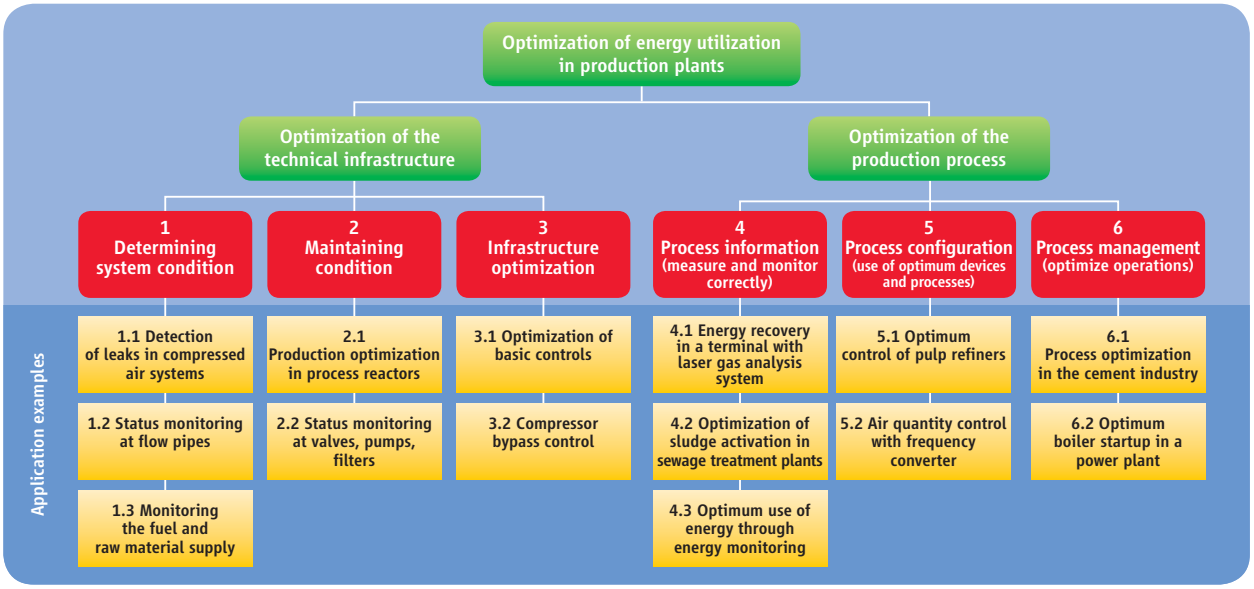
Source: ZVEI

The plant manufacturer and operator are together responsible for its optimization. Positive return-on-investment calculations show that investment and process automation solutions pay for themselves very quickly (within a few months) and play an important role in environmental and climate protection.

II The versatile contribution of process automation to improving energy efficiency

Process automation can contribute to improving the energy efficiency of industrial production plants in many ways. This requires a structured analysis, which is illustrated in the diagram below. The higher-level goal is to optimize the use of energy in production plants. We differentiate between measures that aim to ensure that the technical infrastructure of the production process is kept in the best possible condition (left-hand section) and measures aimed at optimizing the production process itself (right-hand section).

Contribution of process automation to improving energy efficiency



Source: ZVEI, Measurement and Process Automation Section, 2009

Three main areas can be identified for the optimization of the technical infrastructure. They help to prevent an increase in energy use due to plant downtime and the resulting startup and shutdown processes as well as defective products. **Determining system condition** serves to identify the sources of faults and weak points in good time before breakdowns and damage occur. **Maintaining condition** aims to plan the relevant maintenance tasks in the best possible way and complete them with minimum impact on the production process. The plant's weak points can be identified based on experience from the three areas mentioned. They can be eliminated by **optimizing the infrastructure** thus reducing the frequency of breakdowns significantly.

There are also three main factors for the optimization of the production process, the first of which is **process information**. It is important in this regard to ensure that the most suitable parameters are measured with the required accuracy and monitored for process assessment. It has been shown that the choice of „correct" measured variable for process assessment can significantly influence energy use. The characteristic curves within the range of the optimum operating point are often extremely non-linear. If the measurement is inaccurate, e.g. because the measurement method is unsuitable or the measuring tolerance too large, plant operators choose to err on the side of caution and use more energy than required. Correct **process configuration** means that the most suitable devices and procedures are used for the task at hand. It has also been shown here that considerable energy savings can be made through the clever choice of controlled variable or optimization criteria. Appropriate **process management** can improve a perfectly configured plant even further. This involves evaluating all of the available process information together as a whole and developing the best strategy for achieving the economic goal. This process is often supported using computer simulations.

The following sections address all of the points listed above using real examples to show how process automation devices and systems can be used to improve the energy efficiency of production plants.

1. Detecting system condition

1.1 Detection of leaks in compressed air systems

Industry: entire process-engineering industry

Today's process industry requires large quantities of compressed air to ensure efficient production. This gives rise to the possibility of various leaks in the several kilometers of compressed air lines in the plants. Energy-intensive compressors must continuously re-pump the compressed air lost through the leaks. Given that compressed air is the most expensive of all energy sources, improvements in this area signify major savings. These savings can be achieved using highly-sensitive, thermal pressure sensors (a turndown ratio up to 1:1000), which detect leaks reliably at an early stage.

Potential for savings

- It was possible to reduce the electricity required for compressed air in a battery manufacturer by 563 MWh/a. This equals a saving of 21% (approx. 327 t CO_2). Leaks make up a significant part of these losses (source: www.druckluft-effizient.de, web site dedicated to compressed air systems).
- Measurements have shown in one plant that 25% of the compressed air generated is lost through leaks. If the plant reduces this loss by even a half, it can save 140,000 euro in energy costs per year.

Thermal flowmeter display

Losses in compressed air systems

Diameter of leak (mm)	1	3	5	10
Air leak (l/s)	1.2	11.1	30.9	123.8
Energy loss (kWh)	0.3	3.1	8.3	33
Costs (EUR/a)	144	1,488	3,984	15,840

(*) kW x 0.06 € x 8000 Bh/a (www.druckluft-effizient.de)

Source: ABB

1.2 Status monitoring at flow pipes

Industry: oil and gas industry, petrochemical industry

Ultrasonic flow sensors can not only detect leaks in pipes early, but also contamination and blockages in oil and gas pipelines. Operating conditions can be monitored constantly at the flow and gas flow pipes and the efficiency of the pipes thus improved. The loss of valuable fuels (e.g. oil, gas) through leaks is prevented and the environment protected from pollution and subsequent damage. Furthermore, the energy required by the pumps responsible for transporting the fuels is reduced as the pipes are always maintained in perfect transportation condition. All in all, availability of the plants and transport systems is increased and a reliable supply guaranteed.

Potential for savings

- Early detection of various instances of leaks in oil and gas pipelines meant that the loss of several million euro of fuels was prevented and the environment protected from pollution.
- The costs incurred in the event of damage, amounting to several million euro, to clean the environment and for consequential damage can be avoided.
- The use of cleaning energy is unnecessary for pollution and blockages.
- The required operating energy can be reduced, e.g. the energy required by the pumps for transporting the fuels.
- The estimated energy savings for operating flow pipes such as pipelines are up to 5% of the operating costs based on current experience.

Source: Siemens

Image, left: leak in a pipeline.
Image, right: contaminated/blocked pipeline.

1.3 Monitoring the fuel and raw material supply

Industry: oil and gas industry, petrochemical industry

Wireless pressure transmitters are employed at BP Bitumen to secure the supply of fuel to multiple bitumen lines via a temporary liquid gas tank. If a fully functioning backup system is not in place, the production lines cool down within a very short period of time if the regular fuel supply system fails. As a result, the production plants have to be restarted, which is a very time-intensive and energy-intensive process.During normal operation, the wireless solution provides information on the state and condition of the supply of fuel and raw material and makes it possible to optimize energy efficiency, cut energy costs and reduce emissions.

Source: Emerson

BP Bitumen considers the smart wireless solution a cost-effective, reliable method for monitoring the temporary gas supply system in plant units that are difficult to access.

Mobile measurement with wireless pressure transmitter

Potential for savings

- ☐ Energy costs are reduced by approx. 13%.
- ☐ Better compliance with environmental regulations and clear documentation.
- ☐ Production downtime is prevented which saves approx. 10,000 euro in costs per day.

2. Maintaining condition

2.1 Production optimization in process reactors

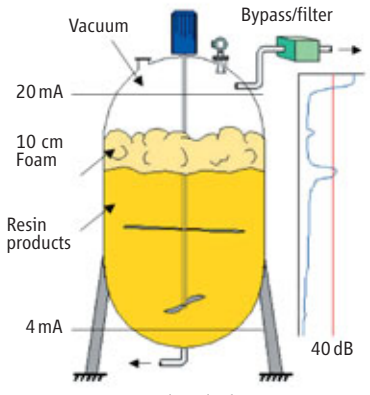
Industry: chemical industry (resin production in the paper finishing sector)

Process radar level measuring systems are used in the production of resin for the paper finishing sector, for example, to enable reliable and maintenance-free level and volume measurement of materials in the mixing process reactors. Boiling processes take place in these reactors giving rise to intensive steam and foam generation. Contamination caused by foam, which would otherwise result in blockage of the bypass lines and filters, can be detected at an early stage using this technology.

Foam generation

The status and diagnostic information of the radar measuring system prevents production downtime as well as complex and expensive cleaning, cooling and heating processes. The technology also optimizes production quality and energy use as a result of the increased measuring reliability of the sensors. Energy use can be controlled in the best possible way. At the same time, energy-saving cleaning intervals can be introduced as required with superheated steam thanks to the integrated cleaning system.

Production optimization in process reactor



Potential for savings

- ☐ Reduced energy costs when starting up production processes.
- ☐ Increased energy efficiency in relation to savings in heating and cleaning processes as encrustation and contamination are detected immediately and eliminated.
- ☐ The plant operator calculated the potential for energy savings to be 100,000 euro monthly per reactor. The payback period is less than a month with these savings.
- ☐ The savings achieved in energy costs for operating this production process are estimated to be 15% of operation costs with the measures described.

Source: Siemens

2.2 Status monitoring at valves, pumps, filters and compressors

Industry: oil and gas industry, petrochemical and chemical industry

Process instrumentation technology, e.g. acoustic sensors, can be used to detect leaks in pumps and pipes. This is done by analyzing the sounds created when liquids and gases leak. Pump efficiency and operating effectiveness can be optimized by sealing leaks and improvements can be made to operating efficiency at the filters and compressors. Intelligent electro-pneumatic position regulators provide optimum control of valves in flow pipes. Disturbance variables can be corrected much faster, particularly in fast processes in chemical and petrochemical procedures. Process plants can thereby produce a larger quantity of product using less primary energy. Product yield can be increased by 3% by retrofitting even one of the control valves with an intelligent electro-pneumatic position regulator and corresponding pneumatic connection (in an OLEX unit for separating butane and butene).

Potential for savings

- Modern position regulators offer extensive asset management functions, which support predictive maintenance and ensure that unscheduled plant shutdown causing production losses is avoided. Leaking valves can be detected using acoustic sensors and unnoticeable product loss prevented. If an unnoticed leak of 3% – corresponding to a leakage of 800 kg/h – occurs due to wear in a gas reducing valve, with a nominal diameter of DN150 and primary pressure of 20 bar, daily product losses would be up to 10,000 euro.
- Furthermore, in contrast to conventional devices, modern position regulators only consume one tenth of the instrument air. This reduces consumption of auxiliary energy in the plants considerably.
- Traditional position regulators consume approx. 200 to 250 euro of instrument air annually per device. This means that up to 20,000 euro can be saved per year in a medium-sized plant with 100 control valves for example. Compressed air consumption can thus be managed more efficiently in plants.

Source: Siemens/Samson

3. Infrastructure optimization

3.1 Optimization of basic controls

Industry: entire process-engineering industry

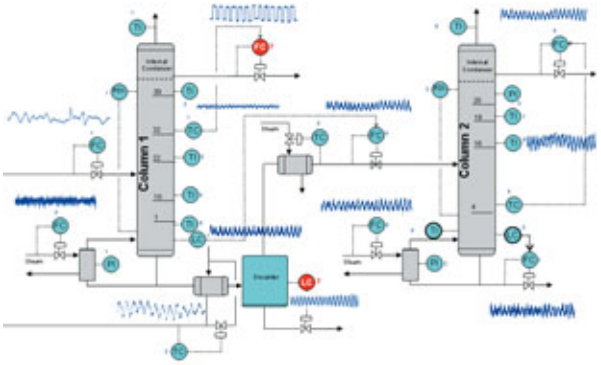
Basic controls regulate the process values of heaters, drives and valves. These controls are often not configured at all or have moved from their optimum setting over time. This is the norm in many plants, with the result that the plant is less efficient and productive than it could be. In addition to the negative impact of compromised quality, lower throughput and increased raw material use, the position energy required for the control is wasted. In most cases, poorly-configured controls cause greater variability in the process variables (to the point of frequent oscillations) and excessive actuator activity as a result. Expensive energy is required for this unnecessary actuator output. If the control were better, this energy could be saved and production improved at the same time. The potential for cost savings is significant as the position energy is mainly provided in the form of electricity, heat or compressed air.

Source: ABB

Potential for savings

- For example, in the chemical industry, the savings for the heating control in a distillation column can be 6 MWh annually.
- Further savings can be made if the control valves are correctly regulated. Approx. 75 euro of compressed air can be saved per year and valve for example. The potential savings are significant if you consider that hundreds and thousands of valves are typically used in a plant.
- However, the greatest energy savings are gained from the improved product quality, the reduced quantity of charge materials required and the longer operating life of the plant's assets. This easily creates savings of several hundred thousand euro annually.

The quality of the control influences performance of the entire plant



Compressor

Image, left: Pneumatic drive of a pump limit control valve

3.2 Compressor bypass control

Industry: chemical, petrochemical and metal industries

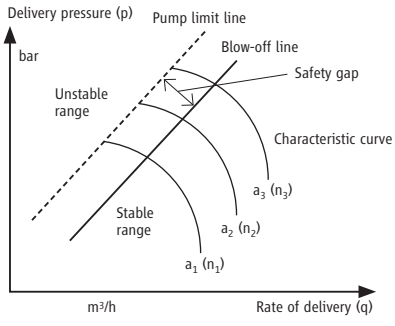
Compressors are essential in many industries for compressing process gases, e.g. refineries, chemical plants and metallurgical plants. A reduction in the flow rate causes flow reversal in the compressor's impellers. This „surge" can destroy the machine and result in major costs. Bypass valves guide part of the compressed gas to the suction side of the compressor to prevent „surging". Part of the compression energy is unavoidably destroyed in the process.

In conventional devices, an adequate gap must be maintained to the pump limit line to ensure that no damage is caused to the machine in any circumstances.

Source: Samson

An improved control strategy using speed-optimized bypass valves makes it possible to move closer to the compressor's „pump limit", thus saving on valuable energy.

Typical characteristic diagram of a turbocompressor



Potential for savings

- Reduction of energy costs for the operation of process gas compressors.
- If you take a medium-side compressor with an output of 600 kW, up to 150,000 kWh/year can be saved with a mere 3% improvement in control quality.
- Machine downtime can be avoided as well as the high maintenance and subsequent costs associated with it if process reliability is increased.

4. Process information

4.1 Energy recovery in a terminal with laser gas analysis system

Industry: oil and gas industry, petrochemical industry

There are two disadvantages associated with the continuous loading and unloading of tankers in modern loading and storage terminals, e.g. Kiire, where Japan's strategic oil reserves are stored. The first of these disadvantages is that foul-smelling and polluting carburet hydrogen occurs and leaks, the second is that valuable and energy-rich raw materials also escape. Therefore, a system to recycle tanker gases improves both environmental protection and productivity at the same time. As a measure to ensure plant safety, several laser sensors are integrated in the process and reliably monitor this recycling system in real time for critical, explosive oxygen limit values. The measuring principle is based on the specific light absorption of oxygen molecules, whereby a laser serves as the source of light for measurement. The laser gas analysis systems have an extremely short reaction time so that, if the oxygen content in the process exceeds the permitted limit value, the required quantity of nitrogen is introduced immediately. This pushes the oxygen concentration below the limit value once more, to a level where the risk of explosion can definitely be ruled out.

Potential for savings

- The installation of 12 gas analyzers in total in Kiire ensures comprehensive explosion-proof monitoring of the oxygen, which optimizes nitrogen consumption at the same time. With recycling plant safety monitored in this way, the plant reduces the level of air pollution (odors) for residents and recovers volatile hydrocarbons with an energy equivalent of 17 million liters of crude oil per year.
- Savings amount to approx. 4 million euro per year (value of the recovered 17 million liters of crude oil)

Redundant in-situ oxygen measurement with laser analyzers

Source: Siemens

4.2 Optimization of sludge activation in sewage treatment

Industry: water/wastewater

Modern management of sewage treatment plants aims to ensure compliance with the purification rates stipulated by law (limit values) while optimizing energy utilization. Approx. 60% of the electrical energy needed in a sewage treatment plant is used to operate aeration basins, where bacteria that break down the wastewater are aerated.

In addition to oxygen measurement, the ion-selective measurement of ammonium and nitrate is central to energy-efficient operation.

Source: Endress+Hauser

Once the measuring probes have been installed, the aeration control system is configured, offering the plant operator a number of advantages:

Steinen sewage treatment plant

Potential for savings

- Reduction in the average oxygen concentration in the sludge activation process and thus an 8-15% reduction in specific electricity consumption.
- Up to 20% reduction in wastewater charges thanks to better discharge values (cost savings).
- Enhanced operational safety.

4.3 Optimum use of energy through energy monitoring

Industry: entire process-engineering industry

If energy costs are to be cut permanently, the main energy users, e.g. electricity, gas, steam and compressed air, must be measured and monitored continuously. Successful reductions are saved, documented and developed. This is achieved by simultaneously recording the measured values in real time and analyzing energy use, as well as monitoring the measured values by alerting when deviations to target values occur.

In the case of complex tasks, potential energy savings can only be harnessed with the aid of accurate measurement and analysis of electricity consumption, load profiles, temperatures and flow rates.

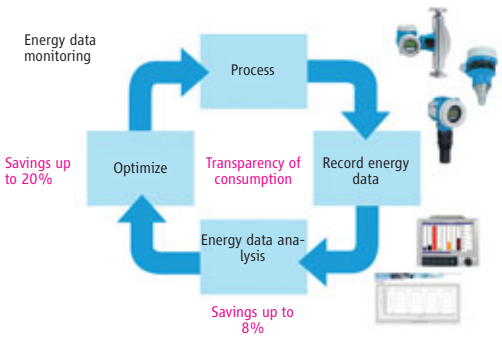
In order to meet future challenges in energy procurement, an energy management system should have a modular design to accommodate political requirements and any developments in procurement management on the energy markets. The topics that fall under this are „a certifiable energy management system“, forecast-based purchase of energy and portfolio management.

Source: Endress+Hauser/ABB

Potential for savings

- The advantages are that energy data is available centrally and all medium and energy flows are transparent.
- Supply guaranteed through permanent monitoring of measuring operations and process variables.
- Potential energy savings arising from an increased awareness alone are approx. 8%.
- A further 20% energy savings can be achieved through analysis and the controls and optimization measures derived from analysis.

Energy monitoring provides transparency on consumption



5. Process configuration

5.1 Optimum control of pulp refiners

Industry: pulp industry

Thermomechanical pulp refiners use up large quantities of energy in pulp mills. Wood chips mixed with water are ground to wood fibers between rotating refining disks producing large amounts of steam. The refiners are operated by motors, which can reach an output of more than 100 MW.

It is possible to improve control of the pulp quality significantly using a special measurement method that measures the temperature directly in the refining gap of the refiner. The quality is controlled via temperature distribution and not indirectly by means of the current consumption of the motor that drives the refiner, which has been the standard approach until now. The energy required to produce pulp can be drastically reduced using this direct method. Considerable savings have already been made in the Hallsta paper mill (part of Holmen Paper) in Sweden thanks to this technology:

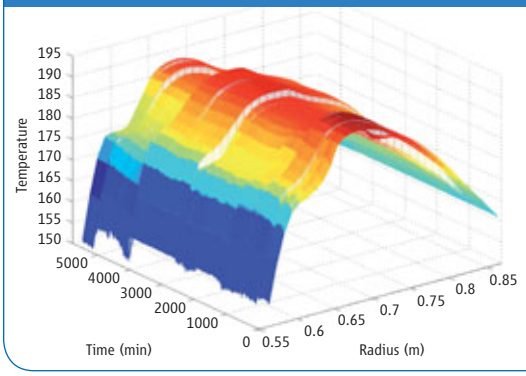
Potential for savings

- Reduction of specific energy consumption by approx. 50 kWh per tonne of pulp produced. This is approx. 5 % of the specific electricity requirement in the pulp industry.
- This equals overall savings of up to 20 GWh per factory per year, i.e. approx. 20,000 tonnes of CO_2 annually.

Refining disk

Source: ABB

Temperature profile in refining gap



5.2 Air quantity control with frequency converter

Industry: entire process-engineering industry

It is worthwhile to use an energy-saving motor and a specific method to control the air quantity in the flue gas filtering area of aluminum melting furnaces. Until now, a mechanical throttle valve was used to control the air quantity. The motor ran with a high output at a constant speed against the resistance of the throttle valve.

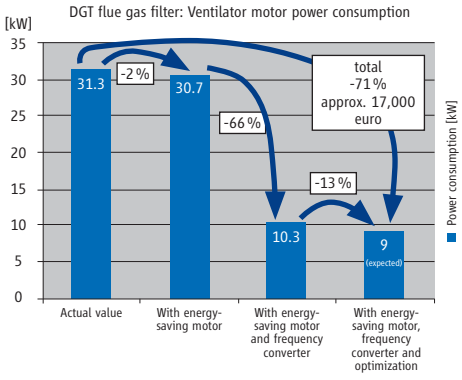
Firstly, the electric motor used to-date, with a nominal capacity of 45 kW, is replaced by an energy-saving motor. The motor is then fitted with a frequency converter. This enables control of the motor speed and thus the air quantity. The throttle valve is not necessary as the speed is controlled with the converter. The motor only needs the energy quantity required at any given time. A drive motor with a capacity of 15 kW is perfectly adequate thanks to the new form of air quantity control using a frequency converter.

Source: Siemens

Potential for savings

- Changing to a high-efficiency energy-saving motor can reduce energy consumption by 2–4 %.
- The change of control concept from throttle valve to speed control with a frequency converter results in 50–70% energy savings.
- Air cleaning can operate at partial load.
- Maximum ventilation output is generally required for melting the aluminum. However, the air quantity can be significantly reduced in the holding phases during continuous production and at the weekends. Energy consumption can be reduced by a further 13 % if this is taken into consideration for control of the air quantity.

Energy savings at the flue gas filter



6. Process management

6.1 Process optimization in the cement industry

Industry: cement industry

Cement production is one of the most energy-intensive of all industries. This is mainly due to the rotary kilns, where the ground raw materials are burnt at 1,450 degrees to make bricks. The only way to run the complex chemical reactions efficiently, particularly in the rotary kilns, is through the use of modern analytical instrumentation and sophisticated model-based online optimization. Modern gas analyzers provide model predictive multivariable control through the continuous measurement of O_2, CO, CO_2, NO and SO_2. This calculates set points for the rotary kiln so that energy use is minimized and the required product quality achieved at the same time.

Source: ABB

Potential for savings

- To date, this approach has made it possible to optimize combustion in more than 200 rotary kilns globally thus saving a total of over 20 million tonnes of CO_2.
- Savings are made on the same scale in other areas of cement production through the use of model-based optimization (e.g. the grinding process). In the entire area of cement production, the potential for savings in electrical energy alone is approx. 3–5% with the planned optimization. Similar savings are made in fuels and emissions.

Cement factory

6.2 Optimum boiler startup in a power plant

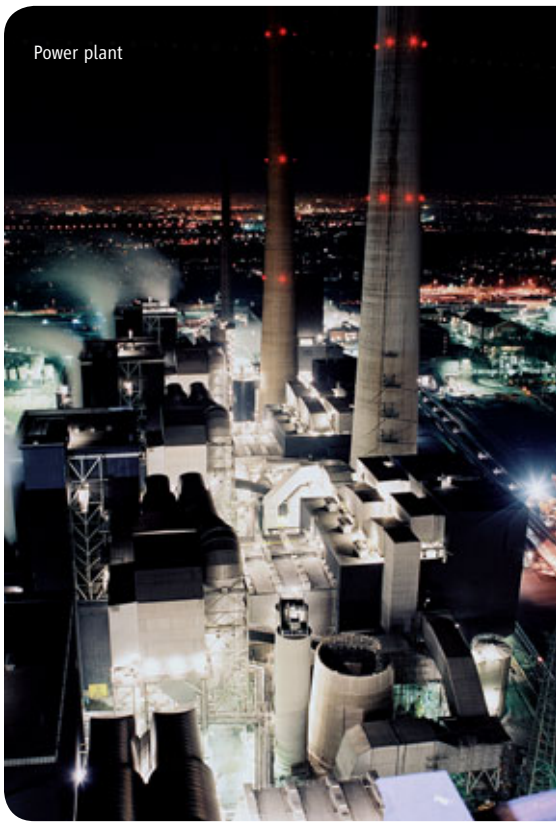
Industry: power plant industry

A large number of steam power plants are used today to reliably meet electricity requirements based on load forecasts. The necessary boiler startup process is energy-intensive and must satisfy time, energy use and thermal stress requirements all at the same time. This complex problem can be solved online using a new, efficient mathematical method of optimization (software) to calculate the startup profile so that savings of up to 20% can be made. The boiler is protected at the same time and emissions significantly reduced.

Source: ABB

Potential for savings

- Energy savings of 10–20% per startup for up to 150 boiler startups per power plant per year.
- Annual savings of 200–2,500 tonnes of CO_2 – this is the same as approx. 1,000 medium-sized vehicles per year.
- Significant reduction of nitrogen oxides (NO, NO_2) also.
- A secondary effect of monitoring the thermal stress is that the boiler operating life is prolonged.



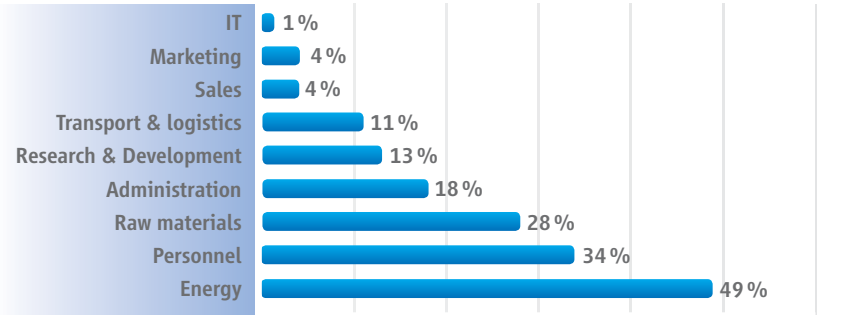
Typical operating screen for optimizing boiler startup

III Need for action

The discussion surrounding environmental policy and the constant risk of rising energy prices are currently stimulating the demand for energy-efficient automation solutions. However, this does not go far enough to increase the significant savings potential in the installed base within the timeframe required by environmental policy. In addition to the joint efforts of ZVEI and the manufacturers, to explain the issues and provide information, accompanying measures from the policy-makers would be welcome. The following steps could serve to accelerate progress in this area:

- Political programs to promote energy consulting must also include manufacturers of intelligent automation solutions.
- Include the subject of energy efficiency in the educational programs of schools, technical colleges and universities.
- Consider plant life-cycle costs in requests for quotes and proposals, particularly in the area of public procurement.
- Incentive schemes for energy efficiency analyses in companies, particularly for on-site measurement of energy consumption and investments in energy saving. This also includes improved conditions for writing off the cost of implementing energy-efficient solutions.
- Assign a higher priority to energy efficiency in policy-making: combine Germany's energy and climate policy in one ministry.
- Assign a higher priority to energy efficiency in companies: afford it the same importance as occupational safety and environmental protection. Create a position for an energy-efficiency officer in every company.

What areas will your company focus on to decrease costs in the next 12 months?



Source: CHEMonitor, CHEManager 2/2009 (page 4), GIT Verlag (Publishers)

Industries using energy have already recognized the potential for cost savings that energy offers. This fact was clearly shown, for example, by a CHEManager survey carried out in partnership with Droege & Comp. consultants among decision-makers from Germany's chemical industry. Companies have made significant progress in this area in recent years. However, the potential still waiting to be discovered and harnessed is vast.

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The ‚ZVEI - Zentralverband Elektrotechnik- und Elektronikindustrie e.V.', the German Electrical and Electronic Manufacturers' Association, represents the economic, technological and environmental policy interests of the German electrical and electronics industry at the national, European and international levels. It provides specific information about the economic, technical and regulatory framework conditions of the electrical industry in Germany. The ZVEI promotes the development and use of innovative technologies by proposals concerning research, technological, environmental protection, educational and scientific policy. It supports market-orientated European and international standards-making activities.

The ZVEI is a member of the Federation of German industry (BDI), the umbrella organization representing the interest of the German industry in dealing with parliament, government and opposition, the political parties, trade unions and other social groups, the bodies of the European Union and other national and international institutions. The BDI is a member of Businesseurope, which represents the common interests of European Industry in dealings with the agencies of the European Union. It belongs to the Business and Industry Advisory Committee (BIAC), the official advisory body of the OECD. The specific interests of the electrical and electronics industry at the European level are represented by Orgalime, the European Engineering Industries Association with 35 Member organisations in 23 European countries.